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VIRTUAL EVENT

5th Edition of

ADVANCED CHEMISTRY WORLD CONGRESS

March 25-26, 2024

ADV. CHEMISTRY 2024

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PROGRAM-AT-A-GLANCE >>

YOUR FIRST CHOICE FOR RESEARCH INGENUITY

ADV. CHEMISTRY 2024

DAY 1
MARCH 25, 2024

Scientific Program

GMT - Greenwich Mean Time (UK Time)

08:15-08:30	**Opening Ceremony**

Topics: Analytical Chemistry | Agricultural Chemistry| Electrochemistry | Food Chemistry | Organic Chemistry | Medicinal Chemistry | Green Chemistry | Photo-Chemistry and Clean Energy | Physical Chemistry | Polymer Chemistry and Technology | Radiochemistry | Environmental Chemistry | Industrial Chemistry | Green Chemistry | Molecular Biology | Biochemistry | Packaging and Packing Materials | Waste Recycling and Management

Distinguished Speaker Talks

08:30-08:50	**Title: Aims and challenges of an algebraic molecular orbital theory** **Jun Yasui,** *Kwansei Gakuin University, Japan*
08:50-09:10	**Title: Design of anisotropic phospholipid self-assembly for drug delivery system** **Noriyuki Uchida,** *Tokyo University of Agriculture and Technology, Japan*
09:10-09:30	**Title: Accurate determination of boron in silicate samples using an improved boron–mannitol complex digestion method by ICP-MS** **Xijuan Tan,** *Chang'an University, China*
09:30-09:50	**Title: Analytical effect of stabilizer volume and shape on zircon U–Pb dating by nanosecond LA-ICP-QMS** **Dongyang Xiong,** *Chang'an University, China*
09:50-10:10	**Title: Nontargeted data analysis strategy in forensic discrimination of gasoline based on GC-MS data and classification and regression tree (CART)** **Lee Loong Chuen,** *Universiti Kebangsaan Malaysia, Malaysia*
10:10-10:30	**Title: Oxygen mobility in doped first-order Ruddlesden – Popper phases** **Vladislav Alexandrovich Sadykov,** *Federal Reseatch Center Boreskov Institute of Catalysis SB RAS, Russia*
10:30-10:50	**Title: Improvement of fatty acid based nutritional quality of fish during frying using artificial intelligence** **Jitamanyu Chakrabarty,** *National Institute of Technology Durgapur, India*

Refreshment Break 10:50-11:05

11:05-11:25	**Title: A coupling approach of phyto-electro remediation for removal of heavy metals from sewage sludge by *Spinacia oleracea L*** **Srinivas Namuduri,** *GITAM (Deemed to be University), India*
11:25-11:45	**Title: Emerging roles of noncoding RNAs in breast cancer development** **Nida Jamil Khan,** *Jamia Millia Islamia University, India*
11:45- 12:05	**Title: Intermediate syndrome due to organophosphate poisoning: A case report** **Shubhangi Setia,** *Jawaharlal Nehru Medical College, Datta Meghe Institute of Higher Education and Research, India*
12:05-12:25	**Title: Interactions between dopamine metabolites and α-synuclein in causing Parkinson's disease** **Sivakumar Palanisamy,** *Excel Engineering College, India*
12:25-12:55	**Title: Features of phase, isotopic equilibrium and multiplication of a single stage separation factor during the concentration of boron-10 isotope by chemical exchange with using of boric acid** **Aleksey Vladimirovich Khoroshilov & Penkin Pavel Vladimirovich,** *Mendeleev Russian University of Chemical Technology, Russia*
12:55-13:15	**Title: Synthesis of chitosan derivative as an enterosorbent for sorption of heavy metal ions** **Sevda Fatullayeva,** *Catalysis and Inorganic Chemistry Institute of Ministry of Science and Education of the Republic of Azerbaijan, Azerbaijan*

Lunch Break 13:15-13:50

13:50-14:10	**Title: Green synthesis based on 3-chloro-6-hydrazinylpyridazine under the action of microwave (MW) and ultrasonic (US) irradiation** **Yana Gharibyan,** *Armenian National Agrarian University, Armenia*
14:10-14:30	**Title: Electron–beam radiation effects in the multilayer structures grown by periodical deposition of Si and CaF_2 on Si (111)** **Anatoly Dvurechenskii,** *Novosibirsk state university, Russia*
14:30-14:50	**Title: The antioxidant activity of betanin protects MRC-5 cells against cadmium induced toxicity** **Fatemeh Rajabian,** *Mashhad University of Medical Sciences, Iran*

14:50-15:10	**Title: Properties of metals and metal alloys powders for 3D printers** **Oleksandr Radchenko,** *Frantsevich Institute for problems of material Science NAS of Ukraine, Ukraine*
15:10-15:30	**Title: Dextrose can increase such as decrease the range of TMJ movement** **Mai Ahmed Haggag,** *Mansoura University, Egypt*

Refreshment Break 15:30-15:45

15:45-16:05	**Title: Establishing an understanding of polyethylene glycol as a green solvent** **Markus Manfred Hoffmann,** *State University of New York, USA*
16:05-16:25	**Title: Using crushed stone fines as a precursor for the synthesis of zeolites Na-X, Na-A, CAN, MER, and ANA** **Hugo Martín Galindo Valbuena,** *Universidad Nacional de Colombia, Colombia*
16:25-16:45	**Title: Advances in laser processed material of soft sensing and soft actuation** **Yun Ling,** *Duke University, USA*
16:45-17:05	**Title: MDH CURES community: A supportive network to increase student retention and learning** **Joseph Provost,** *University of San Diego, USA*
17:05-17:25	**Title: Novel concepts based on quantization effects in semiconductor nanostructures and via molecular singlet fission for ultra-high solar photon conversion efficiency of sunlight into photovoltaics and solar fuels** **Arthur J. Nozik,** *University of Colorado and National Renewable Energy Laboratory (NREL), USA*

Closing Remarks

End of Day 1

DAY 2

MARCH 26, 2024

Scientific Program

GMT - Greenwich Mean Time (UK Time)

08:15-08:30	**Introduction**

Topics: Analytical Chemistry | Agricultural Chemistry| Electrochemistry | Food Chemistry | Organic Chemistry | Medicinal Chemistry | Green Chemistry | Photo-Chemistry and Clean Energy | Physical Chemistry | Polymer Chemistry and Technology | Radiochemistry | Environmental Chemistry | Industrial Chemistry | Green Chemistry | Molecular Biology | Biochemistry | Packaging and Packing Materials | Waste Recycling and Management

Distinguished Speaker Talks

08:30-08:50	**Title: Advances in materials development for material extrusion (MEX) based additive manufacturing** **Caroline Sunyong Lee,** *Hanyang University, Republic of Korea*
08:50-09:10	**Title: Excellent ammonia sorption enabled by metal-organic framework nanocomposites for seasonal thermal battery** **Li-Wei Wang,** *Shanghai Jiao Tong University, China*
09:10-09:30	**Title: Effects of argon/nitrogen sputtering gas on the microstructural, crystallographic and piezoelectric properties of AlN thin films** **Rhonira Latif,** *Universiti Kebangsaan Malaysia, Malaysia*
09:30-09:50	**Title: Iridium oxide and cobalt hydroxide microfluidic-based potentiometric pH sensor** **Qiuchen Dong,** *Xi’an Jiaotong-Liverpool University, China*
09:50-10:10	**Title: The use of biomass for fuel optimization of coal-fired power plants** **Tri Nguyen,** *Power Engineering Consulting Company 2 (PECC2), Vietnam*
10:10-10:30	**Title: Synthesis of gold nanoparticles in ecofriendly approach and its colorimetric detection of Cd^{2+} ions in real samples analysis** **Manjushree Bhattacharyya,** *Vidyasagar University, India*

10:30-10:50	**Title: Optimization of vitamin B12nano-emulsification and encapsulation using spontaneous emulsification** **Shabnam Karbalaei Saleh,** *Islamic Azad University, Iran*

Refreshment Break 10:50-11:05

11:05-11:25	**Title: Synthesis of a new camptothecin analogue useful for enhanced topoisomerase 1 inhibition activity** **Shraddha Upadhyay,** *Swami Vivekanand Subharti University, India*
11:25-11:45	**Title: Incorporation of Ag-doped ZnO nanorod through graphite hybridization: Effective approach for degradation of ciprofloxacin** **Tanu Shree Roy,** *Bangladesh University of Textiles, Bangladesh*
11:45- 12:05	**Title: Analysis and optimization of plant layout using computerized algorithms for relative allocation of facilities** **Vijay kumar. M,** *JSS Academy of Technical Education, India*
12:05-12:25	**Title: Process intensification by spherical crystallization** **Jyothi Thati,** *Osmania University, India*
12:25-12:45	**Title: First-principle investigations of structural, electronic, optical and mechanical properties of inorganic halide perovskite $KAgR_3$ (R = Cl and F) materials for water splitting degradation applications** **Waqar Azeem,** *Rabdan Academy, United Arab Emirates*
12:45-13:05	**Title: Spectroscopy of cocaine and its isomers** **Safa Ben Amara,** *Universit´e de Tunis El Manar Facult´e des Sciences de Tunis, Tunisia*

Lunch Break 13:05-13:40

13:40-14:00	**Title: Prospects for hydrogen fuel cell vehicles to decarbonize road transport** **Mehmet Dogan Ucok,** *Sabanci University, Turkey*
14:00-14:20	**Title: Study of the influence of *Pseudomonas aeruginosa* on α brass and (α + β) brass behavior against corrosion in drinking water** **El Mestari Meryem,** *Ibn Tofail University, Morocco*

14:20-14:40	**Title: The dynamic pseudo-equilibrium moisture content, a new property of materials when they are drying, the practical limit for the thin layer drying kinetics** **Alexis Faneite Noguera,** *University of Zulia, Venezuela*
14:40-15:00	**Title: Unraveling the effects of NADH on experimental diabetes in murine model and its implications in beta cells survival** **Benachour Karine,** *Laboratory of Experimental Biology and Pharmacology, Algeria*
15:00-15:20	**Title: Novel 4th generation TKI targeting T790M resistance mutation in EGFR: Exploring its binding dynamics by a combined in silico/experimental approach** **Minnelli Cristina,** *Polytechnic University of Marche, Italy*
15:20-15:40	**Title: Metal complexes for quantum energy technologies at room temperature** **Clebson Cruz,** *Federal University of Western Bahia, Brazil*

Refreshment Break 15:40-15:55

15:55-16:15	**Title: Exploring the interior of the hunga tonga hunga ha'apai submarine volcano** **Román Alvarez,** *Universidad Nacional Autónoma de México, Mexico*
16:15-16:35	**Title: Low-temperature synthesis of ZnO nanorods and their performance as H_2S gas sensor** **Claudio Martínez-Pacheco** & **Laura Lorena Díaz-Flores,** *Juárez Autonomous University of Tabasco, Mexico*
16:35-16:55	**Title: Emerging pollutants in coastal environments: The beaches of Acapulco** **Amado Enrique Navarro Frómeta,** *Universidad Tecnológica de Izúcar de Matamoros, Mexico*

Closing Remarks

End of the Conference

PEERS ALLEY MEDIA

DISTINGUISHED SPEAKER TALKS

DAY 1

5th Edition of

ADVANCED CHEMISTRY WORLD CONGRESS

March 25-26, 2024

Aims and challenges of an algebraic molecular orbital theory

Jun Yasui

Department of Chemistry, School of Science and Technology, Kwansei Gakuin University, Japan

Chemistry is a science that deals with all-natural phenomena involving materials over an extremely wide range of time and space, from micro to macro scales. Although chemical phenomena may be complex, there is no doubt that their foundation lies in quantum mechanics and statistical mechanics. It will soon be 100 years since the birth of quantum mechanics, and even today, when high-speed computers are in use, elucidating and predicting chemical phenomena is not easy at all. The speaker, who believes that theoretical chemistry needs to construct a new paradigm as an integrated science based on quantum mechanics, optimization theory, computational algebra, and computer science, is going to start by defining algebraic molecular orbital theory. This talk will discuss its aims and challenges, but only one of them will be briefly presented here.

The study of chemistry can be categorized into two fields, electromagnetic properties of molecules and chemical reaction. The quantum mechanics of molecules is complicated because the nuclei and electrons that make up a molecule differ by one or two orders of magnitude in charge ratio, while they differ by more than three orders of magnitude in mass ratio. This origin of complexity is manifested in the spectra of nuclei and electrons. Many parameters are required to elucidate a phenomenon. Depending on the purpose of the study, modeling that does not compromise its essence is absolutely necessary. Since the essence of the phenomenon is not obvious from the beginning, it is difficult to find an appropriate model for the purpose while considering what is the essence and how far it can be approximated. One can imagine that a method based on numerical calculations would be inadequate for such modeling. Here lies the need to treat parameters as symbols rather than numerical values, and to introduce polynomial algebra to define the molecular orbital equation.

Biography

The speaker finished his Ph.D. in Chemistry at Kyoto University in 1981, and he has been conducting molecular orbital research as a researcher at the university for several years. After that he was engaged in spectral analysis, molecular design, and electronic property analysis related to the development of chemical, semiconductor, and other materials from both experimental and theoretical perspectives at a polymer manufacturer and a precision machinery manufacturer manufacturer over 30 years, and received his degree from Shinshu University for these studies. Through those experiences, he became acutely aware of the limitations of conventional electronic structure theory in addressing issues in materials development, which led him to the need for an algebraic method. Since his retirement, he has been conducting the study of theoretical chemistry.

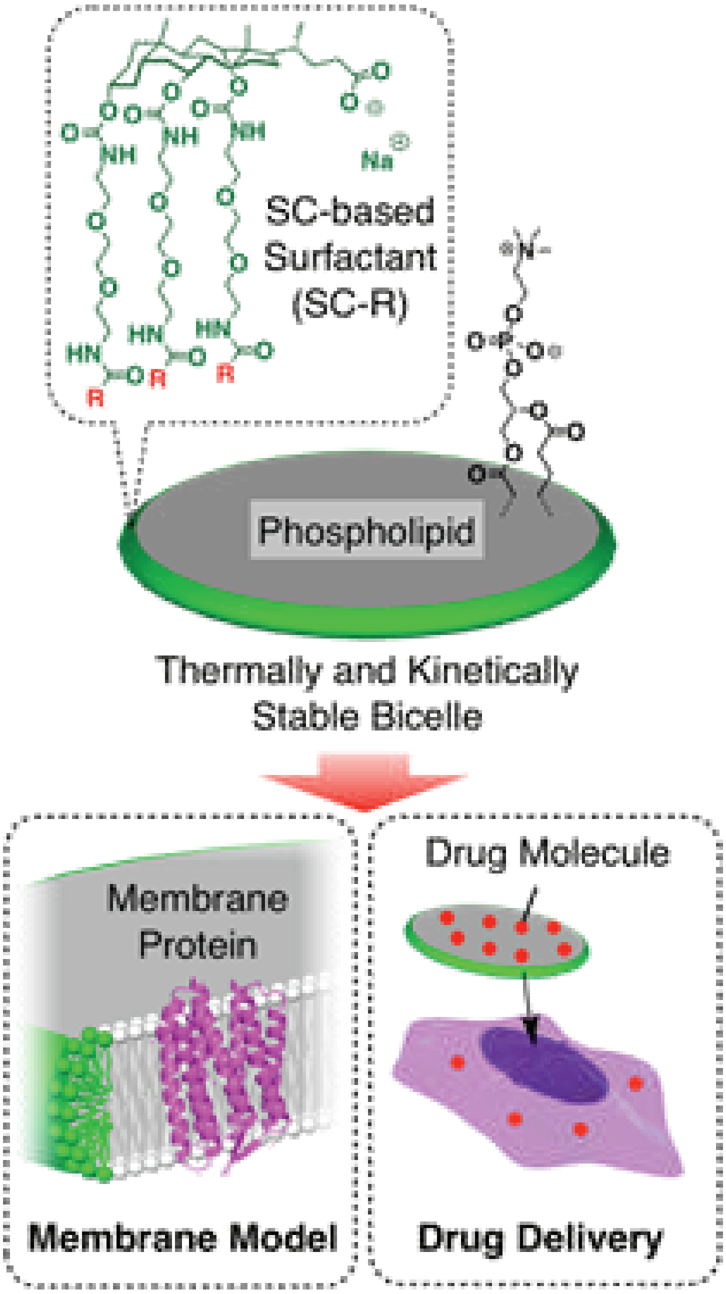
Design of anisotropic phospholipid self-assembly for drug delivery system

Noriyuki. Uchida

Tokyo University of Agriculture and Technology, Japan

Bicelles are aqueous lipid–surfactant assemblies in which lipid bilayer fragments are edge-stabilized by certain surfactants. Because bicelles adopt morphologies that are intermediate between those of lipid vesicles and lipid–surfactant mixed micelles, they form a new class of phospholipid-based materials. So far, bicelles have been applied to bio membrane models, NMR alignment media, and drug delivery carriers. However, applications of conventional bicelles have been limited owing to insufficient stability toward temperature, concentration, pH, etc.

We have developed a series of sodium cholate (SC)-based surfactants allowing for the preparations of kinetically and thermally stable bicelles in view of applications to membrane models or drug delivery carriers (Figure). First of all, we synthesized SC modified with three triethylene glycol chains endcapped with polymerizable units (SC-M) and prepared bicelles by mixing SC-M with DMPC lipid. After crosslinking of SC-M, the bicelle became kinetically and thermally stable. We next utilized SC endcapped with butoxy groups (SC-OC4) instead of SC-M. As a result, we could prepared thermally stable SC-OC4/DMPC bicelles without the complicated polymerization process. Recently, we successfully prepared a bicelle with kinetic stability, dilution tolerance and size tunability by mixing SC endcapped with hexyl chains (SC-C5) and DPPC lipid with a bilayer melting point higher than room temperature. Because the features of the SC-C5/DPPC bicelle are desirable for drug delivery carriers, we utilized SC-C5/DPPC bicelle for a drug delivery application.



Biography

Dr. Noriyuki Uchida is currently working on development of phospholipid-based functional materials at Tokyo University of Agriculture and Technology. He received his PhD from the University of Tokyo under Prof. Aida. After that he worked at RIKEN. He joined Tokyo University of Agriculture and Technology as an assistant professor in 2020. His research interest is design of functional materials based on self-assembly of biomolecules such as phospholipids and proteins, and their application to biomaterials. He has received several awards including the Prize of the Japan Association for Chemical Innovation.

Accurate determination of boron in silicate samples using an improved boron–mannitol complex digestion method by ICP-MS

Xijuan Tan and **Ruili Zhou**

College of Earth Sciences and Land Resources, Chang'an University, China

Objective: Boron contents vary among different silicate rocks, making this element remarkably useful as a geochemical tracer in associated geological activities. To determine boron in silicate samples, it is necessary to release boron from the silicate structure. HF and HCl are commonly utilized for silicate structure decomposition. However, the high volatility in forms of BF_3 and BCl_3 with respective boiling points of −100 and 12.5°C leads to boron loss even at room temperature. This causes poor recovery of boron, making accurate quantification of boron challenging in geochemical studies. This work aimed to propose a reliable digestion approach for accurate boron determination in rock samples by ICP-MS.

Method: Based on a complex formation of boron with mannitol, 50 mg of silicate sample was effectively decomposed by a ternary mixture of 50 μL of mannitol (2% wt.), 0.6 mL of concentrated HF and 30 μL of concentrated HNO_3 after being heated overnight. Following fluoride formation prevention by 8% HNO_3 (wt.) and fluoride decomposition using 6% HCl (wt.), the samples were fluxed in 2.0 mL of 40% HNO_3 (wt.) for 4 h and aged overnight. By diluting 1000-fold using 2% HNO_3 (wt.) solution, the samples were directly quantified by an ICP-MS.

Results: The determination results showed that boron recoveries of the standard materials including diabase W-2, basalt JB-2a, and rhyolite JR-2 were in the range of 95.5%–105.5% (n = 5). For this proposed method, it was found that the contents of boron had no obvious difference under digestion temperatures of 65, 100, and 140°C. It was also found that the ICP-MS quantification accuracy deteriorated at the mass of ^{11}B when boron content was about 7250 ng yielding positive bias with average recoveries of 115.5%–119.8% (n = 5), while the determination results remained unaffected at the mass of ^{10}B (Table 1).

Table 1 Boron determination results with boron–mannitol complex digestion methods.

Sample	^{10}B			^{11}B		
	Content [1] μg/g	2σ	Recovery [2] %	Content μg/g	2σ	Recovery %
W-2_1	12.39	0.21	99.1	12.48	0.09	99.9
W-2_2	13.01	0.14	104.1	12.95	0.06	103.6
W-2_3	13.28	0.17	106.3	13.27	0.07	106.1
JB-2a_1	29.94	0.28	99.9	29.58	0.24	98.7
JB-2a_2	30.08	0.21	100.3	29.75	0.20	99.2
JB-2a_3	29.95	0.25	99.9	29.82	0.15	99.5
JR-2_1	143.6	1.1	99.1	167.4	2.5	115.5
JR-2_2	145.6	1.3	100.4	172.5	1.8	118.9
JR-2_3	148.9	1.0	102.7	173.8	1.1	119.8

[1]Result was the average of five individual measurements and given as 95% confidential intervals.

[2]Recovery was calculated using the form of $(\text{Boron}_{\text{masured}}/\text{Boron}_{\text{referred}}) \times 100\%$.

Conclusion: With this developed boron–mannitol complex digestion method, the boron concentration in the studied silicate standard materials were accurately determined. This in-depth method investigation for silicate boron determination demonstrates the feasibility of this boron–mannitol complex strategy under a wide digestion temperature of 65–140°C, sheding light on the extensive applications of boron as a geological tracer.

Biography

Dr. Xijuan Tan is an associate professor in Chang'an University, China. Dr. Tan did her Ph. D in Chemibiology at College of Chemistry & Materials Science, Northwest University, China. In September 2018, she joined the group of Prof. Dr. Detlef Günther at ETH Zurich and started her one-year post-doc on element composition and lithium isotope study of spodumene by LA-(MC)-ICP-MS. Her research interests are trace element characterizations of different samples from geological science (rocks, sediments, minerals, clays, etc.) to biological materials (human hair, garlic bulbs, etc.) by ICP-MS and LA-ICP-MS.

Analytical effect of stabilizer volume and shape on zircon U–Pb dating by nanosecond LA-ICP-QMS

Dongyang Xiong and **Xijuan Tan**

College of Earth Sciences and Land Resources, Chang'an University, China

Objective: Zircon U-Pb dating is a standard U-Th-Pb system providing accurate and robust geochronological information for both magmatic and metamorphic events. LA-ICP-QMS is favoured in zircon U-Pb dating analysis. However, uncertainty control for zircon U–Pb dating analysis by LA-ICP-QMS remains challengeable. Among multiple sources affecting quantification uncertainties of LA-ICP-QMS analysis, aliasing (or spectral skew) leading to oscillations in the transient signals can cause significant bias for obtained results. To minimize transient signal oscillations, stabilizers are highly suggested to be installed downstream the LA cell. Currently, there has been no analytical influence study of both stabilizer volume and shape on zircon U–Pb dating by LA-ICP-QMS. This work aimed to investigate the effect of stabilizer volume and shape on zircon U-Pb dating, and accordingly suggest a suitable design of stabilizers for routine zircon U–Pb dating analysis by LA-ICP-QMS.

Method: By using zircon 91500 as the reference material for external calibration, the $^{206}Pb/^{238}U$ age of zircon Plešovice was determined by a nanosecond LA-ICP-QMS, where the stabilizer was placed after the ablation cell and sample aerosols. The effect of seven stabilizers with different shapes (cylinder, cubic, ball) and volumes within 14.1 ~ 125 mL on zircon U–Pb dating analysis was evaluated in terms of signal stabilization, signal rising/washout time and U–Pb dating accuracy.

Results: Transient signal oscillations were invisible and signal intensities were comparable using all stabilizers, while the signal rising time was 2.0-fold and washout time was 27.6-fold higher for the 125 mL stabilizer compared to the 21.2 mL stabilizer. The obtained average $^{206}Pb/^{238}U$ age of zircon Plešovice was 335.53±1.02, 361.73±5.04, 340.10±1.98 and 341.21±5.17 Ma (2σ, n≥5), respectively, giving average relative deviations of a single point of age (1σ) less than 2.0%. Among the corresponding $^{206}Pb/^{238}U$ ratios, it was found that the value (0.05343±0.87‰, 1σ, n=5) obtained using 21.2 mL of cylinder stabilizer highly agreed with that of 0.05384±0.74‰ (1σ, n=5) using the commercialized "squid" stabilizer. The analytical efficiency of the 21.2 mL of cylinder stabilizer was then compared to that of 18.5 mL cubic-shaped stabilizer and 14.1 mL ball-shaped stabilizer. Results showed no significant differences in the obtained $^{206}Pb/^{238}U$ ages using stabilizers with volumes ranging from 14.1 mL to 21.2 mL. We also studied the particle filter effect of the stabilizers by packing the 21.2 mL of cylinder stabilizer with 1.0 g of stainless wire. Despite the average $^{206}Pb/^{238}U$ age deviation was only −0.81%, spiky signals occasionally occurred which might be ascribed to the use of a ns-laser and relatively low density of stainless wire.

Conclusion: Our study showed that an empty cylinder-shaped stabilizer of 21.2 mL was preferred for producing smoothing signals. The improved analytical accuracy of zircon U–Pb dating using such a stabilizer ensured the future application to trace element analysis by LA-ICP-QMS.

Biography

Dongyang Xiong is a graduate student studying in the College of Earth Sciences and Land Resources, Chang'an University, China. Since fall in 2023, she has joined Dr. Tan's research group. She majors in geology, and her research interests mainly focus on geochemistry, in particular for the application of LA-ICP-MS to geological studies.

Nontargeted data analysis strategy in forensic discrimination of gasoline based on GC-MS data and classification and regression tree (CART)

Loong Chuen Lee, Md Gezani Md Ghazi and **Hukil Sino**

Universiti Kebangsaan Malaysia, Malaysia

Gas chromatography mass spectrometry (GC-MS) is the most established analytical instrument for profiling gasoline. In the context of forensic investigation, such profile can be applied to determine the source of the gasoline encountered at a crime scene. Recently, nontargeted data analysis is known to be more suitable than the targeted counterpart in accelerating the automation of data interpretation pipeline. This study aims to evaluate the advantages of nontargeted data analysis strategy coupled with the classification and regression tree (CART) algorithm in predicting brand of gasoline according to GC-MS data. A total of 114 total ion chromatograms (TICs) were prepared from 19 gasoline samples sold in Malaysia. The samples are sold under four different brand names: Petronas, Petron, Shell and Caltex. The obtained pixel-level TIC data was first carefully optimized *via* various data preprocessing (DP) strategies before modelling *via* classification and regression tree (CART). Results showed that an appropriate ensemble strategy is needed to improve the trivial inter-brand variation of the 114 TICs. The impact of the DP was further enhanced by considering only the most relevant retention time sub-window. In conclusion, nontargeted analysis of TIC data improved by suitable DP strategy within the right sub window can lead to perfect discrimination of gasoline sold under different brand names.

Biography

Loong Chuen Lee is a senior lecturer in the Faculty of Health Sciences, Universiti Kebangsaan Malaysia (UKM) and member of the Malaysian Institute of Chemistry (IKM). She obtained her Ph.D. degree in Applied Statistic at the UKM in 2019. Her research is focused on the applications of chemometric techniques in determining sources of forensic samples based on chemical instrumental techniques. Her current concerns are identification of sources of gasoline and soil samples for forensic investigation. In her curriculum she has over 35 publications in Scopus-indexed journals, 26 of them are WoS-indexed journals.

Virtual Event

5th Edition of

Advanced Chemistry World Congress

March 25-26, 2024

PEERS ALLEY MEDIA

Oxygen mobility in doped first-order Ruddlesden – Popper phases

V.A. Sadykov[1], **E.M. Sadovskaya**[1], **N.F. Eremeev**[1], **A.A. Kolchugin**[2], **E.A. Filonova**[2] and **E.Yu. Pikalova**[2,3]

[1]Federal Research Center Boreskov Institute of Catalysis SB RAS, Russia
[2]Institute of High Temperature Electrochemistry UB RAS, Russia
[3]Ural Federal University, Russia

Ruddlesden – Popper (RP) phases are important materials for solid oxide fuel cells/electrolyzers, oxygen separation membranes and other electrochemical devices due to their high oxygen mobility provided by a cooperative mechanism of oxygen migration involving both lattice and highly-mobile interstitial oxide anions. This work reviews authors' advances in studying the oxygen transport of doped $Ln_2NiO_{4+\delta}$ (Ln = La, Pr, Nd) by oxygen isotope exchange with $C^{18}O_2$ in the flow reactor.

According to the extended analysis performed by the authors, doping with alkaline earth metals (Ca, Sr, Ba) leads to a decrease in the oxygen diffusivity due to a decrease in the interstitial oxygen content and a larger size of dopant cations resulting in steric hindrances for the oxygen transport [1,2]. In some cases, it leads to the formation of slow diffusion channels with complicated pathways (Figure 1 (a)). With a decrease in the host Ln cation size, this effect becomes less pronounced. Doping $La_2NiO_{4+\delta}$ with other lanthanides (Nd, Sm, Gd, Eu, etc.) can slightly increase or decrease the oxygen mobility in dependence on the dopant radius (Figure 1 (b)) [1,3]. It has been found that the oxygen diffusivity can be also increased by doping with Cu due to the elongation of Ni/Cu–O bonds and anomalous grain growth during sintering. However, it can decrease due to decreasing the oxygen content at a high Cu content, and a non-monotonous dependence can also be observed [1,4]. The correlation of oxygen transport and electrochemical characteristics according to the Adler – Lane – Steele model has been demonstrated [1-4].

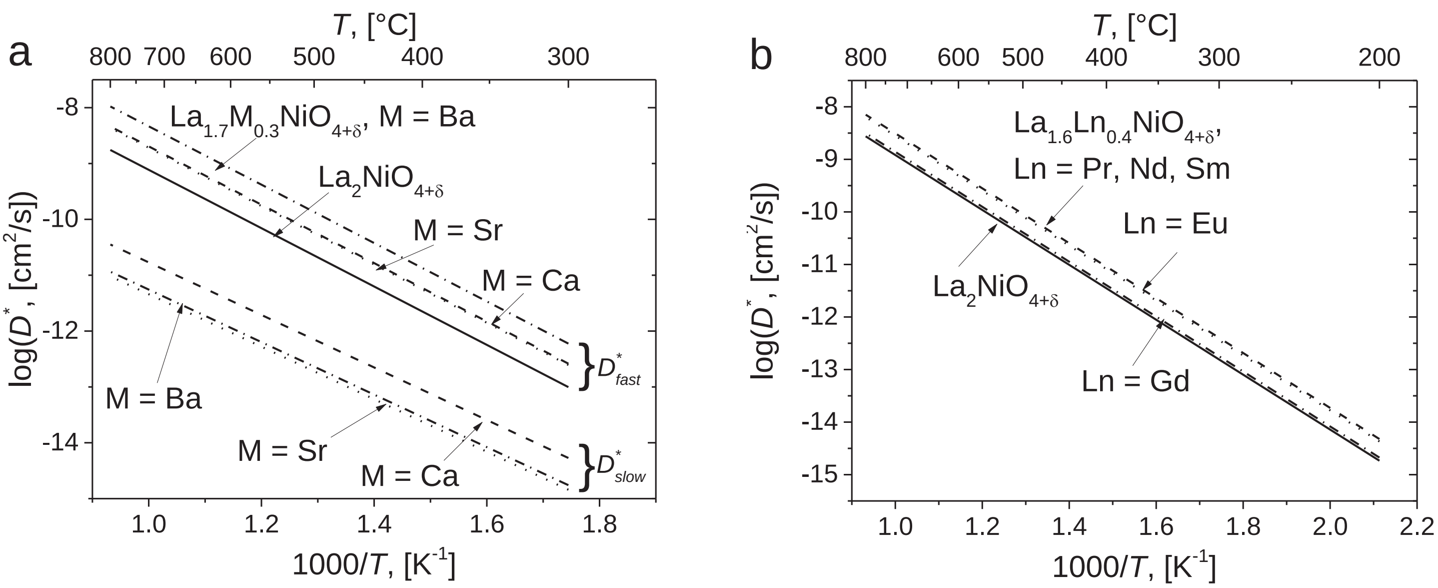


Figure 1. Arrhenius plots for alkaline earth metal (a) and lanthanide (b) doped $La_2NiO_{4+\delta}$.

Biography

Vladislav A. Sadykov is a professor, doctor of sciences, a huge specialist in heterogeneous catalysis, solid state chemistry, materials science, hydrogen energy, Laureate of the A.A. Balandin Prize and many other awards. He is the author of more than 550 works, more than 40 copyright certificates and patents. He is a member of Materials Research Society, Mendeleev Russian Chemical Society, the Academic Council of the Institute, dissertation councils. H-index 36.

He is in editorial boards of the journals Applied catalysis A: General; Membranes (MDPI), Energies (MDPI) and others. Participant of more than 700 conferences, symposia and congresses, enjoys a well-deserved reputation of the scientific community.

International Collaboration: Head of BIC team in 4 INTAS Projects, FP6 Projects SOFC 600 and MatSILC; FP7 Projects OCMOL, THEBARCODE, BIOGO FOR PRODUCTION and many others.

Improvement of fatty acid based nutritional quality of fish during frying using artificial intelligence

Jitamanyu Chakrabarty[2] and **Tithli Sadhu**[1]

[1]SR University, India
[2]National Institute of Technology Durgapur, India

Fish is an excellent human diet worldwide for its "essential" fatty acids (FA), including long-chain ω-3 polyunsaturated fatty acids (PUFA). Fish is usually consumed after different culinary processes to improve its palatability, digestibility, and sensory attributes. Amongst which frying with edible oil is an economical method used globally, but this detrimentally affects the nutritional quality. To circumvent this problem, in this series of works, the changes in fish fatty acids (FA) were analyzed. According to scientists, various nutritional quality indices (NQI) related to FA profile are essential for human. To improve the NQI, eight ANN algorithms were selected, among which Krill Herd (KH) and Symbiotic organism search (SOS) showed the most promising results. A hybrid robust process approach integrating the developed ANN model with eight selected single-objective optimization formalisms efficaciously optimized the unique cooking condition for improving all the NQI of fish after frying up to the recommended limit. To improve all the conflicting NQI simultaneously (i.e., to maximize the ω-3/ω-6, PUFA/SFA, cis/trans FA ratio and minimize the index of atherogenicity, IA value) ANN model with multi objective genetic algorithm (MOGA) was implemented. The optimized condition (temperature- 140.01° C, time- 7.62 min, oil amount- 47.87 ml/kg of fish) simultaneously improved the ω-3/ω-6 FA, PUFA/SFA, cis/trans FA ratio and IA value up to 74.44%, 4.39%, 100.58% and 82.98%, respectively than the conventional frying process. Minimal maximum relative error established the accuracy and reliability of the approach. Finally, sensory evaluation using analytic hierarchy process and fuzzy logic technique, revealed that the obtained optimized condition was accepted based on the sensory attributes of consumers. Therefore, this tuned combination of frying processes may serve as standard for domestic and industrial conditions. Incorporation of AI with food service sectors and industries will improve overall efficiency, customer service and reduce wastage and thus maximize profitability.

Biography

Dr. Jitamanyu Chakrabarty is an Associate Professor in the Department of Chemistry, National Institute of Technology Durgapur, India. He obtained his Ph.D. degree working in Indian Institute of Chemical Biology (CSIR), Kolkata. He stood first in M.Sc. in Chemistry and stood second B.Sc. in Chemistry (with Honors), both from Visva-Bharati, a central university of India. Dr. Chakrabarty has about twenty years of teaching and more than twenty-five years of research experience. His research interest is application of lipid chemistry in various fields like food chemistry, biodiesel, cryopreservation. He has published more than fifty research papers in International and National journals of repute and presented his works in several International and National conferences and symposia. He has guided six Ph.D. students.

A coupling approach of phyto-electro remediation for removal of heavy metals from sewage sludge by *Spinacia oleracea L*

Namuduri Srinivas, Tamanna Parida and **Suresh Kumar Kolli**

Department of Environmental of Science, GITAM School of Science, GITAM (Deemed to be University), India

Background: Challenges have surfaced with sewage sludge for the removal of heavy metals (HMs) and the world needs to counter it in an effectual way. It is a tertiary product derived from processed waste from the sewage treatment plant. Various expensive treatments are introduced for the elimination of toxins while they need attention with high maintenance. A combined sustainable approach, electro-kinetic (EK) treatment with phytoremediation by using *Spinacia oleracea* has experimented for removal of heavy metals. EK treatment helps to make metals in a bioavailable form that are available to plants either for absorption or remediation.

Method: The collection of sludge was done from a sewage treatment plant and then subjected to physicochemical parameters (pH, conductivity, and organic carbon). After that, it was under the EK treatment for 11 days. It was sun-dried for 1 week and amended with soil for the phytoremediation with Spinach. It was prepared with three different concentrations such as 10, 25, and 50% with two sets, treated and untreated (Fig.1). Plants were harvested on the 51st day (final day). Plant, soil, and sludge samples were ground separately for SEM-EDS and ED-XRF analysis to assess HMs concentrations.

Findings: In the treated profile, accumulation of HMs was seen in the root zone than in the untreated profile. Metals were excited and accelerated by EK treatment that helps Spinach to absorb a significant amount whereas in untreated profile, shoot accumulation was dominant. Out of six elements (Ni, Zn, Cu, Pb, Cr, As), the absorption of Pb was the highest.

Conclusion: This study portrayed a positive image of the hybrid technique of EK and phytoremediation with *Spinacia oleracea* by absorbing significant toxins from contaminant sewage sludge.

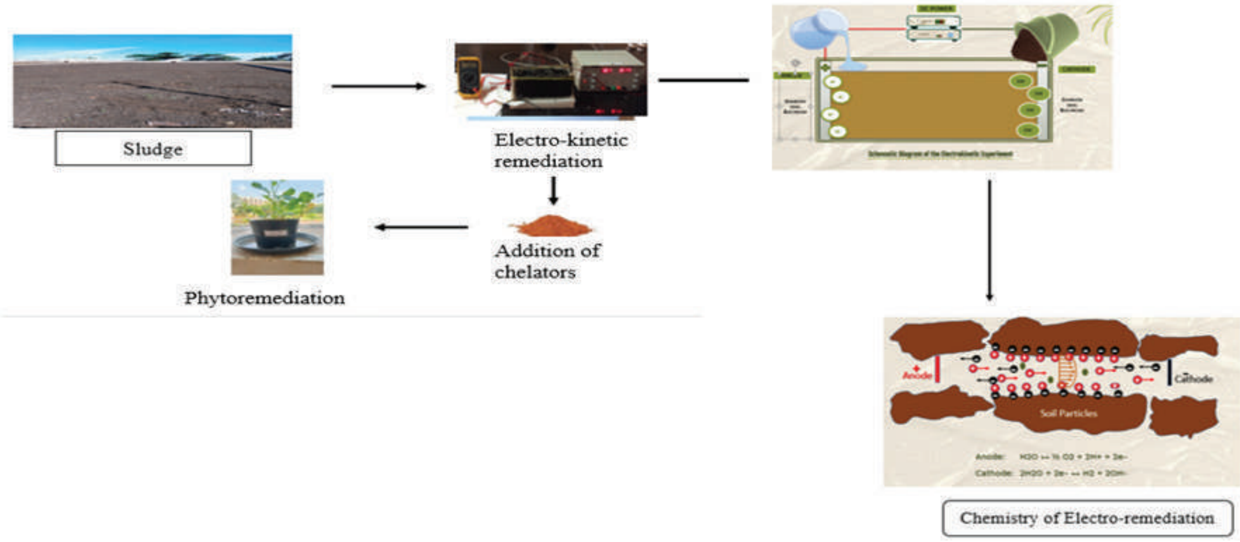


Fig 1 - Representation of Methodology

Biography

Presently Dr. Srinivas Namuduri working as Professor in the Department of Environmental Science & Director, Centre for Integrated Studies, GITAM (Deemed to be University), Visakhapatnam and former Coordinator for DST-FIST program in Environmental Science (2013-18). He having more than 26 years of teaching and research experience in Environmental Science and guided 12 Ph.D. students, four M.Phil. dissertations and six students are currently working in the thrust area of Environmental Remediation. Published a good number of research papers in Scopus/WoS journals and completed six major research projects funded by UGC, DST and National University of Singapore. Besides, completed major industrial projects in the area of air pollution and consultancy works for NTPC, Visakhapatnam Port Trust and local industries. Received Best Teacher and Best Researcher Awards from GITAM (Deemed to be University) in 2010. He also a recipient of the "Fellow of National Environmentalists Association" in 2011. He organized a good number of National and International seminars/conferences in the areas of Environmental Science and conducted several Environmental awareness programmes to students, public and industrial employees.

Emerging roles of noncoding RNAs in breast cancer development

Nida Jamil Khan

Jamia Millia Islamia University, India

Noncoding RNAs (ncRNAs) constitute a substantial component of the mammalian transcriptome and play pivotal regulatory roles in gene expression and various biological processes. Among the diverse array of ncRNAs, microRNAs (miRNAs) have received considerable attention, with extensive research characterizing their synthesis, functional roles, and significance in tumorigenesis. Notably, their pivotal function in the regulation of stem cells has brought another class of small noncoding RNAs, known as aspirRNAs, into the spotlight of cancer research. Furthermore, investigations have exhibited the critical involvement of long non-coding RNAs (lncRNAs) in organizing developmental processes, such as mammary gland development. Importantly, dysregulation of lncRNAs has been identified as an early event preceding the development of several malignancies, including breast cancer. This study comprehensively elucidates the functions of small noncoding RNAs, including miRNAs and piRNAs, as well as lncRNAs in the initiation and progression of breast cancer. In addition, we explore the future prospects of diverse ncRNA-based approaches for diagnostic, prognostic, and therapeutic interventions.

Biography

Dr. Nida Jamil Khan holds a Doctorate in Biosciences and boasts over 14 years of enriching experience in both teaching and research. As an esteemed educational professional, she is dedicated to fostering an inspiring learning environment for Undergraduate and Postgraduate students. Driven by a passion for research and development, she specializes in Animal Physiology, Cell Biology, and Techniques in Biology. With a commitment to interdisciplinary collaboration, Dr. Khan actively engages in research partnerships with industry and reputable institutes.

Her areas of expertise encompass student supervision, curriculum development, and promoting innovative teaching methods. Dr. Khan's career at Jamia Millia Islamia University spans from her role as a Research Assistant in the Department of Lab Medicine at AIIMS to her current position as an Associate Professor. Recognized for her academic achievements, she received a Gold Medal in the SSC Examination from AMU in 1994 and secured the 3rd position in M.Sc. (Bio-Tech) in 2002. Throughout her career, she has demonstrated administrative skills, contributed to cancer biology research, and excelled in creative lesson planning.

Intermediate syndrome due to organophosphate poisoning: A case report

Shubhangi Setia and **Anjalee Chiwahne**

Jawaharlal Nehru Medical College, Datta Meghe Institute of Higher Education and Research, India

Organophosphates, also known as phosphate esters, are a category of pesticide compounds that function by indirectly inhibiting the activity of an enzyme called acetylcholinesterase (AChE). AChE is responsible for breaking down acetylcholine (ACh) at the neuromuscular junction into acetic acid and choline.

The estimated number of pesticide self-poisoning deaths is more than 14 million from the 1960s to 2018. Pesticide poisoning is responsible for half a million fatalities annually in Asia and the Western Pacific, with organophosphate (OP) compounds being the primary cause.

In India, where agriculture is a critical industry, farmer suicide is a pressing concern. Each year, approximately 76,000 cases of OP poisoning are reported in India.

Routes of exposure to these compounds include ingestion, skin absorption, and inhalation. A myriad of symptoms are seen depending on acute or chronic consumption of these compounds, including diarrhea, urination, lacrimation, miosis, bronchoconstriction, nausea, vomiting, and muscle weakness, loss of coordination, impaired cognition, and speech loss. A patient experiencing OP poisoning may exhibit three toxic effects phases, namely acute cholinergic crisis, intermediate syndrome (IMS), and delayed distal polyneuropathy.

We have presented a case involving a 22-year-old farmer who consumed monocrotophos with ethanol in a suicide attempt, subsequently developed ventilator-associated pneumonia, and endured a protracted recovery period due to IMS. The patient received a total of 9000 mg of atropine over his 14-day hospitalization period. We have filed this case report based on the significant dosage of atropine that was administered and the prolonged duration of ventilation and hospital stay that became necessary. Despite receiving extensive medical care, the patient's incapacitation underscores the urgent necessity for a specialized rehabilitation center that can aid individuals in recovering their self-sufficiency. Furthermore, it is crucial to establish stringent regulations governing the sale and accessibility of toxic substances to the general population.

Biography

Shubhangi Setia completed her M.B.B.S. from Jawaharlal Nehru Medical College, Wardha, India. She was awarded the Indian Council of Medical Research grant in 2019 and thereafter completed a research in the field of ophthalmology. She also holds an ACLS/BLS certification. She graduated in 2023 with distinctions in Paediatrics, Obstetrics and Community Medicine. With almost 2 years of volunteer experience in the rural parts of central India, she has worked towards helping underprivileged people and making a positive impact on their lives. Over the past year she has worked on 5 papers covering fields like Diabetic Retinopathy, Deep Brain

Stimulation, Monoclonal antibodies, Erythromelalgia and Organophosphate poisoning. She fascination lies in the field of internal medicine and its subspecialties, propelling her to embark on the journey to become a proficient physician.

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Interactions between dopamine metabolites and α-synuclein in causing Parkinson's disease

P.Sivakumar[1], **S.Priyatharshni**[2], **N.Prabhu**[2] and **M.P.Murugesan**[3]

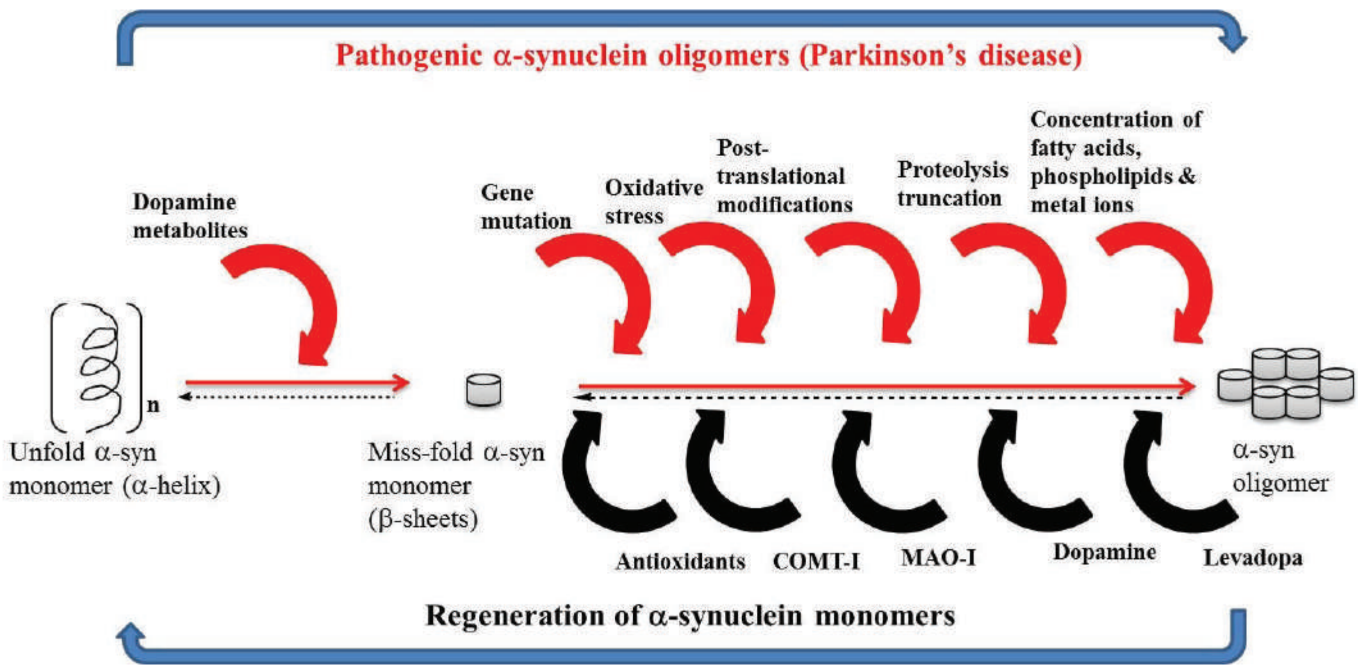
[1]R&D Laboratory, Department of Chemistry, Excel Engineering College, India
[2]R&D Laboratory, Department of Physics, Excel Engineering College, India
[3]Department of Food Technology, Excel Engineering College, India

Objective: Parkinson's disease (PD) is marked by aberrant post-translational modifications (PTMs) in amino acid sequences and the aggregation of alpha-synuclein (α-Syn) protein. Understanding the interplay between dopamine (DA) metabolites and α-Syn oligomers is crucial for elucidating PD pathology. This study aims to discuss the chemical mechanisms underlying DA metabolite-induced α-Syn oligomerization, focusing on dopamine-o-quinone (DAQ), dopamine-chrome (DAC), dopamine-aldehyde (DOPAL) and neuromelanin and their potential role in PD pathogenesis.

Scope: This study examines the current understanding of how DA metabolites contribute to α-Syn oligomerization and PD progression. We explore mechanisms such as ROS-mediated structural changes in α-Syn, direct interactions between oxidized DA metabolites and α-Syn, and the modulation of α-Syn degradation efficiency by DA interacting with lipid or autophagy-related proteins. Additionally, we investigate the impact of divalent Cu^{2+} ions on DA metabolite-induced α-Syn oligomerization and its inhibition by the antioxidant glutathione (GSH).

Results: Our study highlights multiple pathways through which DA metabolites influence α-Syn aggregation, including oxidative modifications, direct binding, and interference with degradation pathways. We discuss the significance of the lysine (Lys) side chain of α-Syn as the initial trigger site for oligomer formation, shedding light on potential therapeutic targets for PD.

Methods Used: This study employs a comprehensive analysis of existing literature to synthesize current knowledge on the chemical mechanisms underlying DA metabolite-induced α-Syn oligomerization.



Conclusion: Understanding the complex interactions between DA metabolites and α-Syn oligomers is essential for developing targeted therapies for PD. By elucidating these mechanisms, we hope to contribute to the advancement of treatments aimed at mitigating α-Syn aggregation and preserving dopaminergic neuron function in PD patients.

Biography

Dr. P. Sivakumar is a highly accomplished researcher specializing in Nanoscience and Technology. He earned his doctoral degree from the National Center for Nanoscience and Technology of the Chinese Academy of Science in 2014. Following this, he embarked on a series of prestigious postdoctoral positions, starting at Jilin University of China in 2015. In 2016, he was selected as a Technion-Guangdong Postdoctoral Fellow for conducting research at the Technion-Israel Institute of Technology in Haifa, Israel. His expertise and dedication led to his selection for the CAS-PIFI Postdoctoral Fellowship in 2018, allowing him to further his research at the Dalian Institute of Chemical Physics in China. With a strong background in nanotechnology and a proven track record of success in various international research environments, Dr. Sivakumar continues to make significant contributions to the field through his innovative research endeavors.

Features of phase, isotopic equilibrium and multiplication of a single stage separation factor during the concentration of boron-10 isotope by chemical exchange with using of boric acid

Aleksei Khoroshilov and **Pavel Penkin and Pavel Ivanov**

Mendeleev Russian University of Chemical Technology, Russian Federation, Russia

The report is devoted of main results to comprehensive studies of boron isotope exchange between two liquid phases with using of boric acid. The two-phase systems under consideration do not involve the use of boron halides (BF_3, for example), which are the basis for the industrial production of boron-10 and boron-11 isotopes.

Research covers a wide range of areas: from single equilibration of liquid phases to multiplication of a single isotope effect and its patterns:- study of phase equilibrium between two immiscible liquids, when one of them is an aqueous solution of boric acid, and the second is one of the amines in an organic solvent, which is expressed by the distribution of boron between the phases;- measurement of the single stage separation factor for boron isotopes α depending on the composition of the phases, namely, the type of amine in the non-aqueous phase, the type of intermediate in the aqueous phase, the concentration of components of both phases;- experimental multiplication of a single stage separation factor in squared-of cascade, including investigation of reagent-free flow reflux.

As a result of the study of phase equilibrium, it was shown that, in particular, the type of amine and organic solvent have a significant effect on the distribution coefficient of boron between phases. The obtained distribution coefficient values vary in the range from 0,01 to ≈ 120.

The experimental results obtained during the research on the single stage separation factor for boron isotopes are interesting. Depending on the type of amine, an inversion of the isotope effect may be observed when, for example, the boron-10 isotope is concentrated either in the organic or in the aqueous phase. As for the numerical values of the enrichment factor, the range of measured values of α varies from 1.005 to 1.040.

To increase the single stage isotope effect, the process of flow reflux at the boron-10 isotope-rich end of the cascade, namely, the transition of boron from the organic phase to the aqueous phase without the use of chemical reagents, was studied. In this case, a two-phase system was used: boric acid in water - trioctylamine in o-xylene with a mediator additive in the form of tartaric acid. At the same time, special patterns of accumulation of the target isotope in the cascade were established.

As a result of research, the possibility of reagent-free flow reflux when concentrating boron-10 in a squared-off cascade using boric acid was established for the first time, which makes such a process for separating boron isotopes especially attractive from an economic point of view.

Biography

Aleksey Vladimirovich Khoroshilov

Specialty: Technology of Isotopes and Highly Pure Substances. He worked in D.I. Mendeleev Russian University of Chemical Technology as a researcher, senior researcher, and Deputy Head of the Isotope Technology Department. Since 2008 he is founder and permanent Director of D.I. Mendeleev Center for Collective Use of Scientific Equipment.

The main area of scientific interests and extensive practical experience are primarily related to the separation and use of stable isotopes. Khoroshilov developed the theoretical foundations of the so-called thermogradient separation methods, found new conditions for the implementation of technological processes for concentrating a number of isotopes, developed a new type of equipment for isotope separation - the horizontal rotary columns.

The scientific manager of projects carried out for organizations and enterprises of Russian. Author and co-author of about 350 scientific papers and textbooks, of more than 20 patents of the Russian Federation. Honorary worker of higher professional education of the Russian Federation.

Penkin Pavel Vladimirovich

Lawyer, economist, manager of scientific and industrial projects,

Graduate of the Executive MBA (32nd stream) and Executive coaching (6th stream) programs of the Moscow School of Management Skolkovo.

He has many years of experience in providing services for organizing corporate governance at industrial enterprises, supporting and optimizing production processes, supplying and setting up equipment of varying degrees of accuracy and complexity.

He is included in the TOP-10 tax consultants according to the authoritative rating of the Kommersant publishing house, and is also noted in the world-famous rating of lawyers BEST LAWYERS in the Insolvency and Reorganization Law category.

Synthesis of chitosan derivative as an enterosorbent for sorption of heavy metal ions

S. Fatullayeva[1], **N. Zeynalov**[1], **D. Tagiyev**[1], **M. Raucci**[2], **E. Amendola**[2], **G. Gomez d'Ayala**[2], **M. Marcedula**[2], **A. Guliyeva**[1], **D. Babayeva**[1] and **E. Nasiyyati**[1]

[1]Catalysis and Inorganic Chemistry Institute of Ministry of Science and Education of the Republic of Azerbaijan, Azerbaijan
[2]Institute of Polymers, Composites and Biomaterials of the National Research Council (IPCB-CNR), Italy

The production of a large amount of toxic substances by industrial enterprises, as well as their use in various spheres of life, lead to environmental pollution, which in turn contributes to the impact of adverse conditions on a living organisms and increase in the number of diseases [1]. Enterosorption is an effective method of removing toxins of various nature by sorbents, used in the prevention and treatment of some diseases, poisoning, correction of pathological conditions associated with endo- and exotoxicosis. Many toxic metals accumulate in vital organs having a negative effect on the biochemical processes of the organism. Thus, ions of heavy metals bind and interact with functional groups of vital compounds, which leads to a disruption of their structure, dysfunction and, ultimately, to a disturbance of redox processes in the organism [2].

A large number of enterosorbents of both natural and synthetic origin have been proposed for the removal of toxic metals and radionuclides. With all the variety of enterosorbents, substances based on polymers and their derivatives are of particular interest. Thus, presence of numerous reactive -OH and $-NH_2$ groups in the structure of chitosan allows carry out various modifications and a strictly directed synthesis of derivatives of this polymer with the purpose to use their as sorbents of heavy metal ions [3].

The aim of the given research is to obtain highly effective chitosan-based "smart" polymer enterosorbents with "memory effect" for selective sorption of toxic metal ions. Samples of N-(2-hydroxybenzyl)-N-ethyl-N-methyl chloride chitosan were synthesized and studied by physico-chemical methods, such as NMR, FTIR, TEM and others.

Application of chitosan-based polymers at the larger scale can contribute as a sustainable and renewable material for the further scientific researches.

Biography

Sevda Fatullayeva graduated from the Baku State University, Chemistry Faculty (1996) and received PhD degree in Chemical Kinetics and Catalysis (2005). She is currently a leading scientific researcher of "Nanostructured metal-polymer catalysts" laboratory and has postdoc researcher position in field of macromolecular chemistry at Institute of Catalysis and Inorganic Chemistry named after acad. M.Nagiyev of Ministry of Science and Education of the Republic of Azerbaijan. She has over 18 years of teaching experience. Her current research interests are polymer and bioorganic chemistry, in particular, preparation of sorbents, hydrogels and metal complexes based on natural and synthetic polymers, study of their physical, chemical properties and study of sorption processes with their participation. She is the author of over 60 publications, including 5 textbooks, 2 patents.

Green synthesis based on 3-chloro-6-hydrazinylpyridazine under the action of microwave (MW) and ultrasonic (US) irradiation

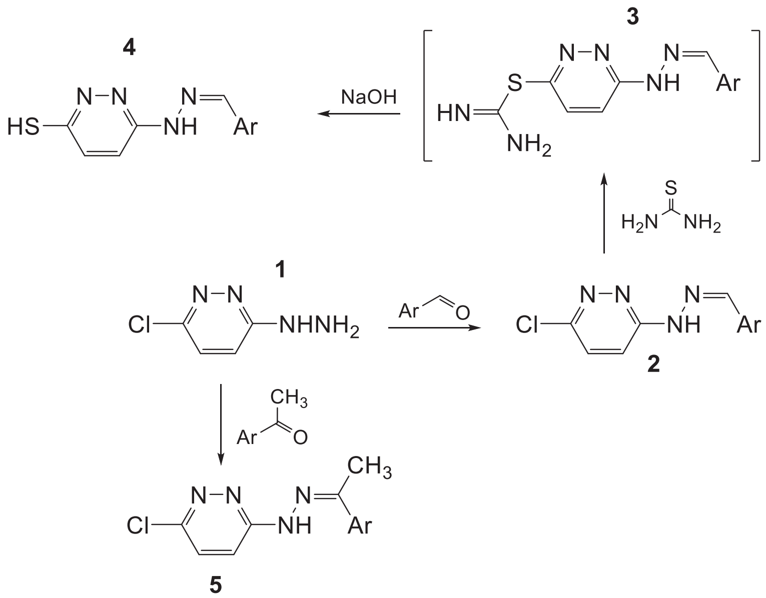
Y. Gharibyan, T. Gomktsyan, A. Karapetyan, A. Vorskanyan, A. Yengoyan and **E. Ghazaryan**

Armenian National Agrarian University, Armenia

Pyridazines have attracted researchers' interest over the past twenty years. This is evidenced by rapidly growing number of review articles related to methods of synthesis of pyridazines derivatives and their biological activity [1-3].

Green chemistry has been gaining popularity in the last few years, it includes echo-friendly microwave and ultrasound-assisted synthesis. Its principles aim to minimize the negative impacts of the chemical processes on the environment and human health [4-7]. They allow to carry out experiment in a short time, with less usage of energy.

The aim of the study is synthesis of 3-(2-arylidenehydrazinyl)-6-chloropyridazine derivatives by green chemistry methods and their comparison with convenient methods.



The reaction 3-chloro-6-hydrazinylpyridazine **(1)** with various aryl aldehydes afforded 3-(2-benzylidenehydrazinyl) substituted derivatives **(2)**, which with thiourea form intermediate thiouronium salts **(3)**. These salts 3 under the action of sodium hydroxide are converted into thiol derivatives. Similarly, 3-chloro-6-(2-(1-phenylethylidene) hydrazinyl) pyridazines **(5)** were synthesized by the reaction of the starting hydrazide **(1)** with 4-substituted acetophenones.

All the syntheses were carried out by convenient method and under the influence of MW and US irradiation. The experimental results showed that usage of the "Green Chemistry" methods allow sharply reduce reaction time and energy consumption.

All in all, in our study we have synthesized a series of compounds and shown benefits of "green chemistry" methods [8,9].

Biography

Yana Gharibyan, a second-year PhD student in organic chemistry, junior researcher at the Armenian National Agrarian University. Working in a laboratory is giving her new learning experience, it allows her to be involved in the exciting realm of green chemistry. She actively bring diverse perspectives to her PhD research. It is devoted to green syntheses and biological study of some azines.

Electron–beam radiation effects in the multilayer structures grown by periodical deposition of Si and CaF_2 on Si (111)

Anatoly Dvurechenskii[1,2], **Alexei Kacyuba**[1], **Natalia Stepina**[1], **Aigul Zinovieva**[1] and **Vladimir Zinovyev**[1]

[1]Rzhanov Institute of Semiconductor Physics, Russia
[2]Novosibirsk state university, Russia

The CaF_2 and $CaSi_2$ materials have a slight difference in the parameters of the crystal lattice with silicon, which allows the epitaxial growth of the CaF_2 Insulator. Recently we proposed a method for $CaSi_2$ synthesis using electron beam irradiation as during the growth of CaF_2 layers with molecular beam epitaxy (MBE) and electron beam irradiation after CaF_2 film growth. Both experiments show high surface roughness. The average surface roughness in the irradiated region is 6-8 nm for films irradiated during CaF_2 film growth and 25-30 nm for films formed with post-growth irradiation (the values are given for the same thickness of the deposited film, irradiation dose and substrate temperature). These data indicate that the considered methods do not provide the necessary planarity of $CaSi_2$ epitaxial films.

The purpose of this work is to develop the method reducing the $CaSi_2$ film roughness at synthesis assisted by electron-beam-irradiation. We combine two approaches to reduce the film roughness: a post-growth electron irradiation and co-deposition of additional Si during CaF_2 growth and combination with technique of solid-state epitaxy at the initial stage of film growth. These approaches allow us to reduce surface roughness down to 1-2 nm.

The formation of $CaSi_2$ films on Si (111) by molecular-beam epitaxy (MBE) of CaF_2 under fast electron beam irradiation was investigated. The method of a high planarity $CaSi_2$ film synthesis assisted by electron-beam-irradiation was developed. We combine two approaches to reduce the film roughness, a post-growth electron irradiation and co-deposition of additional Si during CaF_2 growth. Combination with technique of solid-state epitaxy at the initial stage of film growth allows us to reduce surface roughness down to 1-2 nm.

Biography

Anatoly Dvurechenskii has completed in his doctor degree in physics from Rzhanov Institute of Semiconductor Physics. From 2002 to 2018 he was the Vice-Director of this Institute and currently he is the Head of the Lab. of Nonequilibrium Semiconductor's Systems, Professor of Novosibirsk State University. As a guest scientist he worked at New York State University in Albany (1979), Research Center Rossendorf, Dresden, Germany (1980 – 2006) and at Fudan University in Shanghai, China (2001, 2002, and 2006). He has published more than 400 peer-reviewed papers in reputed journals.

The antioxidant activity of betanin protects MRC-5 cells against cadmium induced toxicity

Fatemeh Rajabian[1], **Arezoo Rajabian**[2] and **Zahra Tayarani-Najaran**[1,4]

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[2]Medical Toxicology Research Center, Mashhad University of Medical Sciences, Iran
[3]Department of Internal Medicine, Mashhad University of Medical Sciences, Iran
[4]Targeted Drug Delivery Research Center, Pharmaceutical Technology Institute, Mashhad University of Medical Sciences, Iran

Cadmium (Cd) can induce both acute and chronic effects in the lungs depending on the time and the exposure route. Betanin is a component derived from the roots of red beets and it is well-known for its antioxidant and anti-apoptosis effects. The current study aimed to survey the protective effects of betanin on cell toxicity induced by Cd.

Different concentration of Cd alone and in combination with betanin was assessed in MRC-5 cells. The viability and oxidative stress were measured using resazurin and DCF-DA methods respectively. Apoptotic cells were assessed by PI staining of the fragmented DNA and western blot analysis detected the activation of caspase 3 and PARP proteins.

Cd exposure for 24 h declined viability and increased ROS production in MRC-5 cells compared to the control group ($p < 0.001$). Also, Cd (35 μM) elevated DNA fragmentation ($p < 0.05$), and the level of caspase 3-cleaved and cleaved PARP proteins in MRC-5 cells ($p < 0.001$). Cotreatment of cells with betanin for 24 h significantly enhanced viability in concentrations of 1.25 and 2.5 μM ($p < 0.001$) and 5 μM ($p < 0.05$) and declined ROS generation (1.25 and 5 μM $p < 0.001$, and 2.5 μM $p < 0.01$). As well as, betanin reduced DNA fragmentation ($p < 0.01$), and the markers of apoptosis ($p < 0.001$) compared to the Cd-treated group.

In conclusion, betanin protects lung cells against Cd-induced toxicity through antioxidant activity and inhibition of apoptosis.

Biography

Fatemeh Rajabian, a recent Ph.D. graduate from the School of Pharmacy at Mashhad University of Medical Sciences in Iran, focused her research on Toxicology. Her work delved into various herbal compounds, including betanin, γ-oryzanol, crocetin, crocin, silymarin, osthole, rutin, berberine, and baicalein, exploring their potential for mitigating the adverse effects of toxins in the environment, industry, diet, or pharmaceuticals. Notably, her latest research highlights the protective properties of betanin against cadmium toxicity in lung cells. Excited about sharing her findings, Fatemeh eagerly anticipates presenting her paper as a virtual speaker at an upcoming conference, aiming to contribute valuable insights and engage in fruitful discussions within the scientific community.

Properties of metals and metal alloys powders for 3D printers

Oleksandr Radchenko and **Kazbek Gogaev**

Frantsevich Institute for problems of material Science NAS of Ukraine, Ukraine

A review of works on the investigation of the properties of metal powders, which are used in additive technologies (AT), namely 3D printing, was carried out [1]. The purpose of the work is the formulation of requirements for metal powders and alloys used in AT. The advantages and disadvantages of 3D printing with metal powders are considered. Of the seven AT processes distinguished by the ASTM F2792-12a standard, the features of five 3D printing processes in which metal powders can be used are described. The greatest attention is paid to the Powder Bed Fusion. Unwanted contamination and impurities that may occur during the production of powders are noted. Commonalities and differences in the production of parts by methods of powder metallurgy and AT are shown. From this point of view, methods of obtaining metal powders are considered. It is shown that the improvement of the quality of powders (reduction of harmful impurities, the shape of the particles is close to spherical, a significant number of particles of the required size, narrow particle size distribution) due to new production methods it is usually associated with an increase in their cost. The chemical composition and impurities of powders of tool steels, nickel, cobalt, aluminum, and other alloys, which are commercially produced for 3D printing, are considered [2]. Powder properties such as particle size and particle size distribution, specific surface area, bulk density, flowability, adjustable chemical composition, and gas content is considered to be related to the 3D printing process. A large specific surface and the presence of chemically active elements in the composition of the powder carries the risk of their ignition in an environment with the presence of oxygen [3]. The importance of knowing the maximum size of particles present in the powder is shown. Attention is focused on the ability of the powder to form a thin, flat layer. It is shown that today there is no technique for testing powder for the ability to form a thin layer. Using the example of gas atomization of powders, the relationship between atomization modes and the properties of the obtained powders of tool steel grade R6M5K5 was considered [4]. Opinions are expressed that certain properties of powders are only a necessary but not sufficient condition for obtaining a part of the required quality. Only taking into account the parameters of the printer, the printing modes embedded in the software, and the properties of the powders can ensure the required quality of the product.

Biography

Dr. Oleksandr Radchenko is a distinguished researcher and expert in the field of powder metallurgy and metal ceramics. He has made significant contributions to the understanding of metal and alloy powders for 3D printing, with a comprehensive review published in the prestigious journal "Powder Metallurgy and Metal Ceramics" in July 2022. His collaboration with researchers is evident in co-authored works, such as the evaluation of explosion hazards of powders and the study of physical and process properties of gas-atomized powders.

Dr. Oleksandr Radchenko's expertise extends to powder technologies and applications, as showcased in the second edition of the "Handbook of Non-Ferrous Metal Powders" published by Elsevier in 2019. His commitment to advancing knowledge in the field is reflected in his numerous publications, emphasizing the importance of his research in shaping the understanding of powder materials for various applications.

Dextrose can increase such as decrease the range of TMJ movement

Mai A. Haggag, Fouad A. Al-Belasy and **Wael M. Said Ahmed**

Faculty of Dentistry, Mansoura University, Egypt

To assess the efficacy of dextrose prolotherapy on the clinical signs and symptoms of patients having disc displacement with reduction (DDWR).

This prospective, randomized, double-blind clinical study included thirty patients suffering from bilateral DDWR. The patients were randomly divided into two equal groups. After induction of local anesthesia, each joint was injected in two sites; one in the superior joint space and the other in the retrodiscal tissue, using 25% dextrose solution in group I and normal saline in group II. Pain intensity, maximal interincisal opening (MIO), and joint sounds (JS) were evaluated preoperatively, 1 week after each injection, and 3 months and 6 months after the last injection.

Patients in group I showed significant improvement in pain and MIO, and higher satisfaction with treatment than patients in group II. Compared to saline injection, dextrose injection resulted in an improvement in JS but without significant difference within and between groups.

Intra-articular injection of 25% dextrose is effective in the treatment of pain and dysfunction of TMJ DDWR as shown by significant improvement in pain and MIO and patient satisfaction. The technique is simple, easy to do, safe and should be adopted whenever appropriate.

Biography

Mai Haggag *(Associate Professor of Oral and Maxillofacial Surgery)* has completed her PHD at the age of 30 years from Mansoura University, Egypt. She is a lecturer, surgeon, researcher, pre-graduated students' examiner, post-graduated students' supervisor for obtaining Master and Doctoral Degrees of Science in Dentistry, Oral and Maxillofacial Surgery. Also, she is an academic coordinator of Year-5 Manchester Program at the same faculty. She has over 16 publications that have been cited over 40 times and over 1,500 reads.

Establishing an understanding of polyethylene glycol as a green solvent

M. M. Hoffmann

Department of Chemistry and Biochemistry, State University, USA

Interest in using polyethylene glycol (PEG) as a green chemical solvent is growing because of its low toxicity, biodegradability and interesting solvent characteristics that allowed its successful use in one-pot, multi-component synthesis reactions. Thus, there is an increased need for a physicochemical understanding of PEG as a solvent to further its use in chemical synthesis.[1] Due to its chemical structure, inter- and intramolecular hydrogen bonding can be expected to play a major role for the molecular level interactions and dynamics. Following a series of experimental measurements on physical properties of PEG200,[2-4] a polydisperse mixture of ethylene glycol oligomers with an average molar weight of 200 g/mol, and its ethylene glycol oligomer components, Molecular Dynamics (MD) simulations were undertaken to study the intermolecular interactions in PEG200.[5] Several force-fields were tested how well they produced the measured physical properties. Agreement with experimental values improved upon adjustments of the partial charges on the hydroxyl groups and the potential function for the -O-CH_2-CH_2-OH dihedral. The extent of these adjustments varied from oligomer to oligomer. These force-field adjustments resulted in an overall reduction of hydrogen bonding interactions with a concomitant shift towards intra-molecular hydrogen bonding. Intramolecular hydrogen bonding was found to be particularly favoured for tetraethylene glycol. To the best of our knowledge these simulations are the first ones reported for a polydisperse mixture of ethylene glycol oligomers. Currently, MD simulations are underway to better understand the effect of water, the main impurity in PEGs, on their physical properties.

Biography

Prof. Hoffmann studied chemistry as an undergraduate at the Technical University (TU) Darmstadt in Germany. In 1992, he moved to the US to pursue a graduate degree in physical chemistry and completed his Ph.D. at Washington University in St. Louis, MO, in 1997. After a post-doc with the Pacific Northwest National laboratory, he has since 2000 been a Professor in Physical Chemistry at State University of New York, College at Brockport. Since 2015, he has been a “Mercator Fellow” supporting him as a guest researcher at his alma mater TU-Darmstadt with the groups of Prof. Buntkowsky and Prof. Vogel.

Using crushed stone fines as a precursor for the synthesis of zeolites Na-X, Na-A, CAN, MER, and ANA

Hugo Martín Galindo Valbuena[1] and **Orlando Hernández Fandiño**[2]

[1]Universidad Nacional de Colombia, Department of Chemical and Environmental Engineering, Colombia
[2]Universidad Nacional de Colombia, Campus Bogotá, Department of Chemistry, Colombia

Crushed stone fines (CSFs) are a solid byproduct from rock crushing in quarries to produce coarse aggregate for the construction industry. CSFs have been extensively investigated as a partial substitute for fine aggregate and cementitious materials in concrete. However, no major research has been given to these solids as a precursor for zeolite synthesis, even though they can contain a high silicon proportion. The CSFs used were mainly composed of quartz, and they also had minor proportions of aluminum and iron minerals.

This work addressed the use of CSFs as sources of silicates for the synthesis of valuable zeolites such as Na-A, Na-X, CAN, MER, and ANA. The approach to the synthesis of the zeolites focused on the activation of the CSFs through alkaline hydrothermal hydrolysis. The activation led to the depolymerization of the silicates and their subsequent transport to the liquid phase.

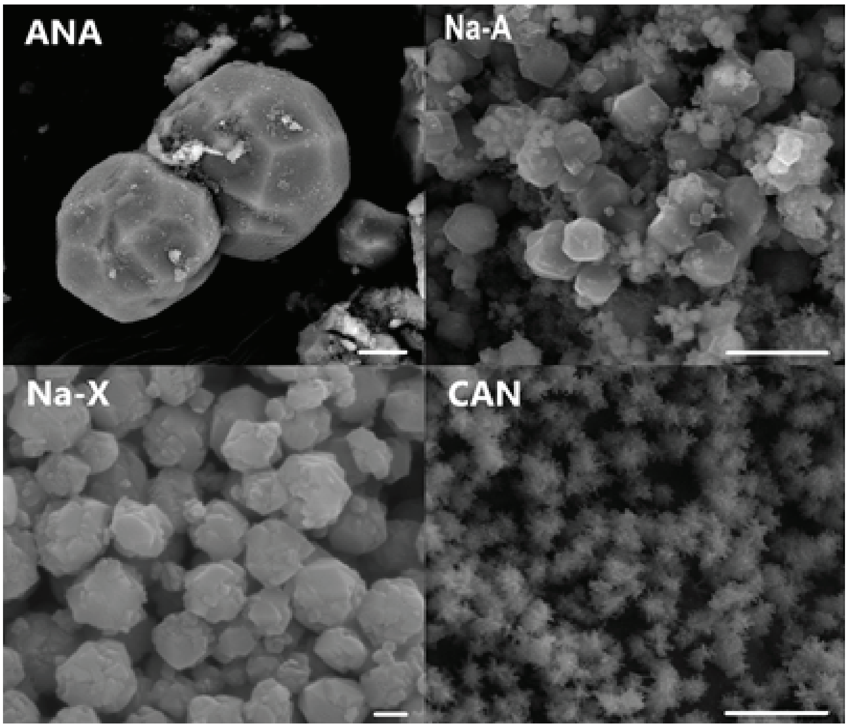
The activation was tuned to produce zeolite ANA in situ as a precipitated solid in addition to the aqueous silicates. Such tuning took advantage of the presence of aluminum in the CSF to lead to the synthesis of ANA. The aluminum in the CSF was also transported to the liquid medium during the alkaline hydrolysis. ANA was used as a parent structure for its interzeolite conversion to MER.

The aqueous active silicates were mixed first with a sodium hydroxide solution and then with an aluminum nitrate solution to fulfill different SiO_2/NaOH and SiO_2/Al_2O_3 molar ratios to produce the target zeolites. The hydrogel precursor formed from the condensation of the aqueous silicates and aluminates was taken to crystallization at different times and temperatures. At the end of the crystallizations, the solids were recovered by centrifugation, washed with deionized water, and dried at 90°C for 24 h. The table below summarizes some of the conditions used for the syntheses.

Synthesis conditions of the zeolites

Crystallization conditions		Molar ratios		Synthesized material
T (ºC)	t (h)	SiO_2/Al_2O_3	$SiO_2/NaOH$	
66	36	1.2	0.125	Na-A
90	10	3.4	0.113	CAN
90	10	5.2	0.204	Na-X
90	8	7.5	0.346	Na-P

Morphology of the synthesized zeolites (bar = 10μm)



Biography

Hugo Martín Galindo Valbuena received his bachelor's and master´s degrees in Chemical Engineering from the Universidad Nacional de Colombia (Bogotá, Colombia). He got his Ph.D. in chemistry at the University of Connecticut. Currently. Hugo is a full-time professor and researcher in the same department and university where he got his undergraduate degree. His research is focused on material synthesis from solid wastes, such as the one used in this research. Characterizations and applications are also part of Hugo´s research interests. To carry out the synthesis of the materials, Hugo has used conventional hydrothermal and microwave-activated processes. This last one is used to accelerate the synthesis to comply with the precepts of intensification for the development of sustainable chemical processes. Hugo also investigates multiphase chemical reactors by using CFD to achieve reliable predictions of the reactor's behavior.

Advances in laser processed material of soft sensing and soft actuation

Yun Ling

Duke University, USA

The advancement of technology is profoundly changing people's lives, and the rise of wearable devices is a notable aspect of it. Soft electronic materials are wearable devices' core components, significantly changing our way of life. Wearable devices are of great scientific significance for the personalized management of chronic diseases, dynamic monitoring of human physiology, long-term sports performance monitoring, phenotypic research of diseases, etc. However, the preparation and processing of soft electronic materials often face high costs, low efficiency, and difficulty controlling morphology and performance. Laser-assisted material processing is an advanced manufacturing technology with advantages that traditional processing methods do not have, such as local high-energy deposition, high resolution, rich products, etc. Laser-assisted material processing provides various soft sensing and actuation materials selections, such as laser-induced graphene (LIG), laser-assisted copper template, etc. These materials have excellent piezoresistive properties and can be used to prepare ultra-sensitive soft pressure sensors, or have surface characteristics with micro-nano structures and can be used to prepare soft pressure sensors with high sensitivity and wide linearity range. In addition, laser-assisted material processing can also be used to design soft actuators, such as LIG-based electrothermal actuators, which use the different thermal expansion coefficients between LIG and metal or polymer to achieve bending or twisting motion. These soft sensors and actuators can be widely used in soft robots, human-machine interfaces, electronic skin, and other fields, impacting human life and scientific progress.

Biography

Yun Ling is a postdoc researcher at Duke University. His research interest mainly focuses on acoustofluidic system, soft electronics, acoustic applications on wearable devices, and soft robotics, including acoustic tweezer, 3D self-assembly structures-based stretchable electronics, bio-inspired/bio-mimetic material. Yun has published 10+ top-level research papers in well-known scientific journals such as Nat. Commun., Adv. Mater., ACS Nano, Sci, Adv. and so on.

MDH CURES community: A supportive network to increase student retention and learning

Joseph Provost

University of San Diego, USA

This presentation introduces an initiative to catalyze the integration of protein-centric-course undergraduate research experiences (CUREs) into diverse academic landscapes, fostering STEM education and promoting workforce diversity. The core of this project revolves around seamlessly integrating research into undergraduate curricula. This strategic endeavor seeks to bridge the widening chasm between the escalating demand for STEM professionals and the prevailing workforce shortfall.

Central to this project is establishing a collaborative network of life scientists united by the focal point of malate dehydrogenase (MDH). This pivotal protein serves as the nexus, galvanizing a dynamic community of faculty members who mutually support one another through shared objectives. This collective hub of expertise converges around protein-centric research spanning biochemistry, cell biology, and related disciplines. The approach includes three essential foci: 1) Inclusive Training and Mentorship: A dynamic program supports a diverse array of faculty members, to embed CUREs within their pedagogical strategies. 2) Regional Hubs: Localized hubs serve as epicenters of engagement, mentoring faculty, fostering collaboration among institutions and propelling sustained growth. 3) Resource Development and Partnerships: Access to teaching support and examples, pedagogical support, protocols and projects, and a robust collection of MDH clones are all resources poised to streamline CURE adoption, complemented by synergistic partnerships amplifying the initiative's reach.

At the heart of this are students engaged in comprehensive learning, acquiring crucial scientific proficiencies including: integrating hypothesis formulation, experimental design, practical laboratory and computational techniques, data interpretation, collaborative teamwork, and effective oral and written communication. By democratically extending this course-embedded research experience, we strategically equip graduates with the toolkit for successful post-graduate trajectories. This initiative, driven by a collaborative community of educators, not only enriches STEM education but also fosters a future STEM workforce poised to cultivate skilled and well-rounded graduates prepared to thrive in diverse professional landscapes.

Biography

Joseph J. Provost is an accomplished educator and researcher at the University of San Diego. His PhD is in Biochemistry and Molecular Biology and served as an HHMI Fellow at Vanderbilt University before chairing the USD department of chemistry and biochemistry. He is now a full professor at USD. Provost has played a pivotal role in integrating research experiences into undergraduate education, particularly through the Malate dehydrogenase (MDH) Course-Related Undergraduate Research Experiences (CUREs) program. This initiative, facilitated by a network of faculty mentors and regional Hubs, has garnered recognition, including the prestigious ASBMB Educator Award. Provost's research contributions extend to the study of NHE (Na+/H+ exchanger) proteins, revealing insights into cellular mechanisms governing ion transport and pH regulation. His work holds promise for potential therapeutic applications. Through dynamic mentorship, Provost empowers educators to incorporate hands-on research, fostering students' skills in hypothesis-driven inquiry, experimental design, data analysis, and communication. His dedication to cultivating a capable and diverse STEM workforce highlights his significant impact on education and scientific progress.

Novel concepts based on quantization effects in semiconductor nanostructures and via molecular singlet fission for ultra-high solar photon conversion efficiency of sunlight into photovoltaics and solar fuels

Arthur J. Nozik

Department of Chemistry and Renewable & Sustainable Energy Institute (RASEI)
University of Colorado and National Renewable Energy Laboratory (NREL), USA

In order to utilize solar power for the production of solar electricity and solar fuels on a global economic scale, it will be necessary to develop solar photon conversion systems that have an appropriate combination of high efficiency (delivered watts/m^2) and low capital cost (\$/m^2). One potential, long-term approach to attain high power conversion efficiencies above the well-known Shockley-Queisser thermodynamic limit of 33% is to utilize the unique properties of quantized nanostructures (quantum dots (QDs), rods (QRs) and films (QFs)) or Singlet Fission (SF) in molecular chromophores, to control the relaxation dynamics of photogenerated hot carriers in semiconductors and excited states in photoexcited molecules to produce either enhanced photocurrent through efficient photogenerated multiple electron-hole pair (i.e.exciton) multiplication (termed MEG) or enhanced photo potential through hot electron transport and transfer processes. To achieve these desirable effects, it is necessary to understand and control the dynamics of MEG, SF and hot electron and hole cooling, charge transport, and interfacial charge transfer of the photogenerated carriers. These fundamental dynamics in various bulk and quantized nanoscale semiconductors and SF molecules have been studied for many years using various spectroscopies with fs to ns time resolution. The prediction that the generation of more than one electron-hole pair (which exist as excitons in size-quantized nanostructures and photoexcited molecules) per absorbed photon would be an efficient process in QDs, QRs, QFs and SF molecules has been confirmed over the past years in different classes of materials, molecules, and their architectures. Very efficient and ultrafast MEG, also called Carrier Multiplication (CM), and SF from absorbed high energy photons has been reported in many quantized semiconductors and molecules and associated solar photon conversion devices for solar electricity and solar fuels (e.g. H_2) production. Selected aspects of this work will be summarized and recent advances will be discussed, including the very remarkable and extremely large beneficial theoretical effects of combining MEG with solar concentration. The analogous MEG effect in SF molecules and its use in molecular-based solar cells will also be discussed.

Biography

Dr. Arthur J. Nozik is a Research Professor at the University of Colorado, Boulder; Senior Research Fellow, Emeritus at the U.S DOE National Renewable Energy Laboratory (NREL); and a Founding Fellow of the CU-NREL Renewable & Sustainable Energy Institute (RASEI). Nozik has been the Associate Director of a joint Los Alamos National Lab/NREL Energy Frontier Research Center for Advanced Solar Photophysics. Nozik received his BChE from Cornell Universit in 1959 and his PhD in Physical Chemistry from Yale University in 1967. Dr. Nozik's research interests include size quantization and hot carrier effects in semiconductor quantum dots and quantum wells, including hot carrier solar cells and multiple exciton generation from a single photon, and Singlet Fission (SF). He has investigated the applications of unique quantum effects in nanostructures and SF in molecular chromophores for advanced approaches for solar photon conversion to electricity and solar fuels; photogenerated carrier relaxation dynamics in various semiconductor nanostructures; photoelectrochemistry of semiconductor-molecule interfaces; photoelectrochemical energy conversion, photocatalysis; optical, magnetic and electrical properties of solids; and Mössbauer spectroscopy. He has published over 280 peer-reviewed papers and book chapters in these fields with greater than 50,500 citations (Dec.2023) (h factor = 100), written or edited 7 books, holds 11 U.S. patents, and has delivered over 385 invited talks at universities, conferences, and symposia. He has received many awards and honors in solar energy research including the Establishment in 2022 of the Annual Nozik Lecture sponsored by RASEI (Renewable and Sustainable Energy Institute) at the University of Colorado, Boulder featuring High Profile International Scientists, the Cross Medal of the Yale Graduate School (2016) , the Eni Award (from the President of Italy-2008); the Heinz Gerischer Award (2013) and the Research Award of the Electrochemical Society (2002); the Esselen Award (at Harvard University) for Chemistry in the Public Interest from the American Chemical Society 20011), the Research Award of the U.N. Intergovernmental Renewable Energy Organization, and the Thomson Reuters (Clariyate Analytica) Highly Cited Researcher Designation in 2014 in Chemistry and in 2018 in Physics (latest total h-factor is 101). Dr. Nozik has been a Senior Editor of The Journal of Physical Chemistry for 12 years and has served on the Editorial and Advisory Boards of many journals. A Special Festschrift Issue of The Journal of Physical Chemistry honoring Dr. Nozik's scientific career appeared in a December 2006 issue and a special Research Symposium was held in his honor at the University of Colorado in 2016, including the establishment at NREL of a named Honorary Nozik Director's Fellowship. Dr. Nozik is a Fellow of the American Physical Society, the American Association for the Advancement of Science, and the Royal Society of Chemistry; he is also a member of the ACS, the ECS and the MRS.

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Advances in materials development for material extrusion (MEX) based additive manufacturing

Caroline Sunyong Lee, Taehyeob Im and **Heungseok Oh**

Department of Materials and Chemical Engineering, Hanyang University, Republic of Korea

Material extrusion (MEX) additive manufacturing is a method that directly extrudes a feedstock consisting of a mixture of powder and binder to create components of the desired shape. It offers the advantage of utilizing a wide range of powders, including ceramics, metals, and composite materials, and is known for its cost-effectiveness among additive manufacturing techniques.

In this study, the potential applications of Material Extrusion (MEX) were explored through the development of composite-based and ceramic-based feedstocks. For applications involving composite materials, a feedstock comprising metal powder (silicon steel powder) and ceramic powder (SiO_2-based powder) was employed to produce a magnetic core, specifically Soft Magnetic Composites (SMCs). SMC core was utilized to induce liquid-phase sintering of SiO_2-based ceramic powder during the sintering process, resulting in the production of high-density silicon steel core. Consequently, a magnetic core with high magnetic flux density and low core loss was manufactured in the low-frequency range (f<1 kHz).

Subsequently, research was conducted on development of ceramic materials used in CO_2 reduction industries, using TiO_2 powder, a widely-used photocatalytic material, in the desired structural form through additive manufacturing. $MoSe_2$ nano-sheets were then grown on the structure's surface via a hydrothermal synthesis method to form a heterostructure for bandgap engineering. We have designed to extrude 3-dimensional structure to increase the surface area to be exposed to result in improved electrochemical properties and enhanced photocatalytic efficiency. Finally, the feasibility of this approach was demonstrated by evaluating artificial photosynthesis efficiency, confirming its successful conversion of CO_2 into carbon-containing fuels. These findings underscore the potential applications in the field of artificial photosynthesis.

This study demonstrates its effectiveness of MEX in producing magnetic cores as well as enhancing photocatalytic efficiency, for promising technology with diverse applications.

Biography

Dr. Caroline Sunyong Lee is professor in School of Materials Science and Chemical Engineering at Hanyang University in Republic of Korea. She received the B.S. and M.S. degrees in Materials Science and Engineering in 1993 and 1995, respectively, from M.I.T., and the Ph.D. degree in 2001 from U.C. Berkley. And she has worked as a senior researcher in Advanced Research Institute of LG, Korea. She published over 230 peer-reviewed papers and her main research field is electrochromic displays, artificial photosynthesis, 3-D printing and nano materials synthesis. She is currently director of IEEP (Innovative Energy Education Program) of ATC in Tanzania as well as serving Director of Administration at the Korean Institute of Metals and Materials.

Excellent ammonia sorption enabled by metal-organic framework nanocomposites for seasonal thermal battery

L.W. Wang and **S.F. Wu**

Institute of Refrigeration and Cryogenics, Shanghai Jiao Tong University, China

Solar-powered seasonal thermal battery (STB) is currently anticipated as a prospective future sustainable energy technology, for which prevailing the working pairs of activated carbon and halides-ammonia are proven low adaptability in extreme conditions. Here we propose that MOF-ammonia working pair occupying sorption active sites in the reaction process could significantly improve the effectiveness of thermal energy storage under severe ambient temperature. Furthermore, an innovative ammonia-based working pair is reported for STB enabled by *in-situ* growth of $CaCl_2$@ZIF-8(Zn) composite with a high cyclic/real-time sorption capacity of 0.310/0.406 $g{\cdot}g^{-1}$, which is increased by 43.52% compared with ZIF-8(Zn) under the extreme conditions because of strong host-guest interactions to induce coordination bond rearrangements between $CaCl_2$ and ammonia. Based on MOF composites-ammonia working pairs, a proof-of-concept solar-powered STB is designed and tested. Even under severe condition with the evaporation temperature below 10°C, the gravimetric/volumetric heat storage densities and efficiency of STB can still achieve 401.66 $kJ{\cdot}kg^{-1}$, 72.54 $kWh{\cdot}m^{-3}$, and 85.30% due to strong physicochemical coupling sorption behaviour. The method provides a transformative low-carbon route to upgrade low-grade energy for efficient thermal management.

GRAPHICAL ABSTRACT

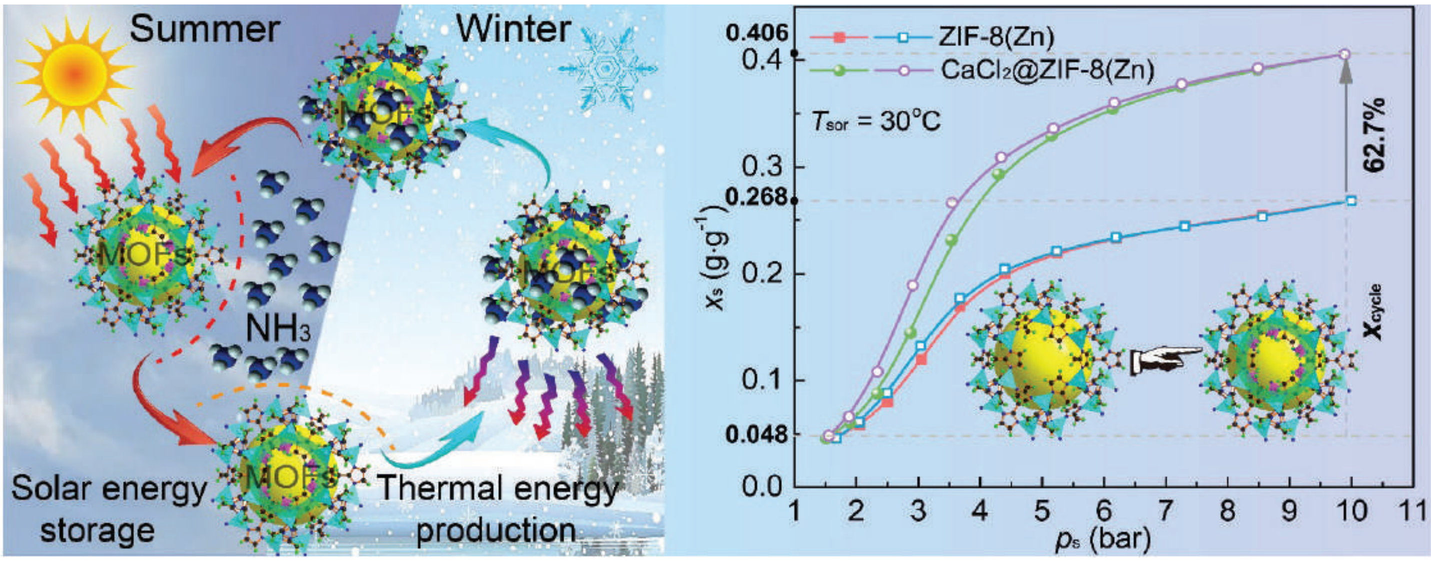

Figure Caption:

Solar-powered seasonal thermal battery is a type of future sustainable technology. In this work, the superb performance of halide @ metal-organic frameworks for ammonia sorption is revealed for transferring the thermal energy from summer to winter with an optimum cyclic/real-time sorption capacity and high thermal energy storage efficiency of 0.31/0.406 g·g-1and 85.30%. It provides a transformative low-carbon route to upgrade low-grade thermal energy for efficient space thermal management.

Biography

Li-Wei Wang is a distinguished professor at the Institute of Refrigeration and Cryogenics, School of Mechanical Engineering, Shanghai Jiao Tong University. As the International Incoming Fellow, she had worked at Warwick University in 2009 and Newcastle University in 2010. The research experience of Prof. Wang mainly focuses on the materials, cycles, and systems for energy conversion with the technology of solid sorption. In the past three years, she has been selected for the global list of highly cited scientists with h-index of 41. The awards she has gotten on the research work included the Second Prize of National Natural Science Award, China Youth Science and Technology Award, the National Natural Science Fund for Distinguished Young Scholars, EU Marie Curie International Incoming Fellowship, Royal Society International Incoming Fellowship, IIR Young Researchers Award, etc.

Effects of argon/nitrogen sputtering gas on the microstructural, crystallographic and piezoelectric properties of AlN thin films

R. Latif[1], M.I.A. Samad[1], M.M. Noor[1], N. Nayan[2], A.S.A. Bakar[3], M. Mansor[3], A.W.M. Zuhdi[4] and **A.A. Hamzah[1]**

[1]Institute of Microengineering and Nanoelectronics (IMEN), Universiti Kebangsaan Malaysia, Malaysia
[2]Microelectronic and Nanotechnology-Shamsuddin Research Centre (MiNT-SRC), Universiti Tun Hussein Onn Malaysia, Malaysia
[3]Low Dimensional Materials Research Centre (LDMRC), Department of Physics, University of Malaya, Malaysia
[4]Institute of Sustainable Energy, Universiti Tenaga Nasional (UNITEN), Malaysia

The growth of highly crystalline c-plane AlN<002> is extremely difficult, entailing high temperature and ultra- high vacuum condition. In sputtering technique, the addition of nitrogen into argon sputtering gas can significantly assist the formation of AlN<002> at low temperature. We incorporated purified nitrogen gas and observed the consistent formation of single crystal <002> AlN thin film layer sputter-deposited on Mo/Si substrate from the AlN ceramic target. Small presence of oxygen content within AlN crystal relates to the preferential growth of AlN<002>. High oxygen content in AlN thin film due to the use of unpurified nitrogen and argon only sputtering gas prefers the formation of AlN <100>. Different AlN crystal structure has shown distinct thin film properties and piezoelectric response. This work provides a method to control the crystal structure of the sputter-deposited AlN thin film layer, either c-plane AlN <002>, a-plane AlN <100> or polycrystalline AlN

Biography

Rhonira Latif received M.Eng degree in electrical and electronic engineering from Cardiff University, Wales, UK in 2008 and Ph.D. degree in electronic engineering from the University of Edinburgh, Scotland, UK in 2012. From 2013 to 2015, she was a Senior Lecturer in Universiti Teknikal Malaysia Melaka, Malaysia. She is currently a Research Fellow in the Institute of Microengineering and Nanoelectronics, Universiti Kebangsaan Malaysia, Selangor, Malaysia. Her research interests include thin film growth using physical vapour deposition, piezoelectric crystals, polymer, metallurgy, MEMS transducers for biomedical applications, biomimetical devices, IC design, signal processing and microfabrication.

Iridium oxide and cobalt hydroxide microfluidic-based potentiometric pH sensor

Qiuchen Dong and **Weiyu Xiao**

Xi'an Jiaotong-Liverpool University, Department of Chemistry, School of Science, China

Microliter volume pH determination is of great importance in the biomedical and industrial applications. The current available pH meter and measurement techniques are hard to reach the high demand of microliter volume pH determination in a repeatable, stable, and sensitivity manner.

Objective: This work aims to fill the gap of microliter volume pH measurements while maintaining good sensing performance.

Scope: The scope of the research lies in the pH sensing with a pH range of 2-12.

Methods: The electrodeposited iridium oxide and cobalt hydroxide along with gold electrode served as working, counter, and reference electrode, respectively. Figure 1 briefly summarized the constructed microfluidic channel in and its planar electrode surface composition. Cyclic voltammetry and Chronopotentiometry was applied for the electrodeposition of iridium oxide and cobalt hydroxide with controlled thickness for fitting with narrow microfluidic channel.

Results: The constructed sensor is able to measure volume for 10–12 μL volume pH measurements with Nernst constant of 55.9 ± 4.4 mV/pH. The electrodeposited thin film was further characterized by scanning electron microscopy (SEM), transmission electron microscopy (TEM), X-ray powder diffraction (XRD), Raman spectrometry, etc. to confirm its morphology and composition. Table 1 has demonstrated different constructed sensors in its sensing performance with control experiment.

Conclusion: The constructed pH sensor was used for human serum sample measurements to confirm the suitability of future applications. The results show that it has only 0.80% variation compared to a commercial pH meter with a limit of detection (LOD, or resolution) of ±0.01 pH. It holds a great potential to be used in the future for microliter volume *in situ* pH measurements.

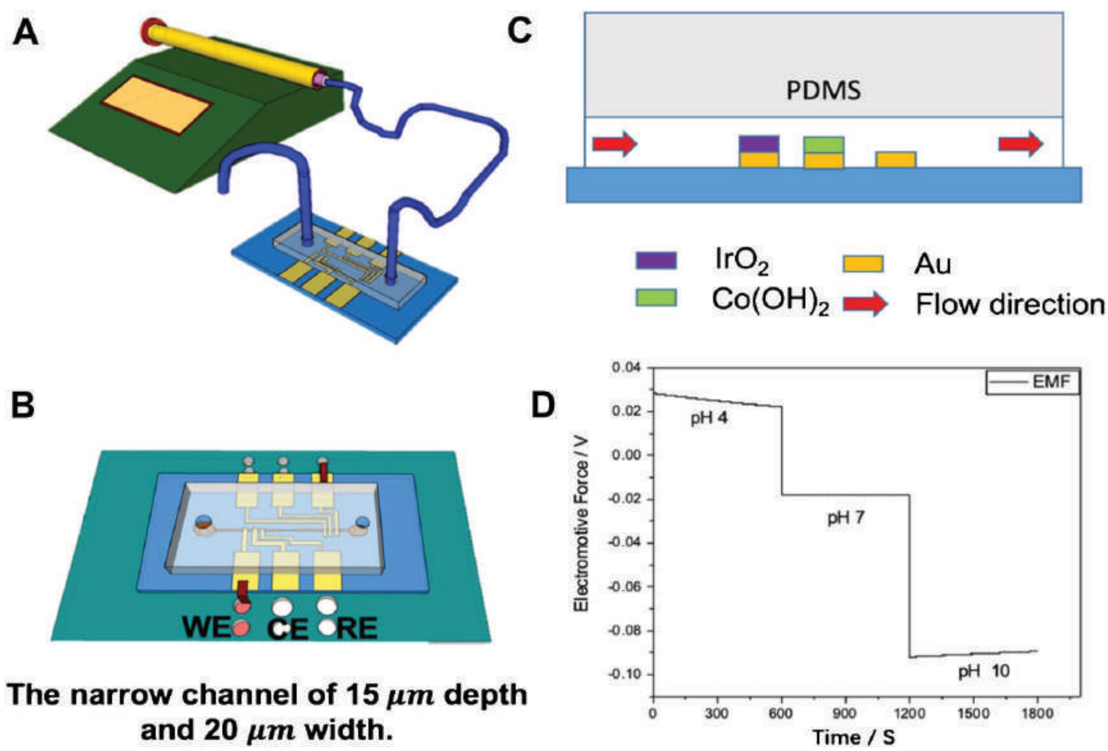

Figure 1 (A) The schematic drawing of the as-prepared microfluidic solid-state pH sensor. The yellow color on the silicon wafer stands for gold patterned microelectrode by photolithography. (B) Polydimethylsiloxane (PDMS) covered on the gold patterned silicon wafer with two pair of gold electrode. (C) A cross-sectional area of the microfluidic channel with electrodeposited iridium oxide and cobalt hydroxide. The liquid flow from left to right indicated by the red arrow. (D) A typical pH response for standard buffer solution.

Table 1. The parameters of 4 different microfluidic-based pH sensors

Sample	IrOx deposition time/s	Co(OH)2 deposition time/s	Electrodeposition Current density/ (A)	pH response mV/pH
micro-IrO_x/Au/Au	150	0	IrOx: 20 A/m^2 $Co(OH)_2$:31 A/m^2	-11.1 ± 0.7
micro-IrOx-150s/ $Co(OH)_2$/Au	150	60		-51.5 ± 6.2
micro-IrOx-60s/ $Co(OH)_2$/Au	60	60		-9.7 ± 4.0
Micro-Au/Au/Au	0	0		-1.6 ± 0.2

Biography

Qiuchen Dong is currently Assistant Professor at Xi'an Jiaotong-Liverpool University in the department of chemistry under School of Science. He obtained his Ph.D. from the University of Connecticut with Professor Yu Lei, and further conducted his postdoctoral research at University of Minnesota with Professor Abdennour Abbas. Qiuchen's research focuses on microfluidic-based chemical sensors and nanomaterials-based gas sensors. He is currently looking for one Ph.D. student with tuition waiver opportunity. Should you have any interest, please contact his at qiuchen.dong@xjtlu.edu.cn.

The use of biomass for fuel optimization of coal-fired power plants

Tri Nguyen and **Huynh Ngoc Tran**

Power Engineering Consulting Company 2 (PECC2), Vietnam

The incorporation of biomass as a supplementary fuel in coal-fired power plants has gained significant attention due to its potential to reduce greenhouse gas emissions and enhance fuel cost efficiency. In this study, we explore the application of biomass in optimizing coal-fired power plant operations by employing a 2D analysis to calculate the behavior of mixed fuel particles in the boiler. Through careful calculations and simulations, a balanced mixture of coal and biomass was formulated to yield an energy release equivalent to that of the conventional coal-only fuel. This optimized fuel mixing demonstrates compatibility with the current operational parameters of the power plant's boiler.

The proposed approach showcases a viable strategy to decrease biomass waste while conserving fuel expenses in power generation. By harnessing the synergies between coal and biomass, this research opens new possibilities for achieving sustainable energy production in coal-fired power plants, reducing environmental impact, and fostering the transition towards cleaner and more cost-effective energy solutions.

Biography

Dr. Tri Nguyen is an R&D engineer at PECC2 who holds a Ph.D. degree in Nuclear Engineering, specializing in Computational Fluid Dynamics (CFD). His academic journey has been driven by a genuine passion for understanding fluid flow and heat transfer within nuclear reactors and heat exchangers.

Throughout his career, he had the privilege of contributing to research and innovation in the field of nuclear and mechanical engineering. His focus on CFD and heat transfer has allowed him to seek ways to improve the safety and efficiency of power systems.

Synthesis of gold nanoparticles in ecofriendly approach and its colorimetric detection of Cd^{2+} ions in real samples analysis

Manjushree Bhattacharyya[1] and **Dr. Maidul Hossain**[2]

[1]Research scholar, Department of Chemistry, Vidyasagar University, India
[2]Assistant professor, Department of Chemistry, Vidyasagar University, India

Now a days environmental pollution derivated from organic toxins and toxic metals is becoming a dangerous factor because of their destructive effects on human health and ecological system. Cadmium is one of the most toxic and hazardous heavy metal to human health and environmental safety. Here in we have demonstrated a new simple, cost-effective, label free and environment friendly colorimetric assay for recognition of Cd^{2+} ions using gold nanoparticles. Formation of HI-AuNPs were characterized by using various spectroscopic analysis such as UV-Visible, TEM, FTIR, EDX, SAED, XRD, FE-SEM, AFM, DLS, Zeta Potential and XPS. The synthesized AuNPs revealed a SPR peak at 539 nm, having spherical shape with 22.24 nm size. The HI-AuNPs probe exhibited extremely selective, sensitive colorimetric response towards Cd^{2+} ions with a visible colour change from red to bluish black within 12 sec. It was assured that aggregation induced sensing mechanism was responsible for colorimetric phenomenon. The detection limit was found to be 5.35 pM, which was far less than the WHO and US-EPA recommended level. In addition, any other metal ions even Zn^{2+} can not interfere in this experiment, though Zn^{2+} and Cd^{2+} possess similar chemical properties. Besides, this proposed method was successfully applied for determination of Cd^{2+} ions in practical purpose such as real sample analysis. The results designated that this simple, cost-effective, label free, environment friendly, selective and sensitive sensing approach has good potential activity in real applications also.

Biography

Manjushree Bhattacharyya is research scholar (UGC-NET- SRF) in department of Chemistry, Vidyasagar University, West Bengal, India. She did her Master's in Vidyasagar University and pursuing her Ph.D. degree from this university. Her research interest is the development of nanoparticles based sensor for the colorimetric determination of toxic metal ions.

Optimization of vitamin B12 nano-emulsification and encapsulation using spontaneous emulsification

Shabnam Karbalaei-saleh, Shima Yousefi and **Masoud Honarvar**

Department of Agriculture and Food Science, Islamic Azad University, Iran

In this study, the use of low-energy methods for nano-emulsification of vitamin B12 was investigated to protect this bioactive substance. The effects of sunflower oil concentrations (4-8%), Tween 80(8-16%), and vitamin B12 (5-15%) on the physicochemical properties of B12 nano-emulsion were evaluated using response surface methodology (RSM). The results indicated that the quadratic model was the most fitting model for experimental data. Optimization revealed that the optimal formulation contained 6.5% sunflower oil, 9.6% Tween 80, and 13% vitamin B12, resulting in maximum efficiency, viscosity, and vitamin B12 content, as well as minimum pH, viscosity, turbidity, efficiency, vitamin B12, p-Anisidine index, PDI, and particle size were 7.24, 17.0024 cp, 2.19, 51.98%, 5.54 ppm, 0.01, 0.34, and 322nm, respectively. This study highlights the effectiveness of spontaneous emulsification as a carrier for the encapsulation of bioactive compounds.

Biography

Recently, she has been working as a beverage production manager in Soli-co Group (Tehran dairy production complex), and for the past three years, she has been working as a research and development manager in the beverage industry in Soli-co Group. Before that, she worked in the production of non-alcoholic beer, drinking water and energy drinks in Castle-Noosh Co.

Synthesis of a new camptothecin analogue useful for enhanced topoisomerase 1 inhibition activity

Shraddha Upadhyay

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The present invention relates to synthesis of a new Camptothecin analogue useful for enhanced Topoisomerase 1 inhibition activity.

The main purpose of this project is to synthesize a novel camptothecin (CPT) analogue drug which could possess more potent anti-cancer activity. Since the CPT structure was available, early efforts were developed to synthesize CPT analogues. However, these methods are not very useful for synthesizing CPT analogues. Based on the previous works, we planned to continuously explore the synthesis of modified CPT analogues. Here, a scalable, efficient and concise route to construct the key core of CPT-family alkaloids by coupling the tricyclic ABC compound with the novel ring E by using inexpensive and readily available materials is employed. An isosteric replacement of 6-memberd unique bifunctional (4-1-hydroxy) lactone ring with 5-member ring might be a useful molecule with higher activity and it may also provide additional information pertaining to SAR. It may reduce the electrophilicity of the lactone considerably and hence, decreases the rate of lactone hydrolysis. This work confirms CPT analogue as a promising template for the elaboration of new anticancer agents. The introduction of a fused novel heterocyclic ring and the carbonyl function of CPT five-member lactone ring brings relatively modest, but significant, quantitative improvement in terms of cleavable complex stabilization and cytotoxicity. More importantly, it brings some qualitative changes in terms of pharmacokinetics and DNA sequence specificity, which may offer new therapeutic opportunities. In summary, a novel synthesis of camptothecin analogue has been achieved from commercially available reagents. This synthesis should be amenable to the large-scale preparation of CPT analogues of medicinal importance. Efforts will be made to actively engage industries in the advanced stages of this project so that faster commercialization of this technology can be achieved.

Biography

Dr. Shraddha currently working as Assistant Professor in Department of Applied Science and Humanities, Subharti Institute of Technology and Engineering at Swami Vivekananda Subharti University, Meerut. Her PhD degree awarded in year 2012 from Banaras Hindu University, Varanasi and PhD topic was "Fused Nitrogen Hetero Cycles: Synthesis of Imidazo, Pyrimido and Pyrrolo Annulated Quinolines. She has also worked with Indian Institute of science (IISc), Bangalore, National Institute of Immunology (NII), Delhi, as Research Associate from 2012-2014, and Indian Institute of Technology (IIT), Delhi, from 2014-2015 as post-Doc Fellow. She has total 04 Patents out of which two are granted by Gov. of India and two are near to grant. Rather than this she also published 18+ research papers in well reputed journals such as Tetrahedron, Tetrahedron letter. She is the National level Gold Medalist and also the awardees of 03 National Awards as Young Scientist and Young Achiever. She has attended more than 65+ National and Inter-National World Congress, Seminar, Conference, FDP etc, collectively. She published one e-book, working as Chief editorial member of 4 National and Inter-National journals and organized multiple National Webinar.

Incorporation of Ag-doped ZnO nanorod through graphite hybridization: Effective approach for degradation of ciprofloxacin

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Ciprofloxacin (CIP) diffusion into environment has long-term consequence for the ecosystem and people's health and considering its ecotoxicity and tendency to inspire resistance in species of bacteria, the elimination of CIP from the aquatic environment is a reason for worry. To remove the CIP from aqueous solution, ZnO-Ag-Gp nanocomposite exhibited efficient photocatalytic properties. The biopersistent CIP is pervasive in surface water and also hazardous to human and animal health. This study utilized the hydrothermal technique to prepare Ag-doped ZnO hybridizing Graphite (Gp) sheet (ZnO-Ag-Gp) to degrade pharmaceuticals pollutant CIP from an aqueous medium. The structural and chemical compositions of the photocatalysts were determined by XRD, FTIR and XPS analysis. FESEM and TEM images revealed the nanorod ZnO with round shape Ag distributed on a Gp surface. The reduced bandgap of the ZnO-Ag-Gp sample enhanced the photocatalytic property which was measured by using UV-vis Spectroscopy. Dose optimization study found that 1.2g/L is optimum for single (ZnO) and binary (ZnO-Gp and ZnO-Ag), where 0.3g/L ternary (ZnO-Ag-Gp) exhibited maximum degradation efficiency (98%) within 60 min for 5mg/L CIP. Pseudo 1st order reaction kinetics rate was found highest for ZnO-Ag-Gp (0.05983 min-1) and it decreased to 0.03428 min-1 for annealed sample. Removal efficiency decreased to only 90.97% at 5th run and hydroxyl radicals played a vital role to degrade CIP from aqueous solution. UV/ZnO-Ag-Gp will be a promising technique to degrade wide-ranging pharmaceutical antibiotics from the aquatic medium.

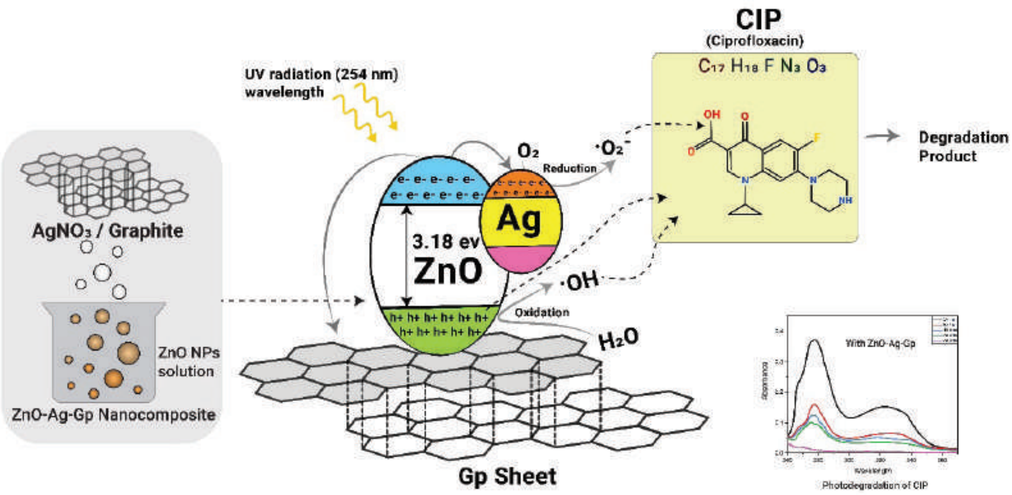

Figure 1: Hybridization of synthesized materials and the degradation phenomena of Ciprofloxacin

Table 1: Comparative study of the Rate constants (1/min) before and after annealing

Photocata-lysts	Degradation time(min)		% of degradation		Kinetics Model	Rate constant (1/min)	
	before annealing	after annealing	before annealing	after annealing		before annealing	after annealing
ZnO	60	120	92	91.3	Pseudo 1st Order	0.0457	0.02381
ZnO-Gp	60	120	93	92.2		0.04911	0.0269
ZnO-Ag	60	120	94	94.9		0.0492	0.03208
ZnO-Ag-Gp	60	120	98	97.5		0.05983	0.03428

Biography

Dr. Tanu Shree Roy recently completed her doctoral degree in Condensed matter Physics (Nanomaterials) at Jahangirnagar University, where her research focused on the **Development of Ag/ZnO nanoparticles: Coating fabrics and removing antibiotics addressing medical and environmental issues.** Throughout her doctoral studies, she has gained a deep understanding of Different types of Synthesis methods of nanoparticles and coating techniques on fabrics and the Advanced Oxidation process for removing antibiotics from an aqueous medium. Her research has been published in reputable journals, including [Heliyon (Elsevier)], Journal of Natural Fibers in Taylor & Francis and many more. She have presented her work at several conferences, such as International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu(ICSTB-2021), and BCSIR Congress 2019. Now she is working as an Associate Professor in Department of Physics in Bangladesh University of Textiles. She has completed her MSc. and BSc in Physics at Jahangirnagar University.

Analysis and optimization of plant layout using computerized algorithms for relative allocation of facilities

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JSS Academy of Technical Education, India
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Facility layout design is the field of selecting the most effective arrangement of physical facilities to allow the greater efficiency in the combination of resources to produce a product. The facility planning plays a vital role in manufacturing process due to there in achieving an efficient process flow it reduces the total cost of manufacturing activity and provides optimum space to give maximum output with minimum effort at the floor area.

The manufacturing facility needs to be responsive to the frequent changes in demand while minimizing material handling. By keeping material moving faster, manufacturing time is also reduced. The objective of the facility planning is to achieve the lower work-in process, inventory, lower material handling and production cost. The different method or techniques are employed to design the facility layout.

Factory layout involves the arrangement and selection of machines, material handling devices, material handling path, resulting in the reduction of cost and time involved in manufacturing a product. The facilities layout problem, which is an integral part of facilities design, aims to spatially locate the production units within a facility subject to design criteria and area limitations, with one or multiple objectives

In this paper, a computerized analysis of layout algorithm is implemented using Computerized Relative Allocation of Facilities Technique-CRAFT, Automated Layout Design Program (ALDEP) technique and Systematic Layout Planning (SLP) for optimization of existing layout. The utilization of the layout is increased by changing the position of the equipment's or by introducing a new machine into the layout. With the advent of software algorithm which allows the user to build models and analyse until satisfactory result is obtained.

Biography

Dr. Vijay Kumar M is a Mechanical Engineer graduated from RV College of Engineering, Bangalore and post graduated in Production Engineering and Systems Technology from, UBDT, Davangere, Kuvempu University and PhD from SJCE, Mysore under Visvesvaraya Technological University, Belgaum. He has 27 years of teaching experience and 2 years of industry experience. His area of specialization is on Simulation of Dynamic Scheduling of Flexible manufacturing Systems using Genetic Algorithm. His subject interest are Artificial Intelligence, Expert Systems, Product Design and Manufacturing, Robotics, Resource Planning and Project Management.

He is also certified on Part and Surface Design from Dassault Systems. He also worked as a Coordinator and trainer for 3years on Product Lifecycle Management software "ËNOVIA" in collaboration with Ministry of Education, France and Dassault Systems, France.

He has guided 4 doctorates under Visvesvaraya Technological University, Belgaum, India and have 40 publications in peer reviewed journals.

Process intensification by spherical crystallization

Jyothi Thati, Vijaya Laxmi Avula and **Sailu Chintha**

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Spherical agglomeration is the modern particle design technique that transforms the fine crystals formed during the crystallization process into agglomerated spheres.

Benzoic acid solid was dissolved in methanol, for this solution measured amount of bridging liquid solvent was added for agglomeration of crystals. This whole solution was added to the anti-solvent (water) which was taken in agitated jacketed crystallizer. Initially small crystals are produced and agglomerated through the continuous addition of small amount of bridging liquid. Sodium benzoate was dissolved in water at room temperature taken in one beaker and hydrochloric acid dissolved in water taken in another beaker. Sodium benzoate and hydrochloric acid were sent to the crystallizer with different feed rates through peristaltic pump under continuous agitation. Small amount of Bridging liquid was added dropwise to the crystallizer. The whole solution was stirred for one hour and separated agglomerates using filtration equipment and dried at room temperature for 24 hrs.

This work focuses on intensifying the process by combining reaction, crystallization and agglomeration of benzoic acid in crystallizer to obtain high quality product agglomerates. Benzoic acid agglomerates were previously prepared as spherical agglomerates by using a semi batch-wise crystallizer. In which the process was intensified by reducing the number of unit operations like separation, crystallization, granulation and filtration etc. In this present work, reactive spherical agglomeration method development was done successfully by combining process steps like reaction, crystallization and agglomeration.

Spherical agglomerates were prepared successfully by spherical agglomeration and reactive spherical crystallization methods. It has been found that bridging liquid addition during the crystallization leads to advantageous properties. As bridging liquid quantity and stirring rate increases, size of the agglomerates increases. In this work, effect of temperature on benzoic acid agglomerates prepared by spherical agglomeration method was studied and observed that with increasing temperature average agglomerate size was decreased. Particle size distribution and morphology improved with increasing process time at different temperatures. The total number of particles with residence time was calculated and found that the total number of particles decreased with increasing residence time, but become denser and bigger with time.

Main objectives include

- To prepare spherical agglomerates for the drugs which have poor downstream and end use properties along with identification and the influence of process parameters.
- To understand the mechanism behind the Spherical agglomeration
- To study the process of spherical agglomeration of different drugs
- To study reactive crystallization of API
- To prepare spherical agglomerates using reactive spherical agglomeration process

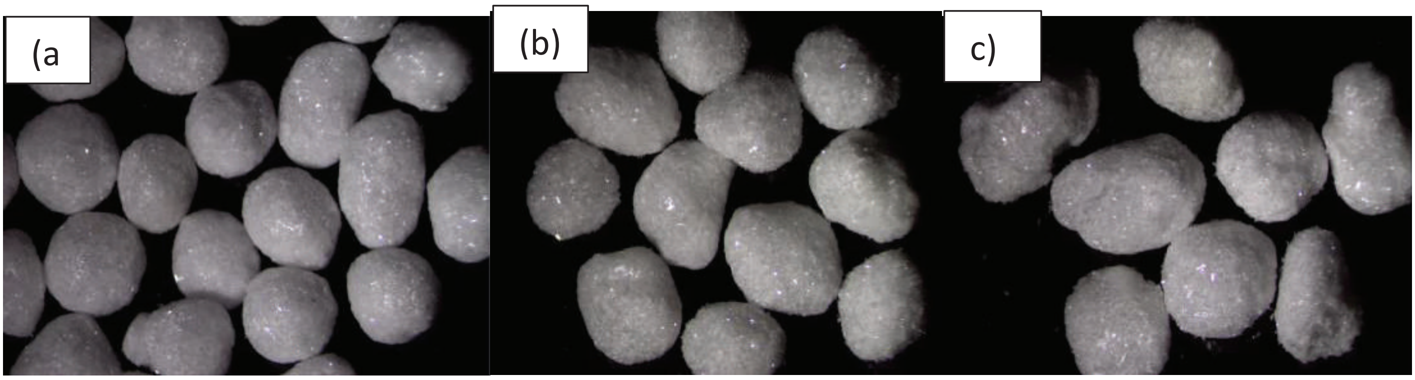

Fig. Morphology of spherical agglomerates using different bridging liquids (a) Toluene-1000 mm (b) Chloroform -1500 mm (c) heptane- 2000 mm. Benzoic acid conc. (0.34g/ml) Agitator speed=700rpm.

Biography

Dr. Jyothi Thati, a dedicated professional in Chemical Engineering, currently serves as a UGC-Assistant Professor at the Department of Chemical Engineering, University College of Technology, Osmania University, Hyderabad. Born on August 23, 1979, she has excelled in her career, focusing on teaching and research excellence.

Dr. Jyothi holds a Ph.D. from the Royal Institute of Technology (KTH), Sweden, earned in 2011. Her educational journey includes undergraduate and postgraduate degrees from the University College of Technology, Osmania University, completed in 2001 and 2003, respectively.

Throughout her career, Jyothi has undertaken key roles, such as UGC-Assistant Professor since February 2018, Principal Investigator for DST-WOS A UCT, OU from September 2016 to January 2018, and Assistant Professor (C) from March 2014 to August 2016 at Osmania University. She has also contributed significantly as a Post Doctoral Researcher at ISPT, Netherlands, from July 2011 to November 2012.

Dr. Jyothi's expertise lies in Chemical Engineering, specializing in Separations and Waste Water Treatment. Her impactful research and commitment to academic excellence underscore her valuable contributions to the field.

First-principle investigations of structural, electronic, optical and mechanical properties of inorganic halide perovskite $KAgR_3$ (R = Cl and F) materials for water splitting degradation applications

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[2]Faculty of Resilience, Rabdan Academy, United Arab Emirates

Water splitting is a green energy source with a low-cost process and high-efficiency production to meet energy demands. Herein, we studied the electronic, structural, optical, and mechanical properties of potassium-based perovskite $KAgR_3$ (R = Cl and F) materials via density function theory. Structural of the compounds are cubic based nature with space group 221 (pm3m). Thermodynamically and structural stability are confirmed by the tolerance factor and formation energy of the compounds $KAgF_3$ and $KAgCl_3$, which are (0.99, 0.90) and (-3.864, -2.952) eV, respectively. According to the electronic persona, compounds have half-metallic (semiconductor) properties with an indirect bandgap of 2.25 eV and 1.10 eV for $KAgF_3$ and $KAgCl_3$. According to the Born Stability, Poison's ratio, and Pugh's ratio criteria, $KAgF_3$ and $KAgCl_3$ are in the cubic phase, stable, and ductile nature. The results show that our compound is helpful for degradation of water splitting applications.

Biography

Dr. Waqar is working as an Assistant Professor at Zayed Military University, Rabdan Academy, Abu Dhabi, UAE. Prior joining to Rabdan Academy, Dr. Waqar was working as an Assistant Professor at the Institute of Physics, The Islamia University of Bahawalpur, Pakistan.

Dr. Waqar has done his bachelor in Physics, and started his academic career as an Applied Physics Lab Instructor from National University of Sciences and Technology (NUST), where he obtained his master degree. After obtaining his PhD degree from The University of Hong Kong (HKU), Dr. Waqar worked as a Research Assistant at HKU. During his Doctorate, he has also been working as a teaching assistant for different Physics courses.

In July, 2019, Dr. Waqar joined the Southern University of Science and Technology, Shenzhen, China as a Postdoc and worked till July, 2021. Dr. Waqar has a vast experience of teaching physics both at undergraduate and postgraduate levels, and also has a good publication record in peer reviewed journal.

Spectroscopy of cocaine and its isomers

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[2]ITNA Institut, University of Cheikh Anta Diop, Senega
[3]Institut für Physikalische Chemie, Universit¨at Freiburg, Germany

The spectroscopy of R-cocaine and its enantiomer S-cocaine has been carried out using density functional theory a common powerful spectroscopic method in distinguishing between enantiomers. We compute conventional spectra in the infrared and ultraviolet frequency and validate the results by comparing them to available experimental data.

Using the B3LYP functional, the calculated IR frequencies and intensities agree well with experimental spectra, and the corresponding normal modes have been analyzed. 1H and 13C NMR experimental chemical shifts have been well reproduced using the gauge independent atomic orbital method. However, In the UV/V is range, the M06-L functional shows a significant improvement compared to B3LYP.

The enantiomeric behavior of the r-cocaine and s-cocaine isomers cannot be reproduced unless the conformational effects are considered. Consequently, we compute a weighted average spectrum for the ten lowest conformations up to 3.39 kcal/mol. Simulated Vibrational Circular Dichroïsm (VCD) and Electron Circular Dichroïsm (ECD) spectra of both isomers exhibit spectra with pronounced features of identical magnitude, making their identification unambiguous.

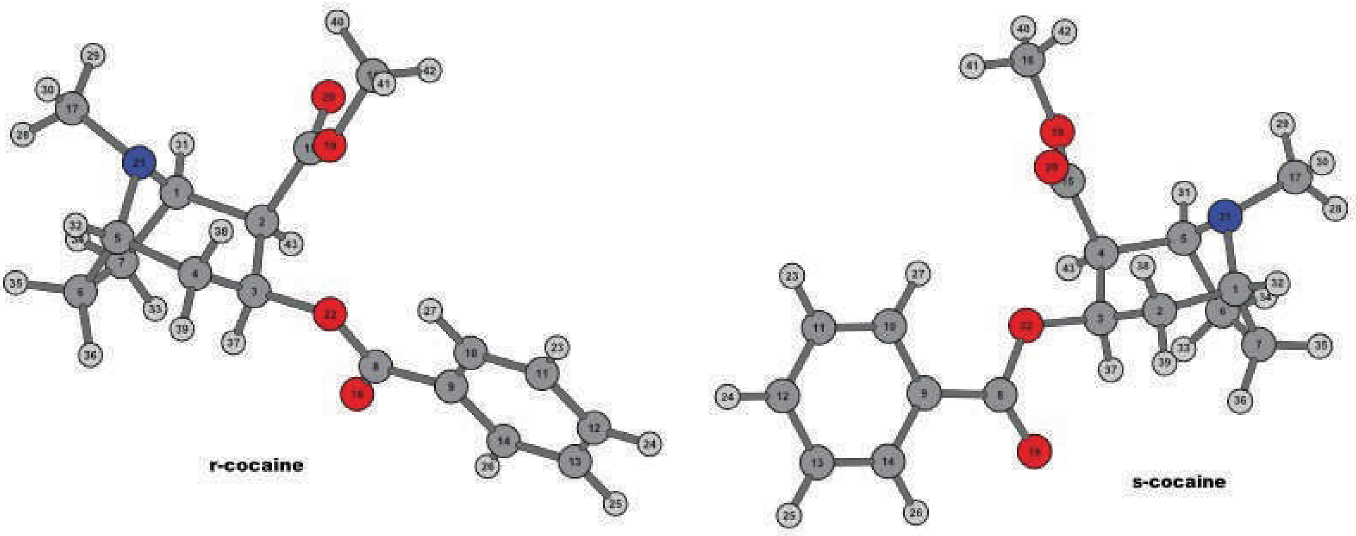

Fig. 1. Optimized structure of r-cocaine.

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Prospects for hydrogen fuel cell vehicles to decarbonize road transport

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Sabanci University, Türkiye

This paper explores the role of hydrogen fuel cell vehicles (HFCVs) in helping to meet global climate goals of limiting long-term greenhouse gas (GHG) emissions to 1.5 °C. Utilizing the GREET Model and data from the International Energy Agency (IEA), the study comprehensively compares the full fuel-cycle emission profiles of HFCVs and battery electric vehicles (BEVs). A key focus is the relationship between the carbon intensity of the electric grid and GHG emissions, particularly when HFCVs are refueled via electrolyzers and BEVs are charged using the same grid.

The research finds that HFCVs generate significantly higher emissions when refueled from outlets producing hydrogen via grid electricity electrolysis. The study highlights that countries with high-GHG electric grids or without clear emission reduction paths would not benefit optimally from adopting HFCVs powered by grid-generated hydrogen. When renewable energy sources power the grid, the emissions for both vehicle types converge towards zero. he gCO2e/mi for BEVs and HFCVs are also calculated when the electricity is produced from renewable energy resources.

The paper quantifies emissions, showing that HFCVs refueled with hydrogen from natural gas without carbon capture utilization and storage (CCUS) emit 105 gCO2e/mile, which nearly triples to 247 gCO2e/mile without CCUS. This emphasizes the importance of integrating CCUS in reducing carbon footprints in hydrogen transportation and climate change mitigation.

The study also delves into forecasts on hydrogen production costs and supply scenarios for 2021, 2030, and 2050, focusing on renewable energy sources (solar PV and wind) and CCUS-equipped facilities. It discusses the cost implications of hydrogen delivery over various distances and the challenges of integrating variable renewable energy sources. The need for effective energy storage solutions is highlighted in the context of the energy transition, particularly with the growing dominance of solar PV and wind energy. This comprehensive analysis aids in understanding the evolving hydrogen supply dynamics and their possible impacts on the adoption of HFCVs.

Biography

Dr. Mehmet Doğan Üçok serves as Coordinator of the Sabanci University Istanbul International Center for Energy and Climate (IICEC) since 2012, in charge of coordinating progress towards achieving the overall objectives of the Center. Üçok holds a Ph.D. in National and International Security Strategies from the Turkish General Staff War Colleges Command, Strategic Researches Institute (2012), with specialization in Energy Security. He received his MA in Social Sciences (Master of Arts Program in Social Sciences - MAPSS) from The University of Chicago, USA (2004) and his BSc in Economics and Management from the London School of Economics (External Programme) and from the İstanbul Bilgi University Honors Programme (2002). Üçok's area of interest encompasses national and international security strategies, energy policy, geopolitics of energy security, foreign policy formation and diplomacy.

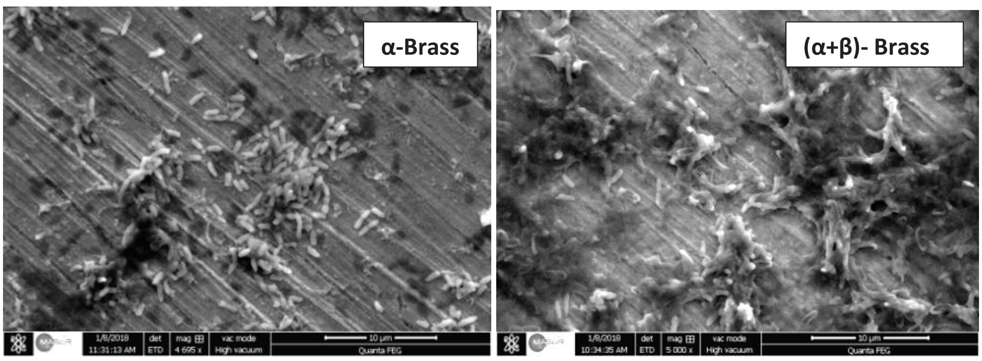
Study of the influence of *Pseudomonas aeruginosa* on α brass and (α + β) brass behavior against corrosion in drinking water

M. Rkayae, M. Ebn Touhami, Y. Baymou, Y. Hassani, K. Elgoufifa and **M. Allam**

Ibn Tofail University, Morocco

To construct a clear idea about the reciprocal influence between *Pseudomonas aeruginosa*'s bacterium and the metal surface of Cu/Zn alloys [α-brass and (α + β)-brass]. This work presents a detailed study of the corrosion behavior of these alloys in drinking water and the electrochemical phenomena that occur during the formation of the biofilm. This study is based on the joint use of microbiological and electrochemical methods to reveal the effects generated between the bacterium and the metallic surface. This study was conducted by stationary electrochemical methods of potential monitoring and polarization curves, and trans-methods (electrochemical impedance spectroscopy) to evaluate the effect of the bacteria on the corrosion behavior of α-brass and (α + β)-brass alloys. The Inductively Coupled Plasma Spectroscopy method was used to monitor the concentration evolution of Cu^{2+} and Zn^{2+} ions as a function of time and to determine also the dezincification factors. The monitoring of the bacteria evolution on the surface is ensured by microbiological techniques (enumeration of viable bacteria adherent and total adherent). The *Pseudomonas aeruginosa*'s strain has a remarkable effect on the corrosion and dezincification of both alloys, this is due to the formation of the biofilm which blocks the formation of a film of protective oxides on the surface. However, its effect on α-brass is largely inferior to (α + β)-brass, this may be related to the surface composition and the simultaneous presence of certain elements such as Cu, Ni and Al.

	Time (Days)	E_{corr}(mV/ECS)	I_{corr}(µA/cm^2)	βa(mV.dec^{-1})	-βc(mV.dec^{-1})
α-Brass	1	-128	11,9	195,8	235,0
	7	-95	7,38	215,7	207,7
	14	-51	5,17	243,5	230,1
α-Brass+ *Pa*	1	-112	12,4	222,4	252,5
	7	-133	15,2	237,2	190,5
	14	-178	17,9	224,3	170,6
(α+β) +Brass	1	-179	14,3	217,1	219,7
	7	-109	11,1	226,4	201,2
	14	-107	11,4	245,6	211,3
(α+β)-Brass+ *Pa*	1	-176	16,8	241,6	263,1
	7	-215	31,6	255,7	241,6
	14	-254	49,4	251,9	213,4



Biography

Rkayae (currently El Mestari) is a PhD student in chemistry during which she attended many research conferences. she's passionate about microbiology and loves working on bacteria and metals she combined between electrochemistry and microbiology methods and got results about two phenomena; biofilm formation and its electrochemical effect on metallic surface

The dynamic pseudo-equilibrium moisture content, a new property of materials when they are drying, the practical limit for the thin layer drying kinetics

Faneite. Alexis[1] and **Angós. Ignacio**[2]

[1]University of Zulia, Venezuela
[2]Public University of Navarre, Spain

The objective of this work is to present the procedure to determine the dynamic pseudo-equilibrium moisture content (Xdpe), during the determination of the experimental thin layer drying kinetics of any material, as well as, to propose the “practical moisture ratio” to be used in the modeling of the drying kinetics. The scope of this work includes the problem and justification, the background of the finding and the theoretical explanation, the experimental method for the determination of Xdpe and the mathematical method for incorporating Xdpe into the drying kinetic equation, as well as the results published so far on the drying kinetics of materials of biological origin, which validate this new property, and the conclusions. The proposed experimental method is based on the traditional method of determining drying curves, but verifying the abrupt change in the kinetic behavior at the end of the determination of every one of them, thereby guaranteeing the identification of an Xdpe for each condition. The curves are modeled in terms of the "practical moisture ratio", which is calculated as the "theoretical moisture ratio", but replacing Xe with Xdpe. These Xdpes are modeled, and the resulting model is incorporated into the kinetic equation that best represents the behavior of the drying curves. Xdpe was found in the drying of green banana shells, cassava root peeled and chopped into discs, and cassava leaves, obtaining an appropriate kinetic equation for the simulation and design of industrial dryers for these materials. The Xe was calculated for the case of cassava root, being effectively below Xdpe. It is concluded that there is a transition stage between the kinetic stage and the thermodynamic equilibrium, which, experimentally, looks like a real equilibrium. The beginning of this transition stage or dynamic pseudo-equilibrium stage would mark the end of the prediction of drying kinetics models.

Biography

Professor Alexis Faneite is Chemical Engineer (Master level), in the process of retiring from the University of Zulia (LUZ), with the position of Associate Professor, and candidate to Engineering Doctor, with 48 years old. He is currently the professor of Thermodynamics Applied at the School of Chemical Engineering, and professor of Separation Processes in the Master 's degree of Chemical Engineering (both in LUZ). He is Editor of a special issue of Sustainability journal (MDPI), Lead Editor of the CRC Press Book Cashew Apple: Opportunities for Industrialization (ISBN 978-1-032-22934-8), and Editor of the Nova Science Book the Cassava crop. Cultivation, Potential Uses and Food Security. He has published 2 book chapters, 15 scientific articles, he has 84 citations, an h index of 6, and an i10 index of 3. He has attended 35 scientific events in countries such as India, the United States, Guatemala, Colombia, Spain, Italy, Honduras, and Venezuela.

Unraveling the effects of NADH on experimental diabetes in murine model and its implications in beta cells survival

Benachour Karine and **Abdellatif Amina**

Laboratory of Experimental Biology and Pharmacology, Algeria

There is no cure for type 2 diabetes, although a combination of diet and exercise can achieve near-normal blood sugar without medication. Type 2 diabetes is an ongoing disease whose symptoms can recur after a long asymptomatic period. Our research provides the first evidence of the efficacy of NADH in preventing symptoms associated with experimental diabetes in rats by normalizing blood sugar levels and protecting beta cells from massive destruction.

Following the observations stating the undeniable efficacy of its rapid energy delivery in chronic fatigue syndrome and its dramatic responsiveness in many autoimmune diseases such as Parkinson's and Alzheimer's, a concept of preventive energy intake was developed to reverse the deleterious effects of oxidative stress on beta cell function in a prediabetic setting. Considering that beta cell death is the end result of chronic energy loss in diabetes, the ability to prevent this irreversible state through systematic and substantial energy supplementation will ultimately prevent beta cell death and organ loss of function.

A previous study reported the undeniable blood glucose lowering effect of NADH in patients with diabetes, raising the question of the mechanism by which NADH protects or rescues pancreatic beta cells from impending death. Accordingly, the present work was designed to highlight the main histological changes observed in pancreatic islets pre-treated with a unique NADH intraperitoneal injection in an experimental STZ-induced diabetes model. Our results indicate that NADH has an effective potential protective effect against STZ-induced diabetes by dramatically reducing the highly detrimental necrotic death pathway that impedes tissue repair, probably by restoring NAD+ and ATP levels in beta cells. To decipher the full mechanism of the protective properties of NADH, further studies on the systematic addition of more NADH during the experiment are needed.

In conclusion, the present study highlights for the first time the protective properties of NADH in a model of experimental diabetes by preventing hyperglycemia and massive beta cell death.

Biography

After obtaining her PhD in veterinary medicine from the Ludwig-Maximilan-University of Munich (Germany), Prof Benachour joined the Department of Experimental Pharmacology at the Faculty of Medicine of Louisiana State University in the USA. Among her achievements, Professor Benachour focused on the development of animal models of atherosclerosis in order to study the role of the repair enzyme PARP-1 in the development of atherosclerosis plaques. Her promising results were published in the prestigious journal “Circulation” of The American Heart Association. Furthermore, the results obtained regarding the role of apoptosis in the genesis of colon cancer were published in the journal “Carcenogenesis”. As a collaborator, Professor Benachour published results in the journal “The Journal of Immunology” of The American Association of Immunologists.

Back in her home country, Algeria, Professor Benachour held positions as Lecturer in general and special Anatomy-Pathology, then University Professor in metabolic diseases and cancer. Moreover, Professor Benachour held the position of head of the Masters in Medical Biology and Cellular Biology and Pathology in 2016.

Currently Professor Benachour holds the position of Director of the Laboratory of Experimental Biology and Pharmacology. In collaboration with English and American universities, she directs several doctoral theses on the effects of NADH, diabetes, colon cancer and COPD, chronic obstructive pulmonary disease.

Novel 4th generation TKI targeting T790M resistance mutation in EGFR: Exploring its binding dynamics by a combined in silico/experimental approach

C. Minnelli[1], E. Laudadio[1], G. Mobbili[1], L. Sorci[1], E. Romagnoli[1], P. Storici[2], R. Galeazzi[1], G. Birarda[2], F. Piccirilli[2] and **A. Toma[3]**

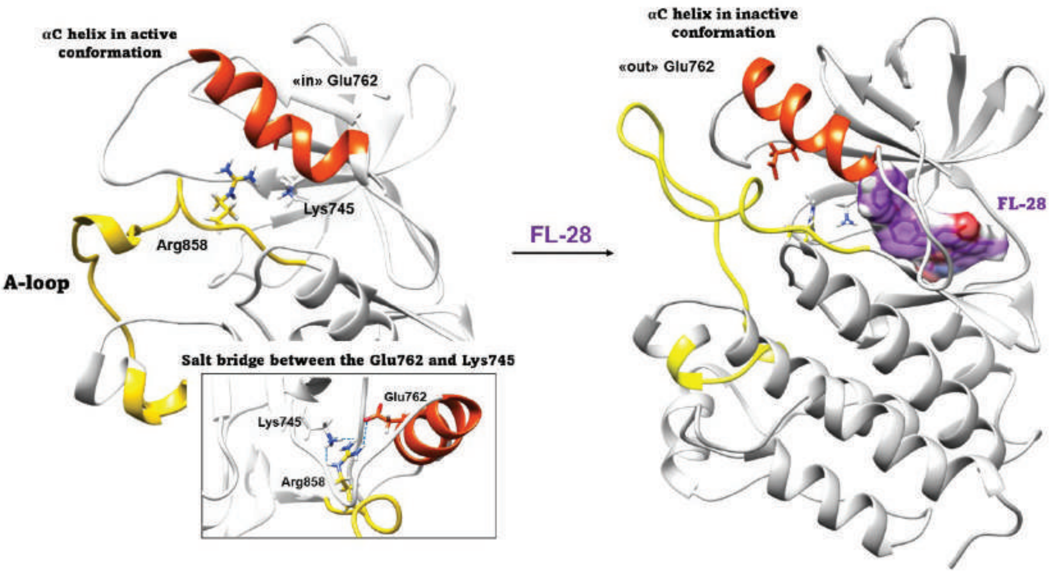
[1]Polythecnic University of Marche, Italy
[2]Elettra Sincrotrone Trieste, Basovizza, Italy
[3]Italian Institute of Technology (IIT), Italy

Targeted therapy with tyrosine kinase inhibitors (TKIs) is the standard of care for patients with non-small cell lung cancer (NSCLC) harboring mutations of the epidermal growth factor receptor (EGFR) gene. First-line therapy of mutated EGFR forms, such as L858R/T790M, is often Osimertinib, a 3rd generation irreversible TKI, but new EGFR mutations emerged. To date, the C797S mutation represents the main on-target resistance mechanisms to OSI (22-40% of all mutations), which prevents the formation of the covalent bond with 797 residues. In this context, considerable efforts have been devoted to the development of a next generation of reversible EGFR inhibitors selectively targeting EGFR L858R/T790M.

Here, we report the *in silico* design, synthesis, and biological evaluation of a novel chemical entity as a reversible wild-type sparing EGFR inhibitor. Starting from our previous work, the 6-(4-nitrophenoxy)-2-(3-phenoxyphenyl)-4H-chromen-4-one **(FL-4)** was rationally modified to increase the potency and efficacy toward EGFR L858R/T790M mutant. Every compound was virtually screened against mutant EGFR and those showing higher binding affinity was synthetized and tested in an activity-based enzyme assay against EGFR-wt and -L858R/T790M. From the results obtained a novel TKI **(FL-28)** was identified with an IC50 25-times lower with respect to **FL-4** for the EGFR L858R/T790M form (Table).

	Kinase activity (IC50, μM)			
Entry	**Wild type**	**L858R/T790M**	**Selective Index**	**LogP**
OSIMERTINIB	5	0.09	56	5.2
FL-4	> 150	12	> 13	6.9
FL-28	25	0.5	50	4

The ability of **FL-28** to selectively targets EGFR L858R/T790M signalling activation was assessed in NSCLC H1975 cell line. Finally, to provide insights on the conformational variations of EGFR induced by **FL-28,** a previous optimized nanoplasmonic sensor has been used as a platform for the protein binding studies. Therefore, EGFR-wt and mutant EGFR proteins were alternatively anchored on Surface-Enhanced Infrared Absorption (SEIRA) nanoantennas. Results suggested variations of helix hydration, ascribable to the ability of compounds to induce the transition of mutant EGFR from the active to the inactive EGFR conformation (Figure).



Biography

Cristina Minnelli (female) was born in 1991; she received a master's degree in Molecular and Applied Biology (summa cum laude) in 2016 and PhD in Applied Biomolecular Sciences in 2019. She won an AIRC Fellowships for Italy in 2018 and is currently researcher in organic chemistry at University Polytechnic of Marche. She is a member of Italian Chemistry Society. She has been Principal Investigator of two FIRC-AIRC projects. He spent three months at Institute Laue Langevin, Grenoble (France) to characterize drug delivery formulations. Dr. Minnelli is author of 40 publications in SCOPUS journals, 40% of which as the main author and she is coauthor of 2 patent (2019 and 2023).

Metal complexes for quantum energy technologies at room temperature

C. Cruz

Federal University of Western Bahia, Brazil

The development of quantum technologies at room temperature is an actual challenge to overcome. The quantum properties of advanced materials must be optimized to preserve their quantumness at such high temperatures. In this scenario, low-dimensional metal complexes (LDMC) present themselves as robust platforms for room-temperature quantum devices. These materials exhibit remarkable stability in their quantum properties, even when subjected to external disturbances such as high temperatures, magnetic fields, and pressures. This stability positions these systems as promising platforms for the development of emerging quantum energy technologies, such as new quantum energy storage devices, quantum batteries, and quantum heat engines. For instance, their ability to maintain quantum behavior at high temperatures enables efficient energy storage and conversion. These advancements highlight the immense potential of LDMC in driving the next generation of quantum energy technologies. Current approaches for such devices involve systems that demand highly controlled environments, often operating at extremely low temperatures. In this context, research on metal complexes opens new possibilities for the development of operational quantum devices under ambient temperature conditions. In this context, this work shows the current trends in the field of metal complexes, focusing on their potential applications in quantum energy technologies. It highlights the importance of exploring alternative materials and methods that can operate at higher temperatures, allowing for more practical and accessible quantum devices. Additionally, this research aims to bridge the gap between fundamental understanding and practical implementation of metal complexes in quantum energy technologies, paving the way for future advancements in this exciting field.

Biography

Clebson Cruz received his Ph.D. in condensed matter physics from Fluminense Federal University in Brazil. Since 2018, he has been an assistant professor at the Federal University of Western Bahia in Brazil, where he is the leader of the Quantum Information and Statistical Physics Group. He is a specialist in quantum technologies based on low-dimensional magnetic systems, focusing on the study of quantum energy technologies. His research in quantum technologies has led to significant advancements in the field, particularly in the development of efficient and sustainable quantum batteries. His expertise also extends to the exploration of quantum properties in advanced materials, which holds great potential for the advancement of various quantum devices. His contributions aim to enhance our understanding of low-dimensional magnetic systems, paving the way for practical applications in quantum information processing and statistical physics.

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5th Edition of

Advanced Chemistry World Congress

March 25-26, 2024

Exploring the interior of the hunga tonga hunga ha'apai submarine volcano

Román Alvarez

Instituto de Investigaciones en Matemáticas Aplicadas y en Sistemas (IIMAS), Universidad Nacional Autónoma de México, Mexico

In January 2022 one of the largest phreatoplinian volcanic eruptions was registered, which induced large-scale atmospheric effects, injecting about 10 percent of the water existing in the atmosphere and creating tsunamis. It occurred in the Tongan Archipelago and tsunamis reached Central and South American coasts. This submarine structure rises nearly 1500 m from the bottom of the ocean with barely protruding sections constituting small islands. The structure of the volcano is poorly understood especially its internal structure. Deep-seated magmatic connections are difficult to define or visualize. We use a high-resolution gravity data set obtained via satellite to calculate the Bouguer anomaly over its structure, to perform a preliminary exploration of its interior. Executing 3D gravity inversions, that transform gravity values in mGal into density distributions in g/cm^3 we find a complex plumbing system with various exhaust trajectories and multiple surface pockets of low-density material within the volcanic edifice; some appear to be associated with ring fractures. This is in line with the report of the 2009 eruption of the same volcano, described as beginning from multiple vents, introducing an asymmetry with similar volcanic structures that erupt through a single, central chimney. The consequence of this distribution of eruption centers is that large areas of the volcanic surface enter in contact with sea water simultaneously. Preliminary evaluation of the area that may enter in contact with seawater yields 26 km^2. We found no signs of a magma chamber within 6 km depth, although several volcanic conduits are identified from such depth to the surface. These models yield quantitative estimates for areas of magma-water interaction and constitute a baseline to compare with structural changes to be induced in future eruptions.

Biography

Román Alvarez obtained MSc and PhD from University of California, Berkeley in 1972 and 1974, respectively. He joined the National Autonomous University of Mexico (UNAM) in 1974 where he continues to date; he has been Professor at the Institute of Geophysics and the Institute of Applied Mathematics (IIMAS), where he is presently located. In the 1989-1997 period he was director of the Institute of Geography. He was Principal Investigator of NASA's Lunar Sample Program in the 1975-1977 period. Has directed and participated in numerous projects, in Mexico and abroad. He collaborates with graduate students and post-graduate doctorates in Geothermics, Volcanology, Magnetotellurics, Remote Sensing, and Gravity and Magnetic Modelling. His editorial activities range from coordinating Special Issues, International Memoires and Bulletins, General Rapporteur, and Editorial Adviser. Evaluation of research articles for various scientific publications is a continuous exercise. He has published research articles consistently throughout his academic career.

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Low-temperature synthesis of ZnO nanorods and their performance as H_2S gas sensor

Laura Lorena Díaz-Flores, Claudio Martínez-Pacheco, Angélica Silvestre López-Rodríguez, Pio Sifuentes-Gallardo and **Germán Pérez-Hernández**

Juárez Autonomous University of Tabasco,
Academic Division of Engineering and Architecture, México

The nanotechnology studies the growth of nanostructures with improved physicochemical properties compared to their bulk materials. These modifications in properties at the nanoscale are due to changes in their dimensions, which generate rearrangements in their atomic structure that enhance certain properties. Therefore, this work presents the fabrication of epitaxially grown of ZnO nanostructures, combining the Sol-Gel and Hydrothermal synthesis methods. Firstly, ZnO seed layer solution was synthesized using Sol-Gel method (60°C) and deposited by means of the Spin Coating technique (32°C), applying three cycles of deposition onto substrates (ITO/PET) creating nucleation points for helping the orientation and morphology of the nanostructures. A drying procces was carried out at 100 °C for 30 min between each layer deposited to achieve a well-adhered film. The growth of nanostructures was stimulated through Hydrothermal synthesis (90°C) using solutions of zinc nitrate and hexamethylenetetramine as precursors (molar ratio 1:1). The reaction time and temperature used were 90°C and 240 min respectively. Three different concentrations of hydrothermal solution were used 10 mM, 15 mM, and 20 mM. The structural characterization showed a polycrystalline structure of ZnO in its hexagonal wurtzite phase. The chemical analysis of seed layer revealed Zn and O signal considered the nucleation points. The morphology of well-aligned ZnO nanorods was observed (D= ≈174.3 nm; L= ≈1397.1 nm) and it was also observed that by increasing the concentration of the hydrothermal solution the diameter of the ZnO nanorods increased. Optical evaluation of the ZnO films revealed that they have absorption in the UV region (365-375 nm) and in the Visible region (400-700 nm), which is helpful for gas sensor application. The films with ZnO nanorods were tested in the sensing of 600 ppm of H_2S gas at 29°C, the sensitivity was directly proportional from 19.9% to 38.2%.

Biography

Laura Lorena Díaz Flores obtained her Ph.D. in Materials Science from the Technological Institute of Saltillo in Mexico in 2001. She has been a researcher-professor in the Academic Division of Engineering and Architecture at the Juárez Autonomous University of Tabasco since 2004 to the present date. She has been a member of the National System of Researchers (SNI-CONAHCYT) in México since 2001. A prime focus of her work lies in synthesis and materials characterization, underscored by a portfolio of scientific publications and patents within the realm of engineering and technology. She has been the Editor-in-Chief of the Journal of Energy, Engineering Optimization, and Sustainability (DAIA-UJAT) since 2016 to the present date.

Emerging pollutants in coastal environments: The beaches of Acapulco

Amado E. Navarro-Frómeta[2], Ángeles Martínez-Organiz[1] and **Paula M. Crespo-Barrera[2]**

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[2]Universidad Tecnológica de Izúcar de Matamoros, México

The number of chemical substances in use has increased and their concentrations in environmental and biological matrices have also increased without their toxic effects having been properly studied. Specifically, are outstanding the emerging contaminants (EC) or contaminants of emerging concern, not regulated and not considered in national monitoring plans. These include pharmaceuticals, personal care products, synthetic surfactants, per- and polyfluoroalkyl compounds, pesticides, microplastics and their additives, micro- and nanomaterials and, more recently, waste electronic components, batteries, and other products of current technological development. Its presence in coastal environments is critical due to the tendency to increase human settlements in these areas and the consequent increase in wastewater discharges, treated or not, into them. This work presents recent findings published by the scientific community regarding the topic and as a case study, results of the evaluation of some of these contaminants on the beaches of Santa Lucía Bay (SLB), México, where the city of Acapulco is located. The samples were taken at the discharge of the wastewater treatment plant on Olvidada Beach, and on three beaches that receive contributions from different streams that cross the city in SLB. The identification of the EC was carried out by solid phase extraction followed by gas chromatography/mass spectrometry. 77 EC, their metabolites, compounds from feces and urine of human origin were identified. A semiquantitative evaluation of their concentrations showed that the contamination of SLB beaches is mainly due to EC entering the streams of the micro-basins. A statistical factor analysis of all EC allowed for differentiation of the sampling points reducing the number of analytes to be quantified and explaining the variance of the relative concentrations of the compounds studied. The presence of EC on SLB beaches is directly related to the discharge of polluted water from the micro-basins that flow into it.

Biography

Full-time Professor at the Technological University of Izúcar de Matamoros. Bachelor's degree in chemistry, 1971, Faculty of Chemistry, University of Havana. PhD in Chemistry, 1977 at the Azizbekov Azerbaijan Institute of Petroleum and Chemistry. Fields of work: Petroleum chemistry; Petrochemical synthesis; Analytical chemistry; Environmental Chemistry and Technology. Member of the National System of Researchers of Mexico, level 1.

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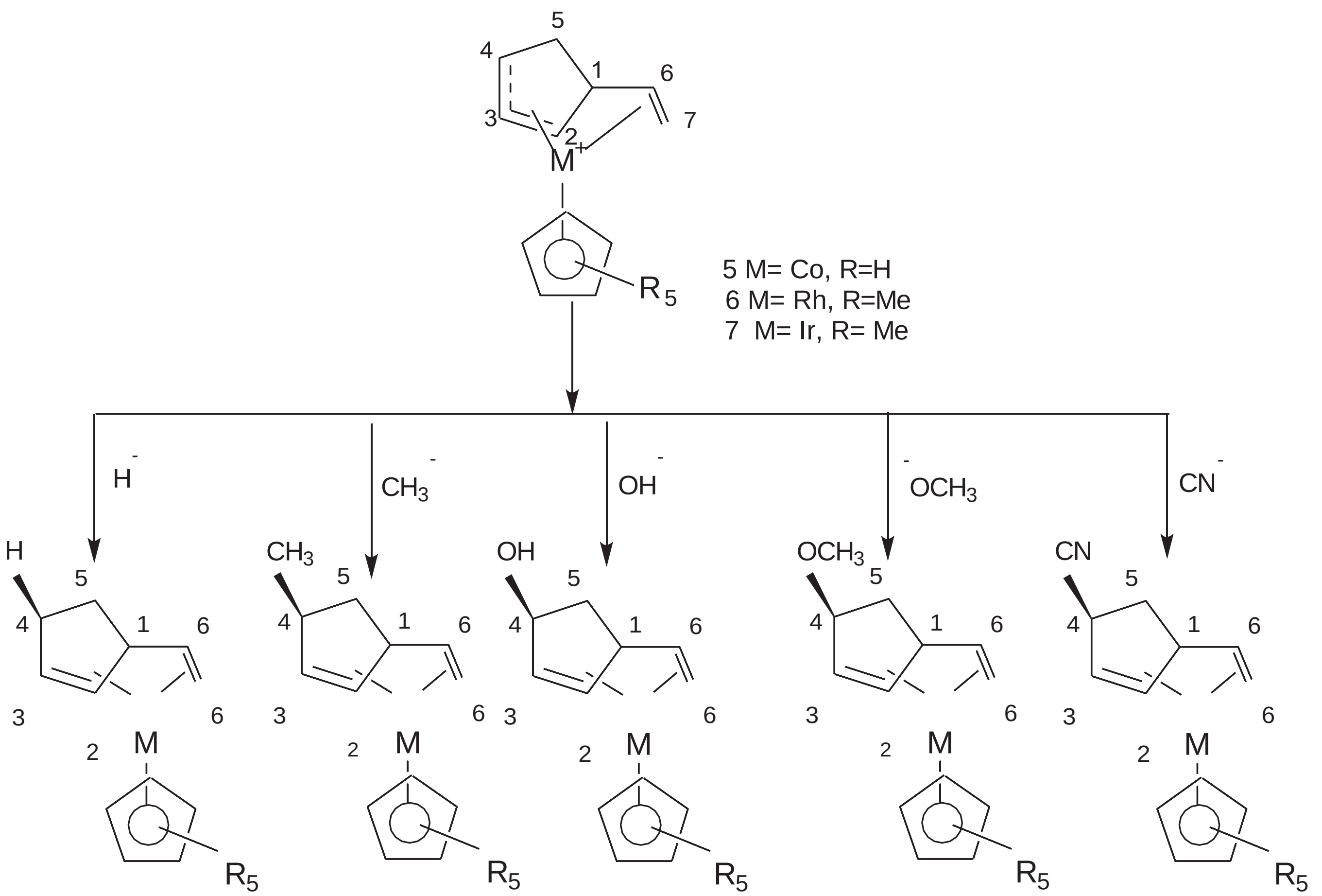
Nucleophilic Addition Reactions to d9 Metal (Co, Rh, Ir) Stabilized Carbocations: Reactions of $[M(\eta^5-C_5R_5)(\eta^2 vinyl-\eta^3 cyclopentenyl)]^+$ with Nu^- (OH^-, CN^-, OMe^-, CH_3^-)

A. K. Fazlur Rahman[1,2], **Martin A Bennett**[1], **Zaheer Masood**[2] and **Bin Wang**[2]

[1]*Research School of Chemistry, The Australian National University Canberra, Australia*
[2]*Department of Chemical, University of Oklahoma, USA*

Nucleophilic addition reactions to metal stabilized carbo-cations, such as, [(η5 -C5 R5) (η2- vinyl η3-cyclopentenyl)] +salts with various nucleophiles such as LiAlH4 , MeLi, KCN, NaOMe, exclusively yields functionalized η2-vinyl η2-cyclopentene complexes, as the addition products in 70-80% yield. These neutral nucleophilic addition products complexes are readily soluble in cyclohexane and ether. Nucleophilic addition reactions to cationic [(η5 -C5 R5) (η2-vinyl η3-cyclopentenyl)] + are regio-selective and preferentially attacked the π-allyl unit not the π-vinyl unit of the carbocation fragment, seemingly followed the Davis, Green, Mingos rule, with a decrease by one unit of the hapticity of the ligand for example: η3 -allyl to η2 -olefin. The position of hydride attack was identified by reaction with LiBD4 and the Nu- appears exclusively to add in C4 carbon of the allylic unit with an exo attack with respect to the metal center suggesting a charge control pathway. DFT calculations were used to compare the nucleophilic reactivity of the coordinated vinyl cyclopentenyl cations coordinated to d9 metals going from 3d Co, 4d Rh and 5d Ir. All systems prefer exo attack at C4 position of the allylic cation, where the nucleophile prefers an attack to the allylic carbocation, from the opposite site of the metal fragment to minimize steric hindrance.



5 M= Co, R=H
6 M= Rh, R=Me
7 M= Ir, R= Me

8a M= Co, R=H
9 a M= Rh, R=Me
10a M= Ir, R= Me

8 b M= Co, R=H
9 b M= Rh, R=Me
10b M= Ir, R= Me

8 c M= Co, R=H
9c M= Rh, R=Me
10c M= Ir, R= Me

8d M= Co, R=H
9d M= Rh, R=Me
10 d M= Ir, R= Me

8 e M= Co, R=H
9e M= Rh, R=Me
10e M= Ir, R= Me

Biography

Dr. Fazlur Rahman did his MA in Chemistry from Brandeis university and a Ph.D. from the Australian National University in Canberra, Australia. He did his post-doctoral works at the university of Tasmania, Australia, at the Ames National Laboratory, USA and at the University of Oklahoma, USA. Dr. Rahman is the recipient of Southwest ACS regional Award in 2009, and the Oklahoma Chemist award in 2015. Dr. Rahman held visiting faculty positions at Texas A&M, University of Rochester, Cal-Tech, UC Berkeley, Free University of Berlin and Fried Schiller University, Rutgers University and at the Columbia University in NYC. He currently holds an endowed professorship and Sharkey's Energy Foundation Chair in Chemistry at the Oklahoma School of Science and Mathematics. Rahman is also an affiliated Professor of Chemistry and Chemical Engineering at the University of Oklahoma where he teaches Organic chemistry as an adjunct Professor.

Cobalt-Catalyzed Enantioselective Hydroboration of α-Substituted Acrylates

Manoj D. Patil, Kiron Kumar Ghosh and **T. V. Rajan Babu**

Department of Chemistry and Biochemistry, The Ohio State University, United States

Even though metal-catalyzed enantioselective hydroboration of alkenes has attracted enormous attention. few preparatively useful reactions of α-alkyl acrylic acid derivatives are known, and these reactions require the use of rhodium catalysts. No examples of asymmetric hydroboration of the corresponding α-arylacrylic acid esters are known. In our continuing efforts to search for new applications of earth-abundant cobalt catalysts for broadly applicable organic transformations, we have identified 2-(2-diarylphosphinophenyl) oxazoline ligands and exceptionally mild reaction conditions for efficient and highly regio- and enantioselective addition of HBPin to α-alkyl- and α-aryl- acrylates, giving β-borylated propionates. Since the C–B bonds in these compounds can be readily replaced by C–O, C–N and C–C bonds, these intermediates, several of them derived from inexpensive feedstock carbon sources, could serve as valuable chiral synthons for the synthesis of propionate-bearing motifs including polyketides and related molecules. Formally, oxidation and amination products derived from the boronates can be thought of as arising via anti-Markovnikov addition of water and amine to the acrylates. Currently such reactions are best carried out under biocatalytic conditions. Chemical methods would provide attractive and scalable alternatives for these important processes. Two-step syntheses of 'Roche' ester (79%; er 99:1), arguably the most widely used chiral fragment in polyketide synthesis, and, tropic acid esters (~80%; er ~90:10), which are potential intermediates for a vast array of medicinally important classes of compounds, illustrate the power of the new methods. Mechanistic studies confirm the requirement of a cationic Co(I) species [(L)Co]+ as the viable catalyst in these reactions. Reactions with isolated and in situ generated LCo(I)-hydride complexes as catalysts rule out the possibility of such intermediates which have been well-established in related hydroborations of other classes of alkenes. A mechanism involving an oxidative migration of a boryl group to the β-carbon of an h4-coordinated acrylatecobalt complex is proposed as a plausible route.

Biography

Dr. Manoj Patil, a postdoctoral scholar at The Ohio State University, specializes in organic and organometallic chemistry. With a Ph.D. from National Tsing Hua University, Taiwan, focusing on gold catalysis, his current research explores cobalt-catalyzed hydroboration reactions of electron-deficient conjugated alkenes. Dr. Patil aims to apply these reactions in organic synthesis for drug and natural molecule development. During his Ph.D., he utilized gold catalysis to synthesize diverse hetero- and carbocyclic organic compounds, showcasing his expertise in innovative synthetic methodologies. Dr. Patil's commitment to unraveling chemical complexities positions him at the forefront of advancing organic chemistry, contributing significantly to both academic and industrial progress.

The Surge in Aseptic Processing Technology

Stephen Scypinski

Stephen Scypinski Consulting LLC, USA

Aseptic processing, which is the manufacture of pharmaceuticals and biopharmaceuticals under sterile conditions, has seen a sharp rise over the past several years. Both Contract Manufacturing Organizations (CMOs) as well as pharmaceutical and biotechnology companies have expanded their aseptic processing capabilities. Several factors have led to this sharp increase. Firstly, the growing number of biologic entities in the clinic and commercialized have contributed to the need for additional aseptic capacity. Growth was also accelerated by the COVID-19 pandemic whereby companies such as Pfizer and Moderna scrambled to secure external manufacturing. These factors have driven CMOs to expand their capacity. However, this is not readily accomplished as an aseptic processing facility requires extensive qualification and validation prior to its use. Therefore, the industry recognizes that there is a capacity shortage. This presentation will discuss some of the challenges facing the pharmaceutical industry regarding aseptic processing as well as discuss trends in the aseptic area.

Biography

Dr. Stephen Scypinski is a semi-retired independent consultant in all areas of Chemistry, Manufacturing and Controls (CMC). He has spent over 30 years in the pharmaceutical industry and has worked at large pharma companies such as Johnson & Johnson, Hoffmann-La Roche and Bristol-Myers Squibb as well as small biotech and start-up companies. Dr. Scypinski has played a leading role in bringing over 60 products to market including the blockbuster drugs ELIQUIS, FARXIGA, OPDIVO, and ENHERTU. He is the Editor-in-Chief of the Journal of Pharmaceutical Innovation and co-editor of the text Handbook of Pharmaceutical Analysis. Dr. Scypinski is an adjunct professor at Duquesne University School of Pharmacy.

Distal Functionalization via Transition Metal Catalysis

Haibo Ge

Department of Chemistry & Biochemistry, Texas Tech University, USA

The ubiquitous presence of sp3 C−H bonds in natural feedstock makes them inexpensive, easily accessible, and attractive synthons for the preparation of common and/or complex molecular frameworks in biologically active natural products, pharmaceutics, agrochemicals, and materials. However, the inertness of these bonds due to the high bond dissociation energies and low polarity difference between the carbon and hydrogen atoms makes them challenging reaction partners. Moreover, the desired site-selectivity is often an issue in reactions with multiple analogous sp3 C−H bonds. To overcome these problems, transition metal-catalyzed C−H functionalization has been developed with the assistance of various well-designed directing groups which can coordinate to a metal center to deliver it on a targeted C−H bond through an appropriate spatial arrangement, enabling C−H activation via the formation of a cyclometalated species. However, the requirement of often additional steps for the construction of the directing groups and their subsequent removal after the desired operation severely hampers the efficacy and compatibility of the reactions. A promising solution would be the utilization of a transient ligand which can bind to the substrate and coordinate to the metal center in a reversible fashion. In this way, the directing group is installed, sp3 C−H functionalization occurs, and the directing group is then removed in situ without affecting the substrate function after the catalysis is finished. Overall, the whole process occurs in a single reaction pot. Herein, we are presenting our studies on transition metal-catalyzed transient directing group-enabled C−H functionalization reaction.

Biography

Haibo Ge received his PhD degree in Medicinal Chemistry from The University of Kansas in 2006, and then moved to The Scripps Research Institute for postdoctoral study. In 2009, he began his independent academic career at the Indiana University – Purdue University Indianapolis and relocated to Texas Tech University in 2020. Research by his group is mainly focused on the development of novel methods for carbon–carbon and carbon–heteroatom bond formation through transition metal catalyzed C–H functionalization.

Agrichemicals in Drinking Water: The Role of Nitrite in Birth Outcomes

Augustine Kena Adjei

University of Nebraska-Lincoln, USA

Introduction: Problems of birth are a major national concern and have long-standing physical, emotional and psychological effects on individuals, families and society. Examining the role of agrichemicals in birth outcomes is critical for developing effective prevention strategies and policies. The objective of this case-control study is to assess the effect of exposure to nitrite through drinking water as a mixture with other agrichemicals. Nitrite is more harmful than nitrate due to its potential to convert to nitrosamines, which are known to be carcinogenic and its potential health risks make it more concerning than nitrate.

Method: Women with at least one birth recorded in Nebraska databases were recruited for this study. Demographic and pregnancy information was collected as well as water, saliva, and blood samples. SPSS and R were utilized to evaluate the impact of agrichemical exposure on the risk of birth defects. Contingency tables were constructed to calculate the proportions of cases and controls exposed to nitrite. Proportions of cases and controls exposed to other agrichemicals were also calculated and odds ratios were determined.

Results: Nitrite exposure and exposure to a mixture of nitrite and other agrichemicals through drinking water increases the risk for birth defects ($p < 0.05$). common birth defects observed were spina bifida, down syndrome and congenital heart defect.

Conclusion: This study suggests that exposure to nitrite and mixture with other agrichemicals through drinking water increases the risk for birth defects. Individual exposure to agrichemical mixture in drinking water is a risk factor for birth defects.

Promotion and Implementation of Bioenergy for Better Environment

Abdeen Mustafa Omer

Energy Research Institute, UK

There is strong scientific evidence that the average temperature of the earth's surface is rising and this may be attribute to increased concentration of carbon dioxide (CO2), and other greenhouse gases (GHGs) in the atmosphere as released by burning fossil fuels. One of the chief sources of greenhouse gases is burning of fossil fuels. Biogas from biomass appears to have potential as an alternative energy source, which is potentially rich in biomass resources. In the present study, current literature is reviewed regarding the ecological, social, cultural and economic impacts of biogas technology. In this communication an attempt has been made to give an overview of present and future use of biomass as an industrial feedstock for production of fuels, chemicals and other materials. However, to be truly competitive in an open market situation, higher value products are required.

A Remote Sensing-Based Pressure-State-Response Paradigm for Spatiotemporal Ecosystem Health Assessment in Langfang, China

A. Ashraf[1], **M. A. Haroon**[2], **S. Ahmad**[1], **A. S. Abowarda**[3], **C. Wei**[1] and **X. Liu**[1]

[1]*School of Environment, Tsinghua University, China*
[2]*Pakistan Meteorological Department, Institute of Meteorology & Geophysics, Pakistan*
[3]*Department of Hydraulic Engineering, Tsinghua University, China*

Economic development is causing significant land usage and land cover changes that threaten ecosystems. Sustainable development and ecological civilization need spatiotemporal ecosystem health monitoring. This research evaluated Langfang's spatiotemporal ecosystem health at the city and administrative levels, taking regional variables into consideration. Using remote sensing-based pressure-state-response (PSR) paradigm was used to formulate the spatial ecosystem health index (SEHI) in multiple epochs (1990, 2003, 2013, and 2021). The analytical hierarchy process (AHP) and principal component analysis (PCA) were employed indicator selection and indicator weighting. The SEHI index was developed by integrating subindices that measure pressure, state, and response. The spatial ecosystem pressure index (SEIP) showed an increase in ecological pressure. In contrast, the spatial ecosystem status index (SEIS) showed a positive ecological shift from 1990. 2013 had the worst ecological deteriorated state. The spatial ecosystem response index (SEIR) showed that the ecosystem's reaction to stressors and circumstances varied, although it was positive in 1990. The spatial ecosystem health index (SEHI) for Langfang administrative units correlated positively with their overall health score in 1990, before development. In 2013, when industrialization began, the SEHI dropped. Later, during circular economy and ecological civilization, SEHI improved. The SEHI classifies Dachang, Dacheng, Guan, Guangyang, and Yongqing administrative units as moderately healthy in 2021. However, the remaining administrative entities were relatively healthy. The SEHI shows Langfang's spatial health improving since 2003. However, it has not yet reached the level observed in the 1990s. Hence, it is imperative to concentrate efforts on mitigating pressure and achieving stability within the region in order to enhance the health of the spatial ecosystem in Langfang. The SEHI can help policymakers assess regional health, identify development plans, promote environmental restoration, and quantify essential adjustments.

Biography

Dr. Anam Ashraf, an experienced environmental scientist, completed her bachelor's and master's degrees in environmental science from Fatima Jinnah Women University and the University of Agriculture in Faisalabad, Pakistan, respectively. During her bachelor's studies, she honed her research skills by focusing on remote sensing, a key component in environmental science. Moreover, her master's research was devoted to the development of green adsorbents for Chromium removal from water. This project demonstrates her dedication to developing sustainable and environment-friendly solutions for pressing environmental challenges. In 2023, Dr. Ashraf accomplished her Ph.D. in Environmental Science and Engineering with a specialization in Environmental Ecology from the internationally acclaimed Tsinghua University, Beijing, China. This Doctoral degree not only solidified her expertise in the field of environmental science and engineering but also signaled her specific interest in the intersection of these disciplines through environmental ecology. Currently, Dr. Ashraf is applying her accumulated knowledge and expertise in her role as a Postdoctoral Fellow at the Landscape Ecology Lab, Xishuangbanna Botanical Tropical Garden at the Chinese Academy of Sciences. With her unfaltering dedication towards her field and outstanding research contributions, she is set to create a significant impact in environmental solutions.

The Current Landscape of Using Direct Inhibitors to Target KRAS G12C-Mutated NSCLC

Jun Zhang

Zhongnan University Xiangya Medical College, China

Mutation in KRAS protooncogene represents one of the most common genetic alterations in NSCLC and has posed a great therapeutic challenge over the past ~40 years since its discovery. However, the pioneer work from Shokat's lab in 2013 has led to a recent wave of direct KRASG12C inhibitors that utilize the switch II pocket identified. Notably, two of the inhibitors have recently received US FDA approval for their use in the treatment of KRASG12C mutant NSCLC. Despite this success, there remains the challenge of combating the resistance that cell lines, xenografts, and patients have exhibited while treated with KRASG12C inhibitors. Here we plan to discusses the varying mechanisms of resistance that limit long-lasting effective treatment of those direct inhibitors and highlights several novel therapeutic approaches including a new class of KRASG12C (ON) inhibitors, combinational therapies across the same and different pathways, and combination with immunotherapy/ chemotherapy as possible solutions to the pressing question of adaptive resistance.

Biography

Jun Zhang, MD, PhD is a physician-scientist, principle investigator, and board certified internist and medical oncologist. Dr. Zhang received his medical degree from Xiang-Ya School of Medicine Central South University in China, PhD of Cancer Biology from LSU, postdoctoral research fellowship at Harvard Medical School and UCSF, and Hematology/Oncology fellowship at Emory University School of Medicine. Dr. Zhang is passionate in frontier scientific discoveries, and has ample expertise in bench-to-bedside translation and development of investigator-initiated clinical trials. He has more than 100 publications including those appeared in high impact journals such as Oncogene, Cancer Research, Clinical Cancer Research, Journal of Thoracic Oncology, Molecular Cancer, Annals of Oncology, JAMA Oncology, Cancer Cell and New England Journal of Medicine, etc. Dr. Zhang is a member of multiple prestigious organizations including AACR, ASCO, ESMO, IASLC, RSM and CAHON where he also served as the Committee Co-chair of Clinical Research.

PEERS ALLEY MEDIA

Studies on the Effect of Droplets and Particles on Structures of Turbulent Swirling Spray and Pulverized-Coal Flames

Lixing Zhou

Department of Engineering Mechanics, Tsinghua University, China

The interaction between droplets, particles and turbulent flames is an important phenomenon attracting more and more attention of many investigators. In this paper, in order to understand the effect of droplets and particles in structures of turbulent swirling spray and pulverized-coal flames, comparative studies on gas, spray and pulverized-coal flames were made by large-eddy simulation (LES) using Smagorinsky-Lilly and energy equation sub-grid-scale (SGS) stress models and second-order moment (SOM) and eddy-break-up (EBU) SGS combustion models. Statistical results were validated by experiments. Instantaneous results indicate that swirling gas, spray and pulverized-coal flames have no wrinkled-flame structures (Fig. 1). It is found that droplets and particles enhance turbulence and combustion.

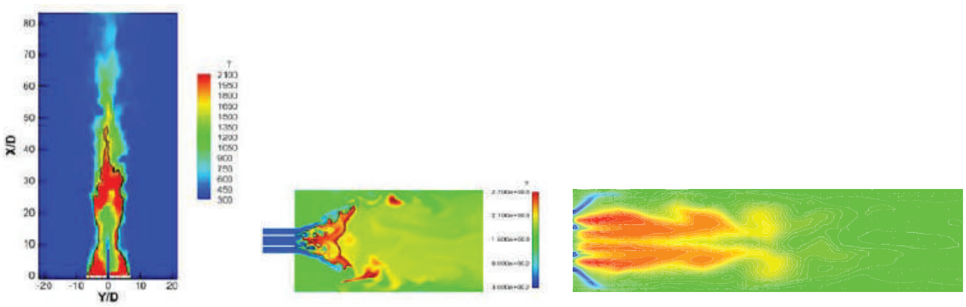


Fig.1 Temperature maps (left to right: gas, spray and coal flames)

Biography

Lixing Zhou is a Professor in the Department of Engineering Mechanics, Tsinghua University, Beijing, China. He got his Ph.D. degree from the Leningrad Polytechnic University, USSR in 1961. He has served as the Chairman of Multiphase Fluid Dynamics Division, the Chinese Society of Theoretical and Applied Mechanics, a member of the Board of Directors, the Chinese Section of the Combustion Institute, and Governing Board of the International Conference on Multiphase Flow. His main research fields are multiphase turbulent flows and combustion. He published two monographs in English and 5 monographs in Chinese, more than 300 technical papers in periodic journals. He won the China National Awards of Natural Science in 2007.He was invited to give five times of plenary lectures and more than 14 times of keynote lectures at international conferences, and serves as members of editorial boards of periodic journals related to combustion and multiphase flows.

Tumor Cell Adhesion and Metastasis Signaling: Contribution of Endothelium Nitric Oxide

Fabiola Sánchez[1,2], **Pamela Ehrenfeld**[2,3], **Gaynor Aguilar**[1] and **Tania Koning**[1]

[1]*Faculty of Medicine, Universidad Austral de Chile, Chile*
[2]*Center for Interdisciplinary Studies on the Nervous System, Universidad Austral de Chile, Chile*
[3]*Faculty of Medicine, Universidad Austral de Chile, Chile*

Metastasis is the main cause of death in cancer patients. The endothelium plays a key role in metastasis allowing the adhesion and extravasation of tumor cells. Nitric oxide (NO) is a key modulator of the endothelial function and we have demonstrated that the stimulation of endothelial cells with secreted factors from breast tumor cells induces S-nitrosylation (the modification by NO of cysteine residues in proteins) of endothelial proteins leading to destabilization of the endothelial barrier which may contribute to transmigration of breast tumor cells and metastasis. The first step in the extravasation process leading to metastasis is the attachment of cancer cells to the endothelium. This step shares similarities with leukocyte adhesion to the endothelium, and it is plausible that it may also share some regulatory elements. We report that the stimulation of endothelial cells with cytokines present in the serum of cancer patients (TNF-α, IL-8) or with secreted factors from breast tumor cells activates the S-nitrosylation pathway and increases leukocyte adhesion *in vitro* and *in vivo.* The stimulation also increases the cell surface availability of the adhesion proteins VCAM-1 and ICAM-1 in endothelial cells in a NO and S-nitrosylation dependent way. We identified PKCz and VCAM-1 as S-nitrosylated targets during this process. Inhibition of NO signaling and S-nitrosylation blocks the transmigration of tumor cells through endothelial monolayers and the development of metastasis in a murine model of breast cancer. We propose that S-nitrosylation in the endothelium activates pathways that enhance surface localization of adhesion proteins to promote binding of tumor cells and extravasation leading to metastasis.

Determination of Element Tin in Haemodialysis Water by Atomic Fluorescence Spectrometry

Angyang Yu

Liaoning Normal University, China

Hydride generation-atomic fluorescence spectrometry (HG-AFS) has become the preferred method for element analysis due to its unique character and advantages. In this work, HG-AFS is used to measure element Tin in haemodialysis water. The impacts of experimental conditions on fluorescence intensity of Tin are investigated and optimized. Overall, an effective method of measuring element Tin's content in haemodialysis water by means of HG-AFS is established.

Excellent Ammonia Sorption Enabled by Metal-Organic Framework Nanocomposites for Seasonal Thermal Battery

L.W. Wang and **S.F. Wu**

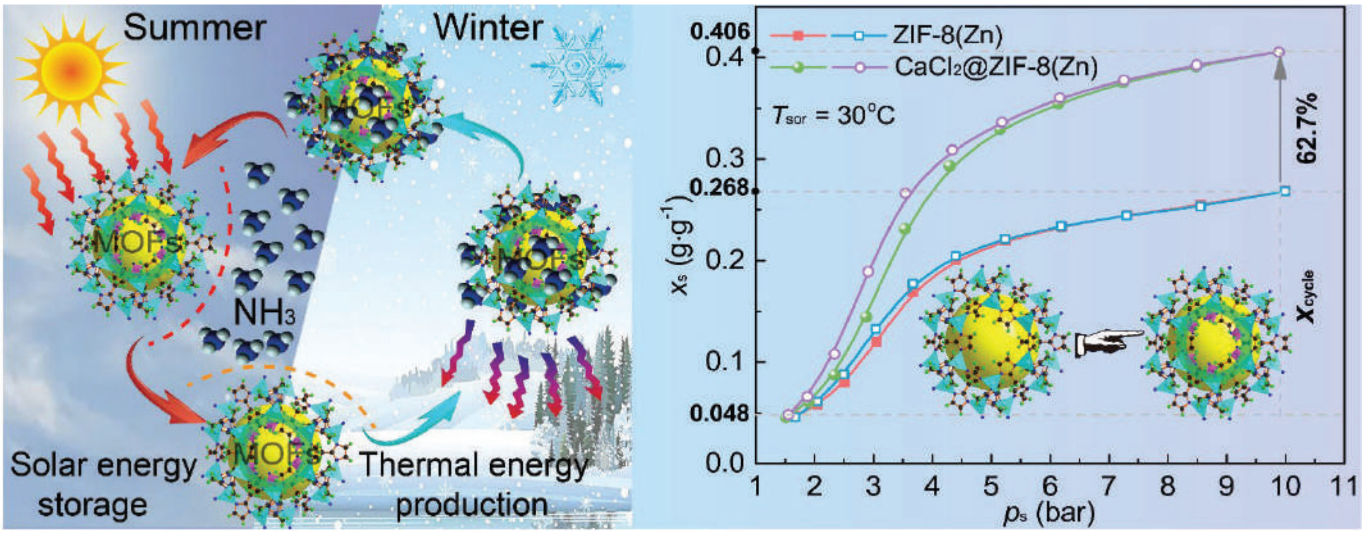
School of Mechanical Engineering, Shanghai Jiao Tong University, China

Solar-powered seasonal thermal battery (STB) is currently anticipated as a prospective future sustainable energy technology, for which prevailing the working pairs of activated carbon and halides-ammonia are proven low adaptability in extreme conditions. Here we propose that MOF-ammonia working pair occupying sorption active sites in the reaction process could significantly improve the effectiveness of thermal energy storage under severe ambient temperature. Furthermore, an innovative ammonia-based working pair is reported for STB enabled by *in-situ* growth of $CaCl_2$@ZIF-8(Zn) composite with a high cyclic/real-time sorption capacity of 0.310/0.406 g·g-1, which is increased by 43.52% compared with ZIF-8(Zn) under the extreme conditions because of strong host-guest interactions to induce coordination bond rearrangements between $CaCl_2$ and ammonia. Based on MOF composites-ammonia working pairs, a proof-of-concept solar-powered STB is designed and tested. Even under severe condition with the evaporation temperature below 10°C, the gravimetric/volumetric heat storage densities and efficiency of STB can still achieve 401.66 kJ·kg-1, 72.54 kWh·m-3, and 85.30% due to strong physicochemical coupling sorption behaviour. The method provides a transformative low-carbon route to upgrade low-grade energy for efficient thermal management.

Figure Caption:

Solar-powered seasonal thermal battery is a type of future sustainable technology. In this work, the superb performance of halide @ metal-organic frameworks for ammonia sorption is revealed for transferring the thermal energy from summer to winter with an optimum cyclic/real-time sorption capacity and high thermal energy storage efficiency of 0.31/0.406 g·g-1and 85.30%. It provides a transformative low-carbon route to upgrade low-grade thermal energy for efficient space thermal management.

GRAPHICAL ABSTRACT



Biography

Li-Wei Wang is a distinguished professor at the Institute of Refrigeration and Cryogenics, School of Mechanical Engineering, Shanghai Jiao Tong University. As the International Incoming Fellow, she had worked at Warwick University in 2009 and Newcastle University in 2010. The research experience of Prof. Wang mainly focuses on the materials, cycles, and systems for energy conversion with the technology of solid sorption. In the past three years, she has been selected for the global list of highly cited scientists with h-index of 41. The awards she has gotten on the research work included the Second Prize of National Natural Science Award, China Youth Science and Technology Award, the National Natural Science Fund for Distinguished Young Scholars, EU Marie Curie International Incoming Fellowship, Royal Society International Incoming Fellowship, IIR Young Researchers Award, etc.

Multi-scale Effects of High-density Urban Green Space Landscape Pattern on $PM_{2.5}$ and O_3

MA Xi-na, LI Jin-ming and **WANG Jing-wen**

A College of Architecture, Chang' an University, China

To investigate the scale effects of green space landscape pattern on $PM_{2.5}$ and O_3 concentrations in high-density urban areas, four landscape pattern indices, namely, edge density, landscape shape index, area-weighted mean shape index and mean shape index, were selected to measure the landscape pattern of green space, and the atmospheric monitoring data from national air quality monitoring stations from 2020 to 2021 were crawled. Correlation analysis and linear regression analysis were applied to investigate the spatial and temporal distribution characteristics of green space landscape pattern in high-density urban areas on $PM_{2.5}$ and O_3, the characteristics of green space landscape pattern and the multi-scale influence relationship between $PM_{2.5}$ concentration, O_3 concentration and landscape pattern index at multiple scales. The results showed that 1) $PM_{2.5}$ concentration and green space landscape pattern index showed significant correlations at all scales in summer; 2) increasing the degree of division of green space boundaries could mitigate $PM_{2.5}$ concentration at the scales of 1 km in spring, 5 km in spring, and 500 m~5 km in summer, and the complexity of green space shape could mitigate $PM_{2.5}$ dispersion at the scales of 500 m~5 km in summer, and at the scales of 1 km in spring, 1 km in km and 1km~2km in summer, increasing the irregularity of the shape at the scale of spring and 1km~2km in summer can mitigate $PM_{2.5}$ diffusion more effectively; 3) increasing the degree of division of the green space boundary and the complexity of the green space shape at the scales of 1km in spring, 5km in spring and 500m~5km in summer can reduce O_3 concentration, and increasing the irregularity of the shape at the scales of 500m in spring and 1km in all seasons can significantly reduce O_3 concentration.

Biography

Xina Ma, 1986, Chang'an University, Ph. D., Associate professor, Member of China Association of Landscape Architecture; Education: 2013.9-2016.7, School of Architecture, Construction of Urban and Rural Habitat Environment, PhD degree;

The Aging Behavior of Micro Plastics Manufactured from Diverse Polymers Is Predicted by The Johnsen Index with Regularized PLS

M. Tahir[2], **T. Mehmood**[1] and **C. Zhi**[3]

[1]*School of Natural Sciences, National University of Sciences and Technology, Pakistan*
[2,3]*School of Mathematics and Statistics, Shandong University, China*

The analysis of micro-plastics in natural and experimental materials is becoming more common. They have the ability to transmit harmful substances and have consequently been identified as a severe worldwide environmental concern in recent decades. To evaluate the aging characteristics of polypropylene (PP), micro-plastics like (PE), polyvinyl chloride (PVC) and polyethylene terephthalate (PETE or PET), carbonyl and hydroxyl indices are utilized.

The current work uses a Johnsen index in regularized elimination in partial least squares (PLS) to predict carbonyl and hydroxyl indices for PE, PP, PVC, and PET polymer types. The suggested approach employs current filter metrics. For predicting FTIR-based data, the proposed Johnsen index-based PLS model beats the previous model for predicting carbonyl and hydroxyl indices. In addition, the suggested technique identifies wave numbers that are influential across functional molecules. Most of the models share the functional compounds CH_3, CH_2, $CH, = C - H$ and $= CH_2$.

Biography

Muhammad Tahir is a dedicated researcher in the field of Machine Learning, specializing in Statistics. He holds a Ph.D. in Machine Learning with a focus on high-dimensional data analysis. Currently, he serves as a Postdoctoral Fellow at Shandong University.

Tahir's academic journey was made possible through prestigious scholarships that supported his doctoral studies in China. His research interests encompass Machine Learning, statistical modelling, and High-Dimensional Data Analysis. He is also enthusiastic about applying his expertise to analytical chemistry analysis.

His work has earned recognition in the academic community and holds promise for practical applications. Muhammad Tahir is committed to advancing knowledge in these domains.

A Systematic Review of Greywater Facilities, Challenges, Achieving Carbon Neutrality and its Future Sustainability

V. Ramani Bai[1], **G. Kangadharan**[2] and **M. Siva Kumar**[3]

[1]Technology & Built Environment, UCSI University Kuala Lumpur, Malaysia
[2]Asia Pacific University of Technology & Innovation (APU), Malaysia
[3]Petroleum and Chemical Engineering, Universiti Teknologi Brunei, Brunei

A sustainable water supply is of primordial importance to the life and welfare of all human beings. The water supplies from Water treatment plants face challenges due to ever-increasing pollution and maintenance of the treatment facilities. One of the smart city concepts is to recycle and reuse greywater. This recycling method is more promising as the greywater has low organic loading compared to "black water", which falls under the category of wastewater. Greywater is often defined as 'used water' and not wastewater, as greywater still has the potential to be utilised a second or third time. Greywater is the water coming from sinks, showers, and/or baths. The proposed research aims to review the applications of the new sustainable greywater drainage system in water industries. Further, it is aimed to analyse the implementation and monitoring system utilising the Internet of Things (IoT) in this field. IoT-based systems for real-time monitoring and troubleshooting drainage systems and waste disposal are quite an emerging field. The review article is expected to provide a solution to sustainable consumption of water, disposal of waste, and achieving carbon neutrality in treating household greywater, thus generating revenue for every individual. It will also make the wastewater treatment industry energy-efficient and sustainable.

Biography

V. Ramani Bai hold a Ph.D. in Environmental and Water Resources Engineering from the Indian Institute of Technology, Madras, and serve as an Assistant Professor at UCSI University Kuala Lumpur. With 30 years in Water Resources and Environmental Engineering, she attained Full Professorship at Limkokwing University and Linton University College. As a principal investigator, she secured a 1.13 Million RM research grant and contributed to an additional 0.13 Million RM. Her expertise in Water resources systems, Hydrology, and Water quality is evident through 2 patents, 3 copyrights, 4 textbooks, 34 journals, 10 book chapters, and 54 conference proceedings. She has received 11 research awards, including the "Hind Rattan Award" and "Women Researcher Award," affirming her global recognition and commitment to excellence in Engineering, Science, and Medicine.

The N-Formamide as A Carbonyl Precursor in The Catalytic Synthesis of Passerini Adducts Under Aqua and Mechanochemical Conditions

Sodeeq Aderotimi Salami, Vincent J. Smith and **Rui W.M. Krause**

Rhodes University, South Africa

A new simple, efficient, and environmentally friendly protocol is presented for the catalytic synthesis of biologically important α-acyloxycarboxamides using N-formamides as a carbonyl precursor under aqua and mechanochemical conditions. The immobilized sulfuric acid on silica gel was employed for the synthesis of desired products via the reaction of benzoic acid, 1-Napthylisocyanide, and various heterocyclic N-formamides. After a careful optimization of the reaction conditions, the desired Passerini products were obtained in high to excellent yields in short reaction times (10-30 min) at room temperature. The highly efficient and environmentally friendly method provides facile access to a library of α-acyloxycarboxamides derivatives for future research on bioactivity screening.

Biography

Sodeeq recently joined the R&D unit Chemical Process Technologies (CPT) as a researcher, responsible for developing chemical synthesis technologies for novel TB APIs (Pretomanid) to conceptualize and assess the viability of the synthetic routes, with particular emphasis on simplicity, scalability, time, waste, safety, and techno-economics. Sodeeq holds a PhD from Rhodes University Grahamstown, South Africa, under the supervision of Prof Rui Krause and Dr. Vincent Smith. His Ph.D. research focuses on the sustainable synthesis and application of isocyanides in the Passerini reaction to identify new isocyanide-based multicomponent reactions and apply them to new heterocyclic synthesis approaches under aqua and mechanochemical conditions. He received the 2021 Commonwealth Chemistry Poster Award in green chemistry and catalysis. Sodeeq also holds a master's degree from the University of Ilorin Kwara State, Nigeria, where He became interested in the biotransformation of natural plants and antibiotic drugs, which involves exploiting microorganisms and their isolated enzymes to develop a variety of valuable constituents through regio stereo selectivity reaction. He obtained his first-degree certificate from Kebbi State University of Science and Technology Nigeria. His research interest ranges from Sustainable Chemistry, Synthetic Organic Chemistry, Catalysis, Mechanochemistry, Polymer Chemistry, and Supramolecular Chemistry.

Climate Change Response in Wintertime Widespread Fog Conditions Over the Indo-Gangetic Plains

Dipti Hingmire[1], Ramesh Vellore[2], R. Krishnan[2], Manmeet Singh[2], A Metya[2], T Gokul[2] and **D.C. Ayantika[2]**

[1]*University of Victoria, Canada*
[2]*Indian Institute of Tropical Meteorology, India*

This study investigates the influence of climate change on widespread fog conditions over the Indo-Gangetic Plains (IGP) of north India using observations, reanalysis data of atmospheric parameters, coupled model inter-comparison project 6 (CMIP6) projections following four future scenarios based on the shared socio-economic pathways (SSP126, SSP245, SSP370, SSP585), and advanced analysis techniques including machine learning. Two parameters fog fraction and widespread fog days (WFDs) are estimated in this study by functional mapping of fog observations with 8 atmospheric parameters for the period 1981–2018 using three empirical/machine learning approaches. Of these, we note that the deep learning convolutional neural network (CNN) exhibits superiority in performance by showing the mapping closer to the observed, and also offers promising potential for operational purposes to provide fog outlooks for the IGP region. Temporal evolution of fog fractions and WFDs is analyzed from the CMIP6 projections following the aforementioned four future scenarios using CNN for the future periods of the twenty-first century. It is noted that there is a substantial enhancement in the CMIP6 projected fog fractions as high as 57% during the period (2015–2045) relative to the historical (1981–2014) period, while the largest increase of 154% is seen in projected WFDs. It is also seen that the near-future period (2015–2045) witnesses a larger prevalence of WFDs, for all scenarios except SSP126, due to the combined effects of air pollution and greenhouse warming. The post-2046 periods, however, generally indicate signatures of decline in foggy days with widespread conditions relative to historical period in most of the scenarios except SSP370. The severity in fog conditions following the high-emission scenarios SSP370 and SSP585 during this period comes from the relative impact of mitigation strategies of pollutants. The findings provide insights into the possible future changes in widespread fog conditions suitable for the IGP region.

Biography

Perpetually intrigued by the complexities of climate interactions, Dipti likes to be called a climate learner, and mainly studies large-scale climate dynamics. Currently she is working with Prof. Hansi Singh at School of Earth and Ocean Sciences, University of Victoria as post-doctoral fellow, on climate downscaling to estimate carbon sequestration capacity of Canada's coastal habitats. She completed her PhD at the Indian Institute of Tropical Metorology at Pune, India. During her PhD she studied the large-scale dynamical aspects of fog over the Indo-Gangetic Plains (IGP) of India and future projections of the fog using CMIP6 simulations. She also worked on numerical simulations of low clouds in the Southern Indian Ocean and the fog over IGP region using The Weather Research and Forecasting (WRF) Model. In her free time, she likes to read books and go hiking. More details about her work can be found at Researchgate.

Nitrogen-Vacancy Centers in Diamond for High-Performance Detection of Vacuum Ultraviolet, Extreme Ultraviolet and X-Ray

Bing-Ming Cheng[1] and **Huan-Cheng Chang**[2]

[1]*Department of Medical Research, Tzu-Chi University of Science and Technology, Taiwan*
[2]*Institute of Atomic and Molecular Sciences, National Taiwan University of Science and Technology, Taiwan*

The nitrogen-vacancy (NV) centers in diamond are among the most thoroughly investigated defects in the solid state of matter; however, their luminescence properties upon VUV and EUV excitation of the host matrix is limited. The knowledge is crucial for the identification of NV as the carrier of extended red emission (ERE) bands detected in diverse astrophysical environments. Here, we found that the NV-containing nanodiamonds excited with VUV and EUV could emit the strong emission at 520 – 850 nm. Our results share multiple similarities with those of the ERE phenomena, providing strong evidence that nanodiamonds are a major component of cosmic dust in the interstellar medium.

We further found that these fluorescent nanodiamond (FND) containing nitrogen-vacancy centers as built-in fluorophores exhibits a nearly constant emission profile over 550 – 750 nm upon excitation by VUV, EUV, and X- radiations over the energy (wavelength) range of 6.2 – 1450 eV (0.86 – 200 nm). The photoluminescence (PL) quantum yield of FND increases steadily with the increasing excitation energy, attaining a value as great as 1700% at 700 eV (1.77 nm). Notably, the yield curve is continuous, having no gap in the VUV to X-ray region. In addition, no significant PL intensity decreases were observed for hours. The superb photostability and broad applicability of FND offer a promising solution for the long-standing problem of lacking a robust and reliable detector for VUV, EUV, and X- radiations.

Based on this finding, we have developed for the first time the use of FNDs as scintillators to image the EUV radiation. This work starts with preparing a uniform thin film of FNDs (~100 nm in diameter) on an ITO-coated glass substrate by electrospray deposition. The film (~1 μm thick) is non-hygroscopic, vacuum-compatible, highly durable, and able to emit bright red fluorescence from NV0 centers when exposed to synchrotron radiation in the EUV region. Beam characteristics (including dimensions, positions, intensity profiles, divergence, and pointing stability) of the radiations of wavelengths in EUV are revealed on the fluorescent screen and imaged by a visible camera. With a spatial resolution of 30 μm, which is primarily limited by the light scattering property of the medium, the device is beneficial not only as a beam position monitor for alignment purposes but also as a sensitive detector for spectroscopic studies in real-time.

A Holistic Method for Determining Floating Photovoltaic Schemes

Ching-Feng Chen

Department of Electrical Engineering, National Chung-Hsing University, Taiwan

This paper determines which floating photovoltaic (FPV) commerce investment is more favorable for Taiwan's Agongdian Reservoir or Japan's Yamakura Dam integrating Time-Series forecasting, Analytical Network Process (ANP), and financial analyses. Although much literature is associated with the FPV environmental impact, energy generation, and PV units on water, there needs to be more discourse on comparative economic analysis in optimal schemes to help investors make decisions. The finances of various countries cannot support long-term renewable energy development, not to mention after the happenings of the epidemic, the Russian-Ukrainian war, extreme environment, inflation, and interest rate hiking in the United States. The results reveal that the metrics impacting FPV deployment scales are system capacity, installation cost, bank rate, and emissions trading systems (ETS) & electricity bills with weights 0.23, 0.23, 0.12, and 0.42, respectively. In the post-FIT era, investing in Japan is more favorable than in Taiwan as the latter’s net present value (NPV) is cheerful (7269.8, at a discount rate of 5%). The internal rate of return (IRR) (10.1%) is affirmative, the benefit-cost ratio (BCR) is above one (1.71, at a discount rate of 5%), and the breakeven point is agreeable (about 55.2%.). The approach proposed in the study benefits stakeholders’ decision-making while funding a project.

Biography

National Taiwan University (NTU), Department of Civil Engineering Majoring Hydraulic Engineering, PhD Candidate.

National Chung Hsing University (NCHU), Department of Electrical Engineering PhD student.

Ethylene and Jasmonic Acid Play a Synergistic Role in The Tomato Fruit Susceptibility to *Botrytis*

Ivan Sestari

Institute of Biological Sciences FURG, São Lourenço do Sul-RS, Brazil

The necrotrophic fungus Botrytis cinerea represents one of the main causes of rot in the post-harvest of fruits. Ethylene and jasmonic acid are plant hormones involved in the interaction between fruits and pathogens. Although the role of both plant hormones in abiotic stress responses is recognized, the putative interaction among them and its influence in the resistance against undesirable biotic interactions is still unknown. To study the role of ethylene and jasmonic acid in the susceptibility of tomato fruit to B. cinerea, the Never ripe (Nr) and jasmonic acid insensitive1-1 (jai1^{-1}) tomato mutants were used, which are insensitive to ethylene and jasmonic acid, respectively. Ripe tomato fruits from wild type (WT), Nr and jai1-1 mutants were treated or not with 1-methylcyclopropene (1.0μL L^{-1}), an inhibitor of the ethylene receptor. Immediately after treatment, fruit were inoculated with B. cinerea (105 spores mL^{-1}) and stored for six days at 25°C and relative humidity of 85%. Fruit susceptibility was represented here as incidence and severity; and the progression of the disease by lesion diameter. The results show that inhibition of ethylene receptor decreases susceptibility to Botrytis only in the wild type fruit. The incidence and severity in the ethylene insensitive mutant was not influenced by the treatment with ethylene inhibitor, however in the jasmonic acid insensitive mutant, the inhibition of ethylene receptor intensified the increase in incidence and severity of Botrytis and the lesion diameter. On the contrary, disease progression appears to be dependent on the sensitivity of fruit tissue to ethylene and jasmonic acid. These results indicate that ethylene and jasmonic acid act synergistically in the susceptibility of tomato fruit to *Botrytis cinerea.*

Biography

Dr. Sestari has experience in Plant Physiology, with an emphasis on Post-Harvest Physiology. He is currently investigating the hormonal regulation of fruit ripening and fruit tolerance to biotic and abiotic stresses.

Rare Earth Element-Associated Hormetic Effects

Giovanni Pagano[1], **Marco Trifuoggi**[1], **Daniel M. Lyons**[2] and **Philippe J. Thomas**[3]

[1]*Department of Chemical Sciences, University of Naples Federico II, Italy*
[2]*Ruđer Bošković Institute, Center for Marine Research, Croatia*
[3]*Environment and Climate Change Canada, National Wildlife Research Center Ottawa, Canada*

Rare Earth Elements (REEs) have undergone a steady spread in several industrial, agricultural and zootechnical applications. A body of literature highlights both favorable and adverse effects, as far as REEs, like other xenobiotics follow hormetic concentration-related trends, implying stimulatory or protective effects at low levels, then adverse effects at higher concentrations. Updated literature both prompts further investigations on REEs in different matrices to evaluate the risks or benefits of these agents. REE mixtures have been used in Chinese agriculture as fertilizers for more than 40 years to improve crop yields. Furthermore, REE supplementation positively affects both animal growth and feed conversion efficiency (FCE) in livestock, and egg production in laying hens. Our recent work focusing on different concentrations of cerium, lanthanum and their mixture above and below micromolar (10-5 to 10-8 M) showed a shift from inhibition to increase of fertilization (Figure 1) and of offspring quality (Figure 2) in Sphaerechinus granularis sea urchins.

The present body of evidence from field practice and our recent laboratory data altogether should prompt ad hoc studies to provide awareness of the dose-related effects of REEs leading to their potentially authorized use in agronomy and zootechny.

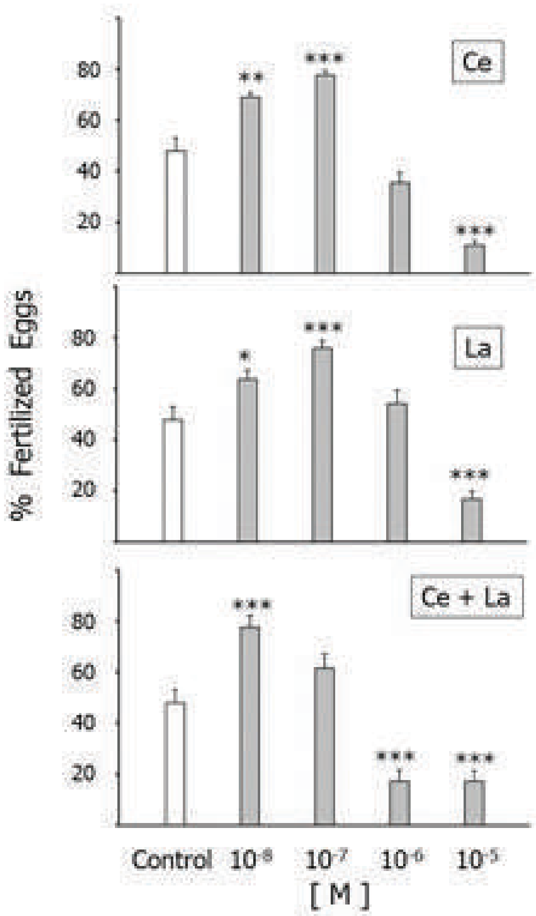


Figure 1. Percent fertilization success of Ce-, La- or Ce+La-exposed S. granularis sperm.

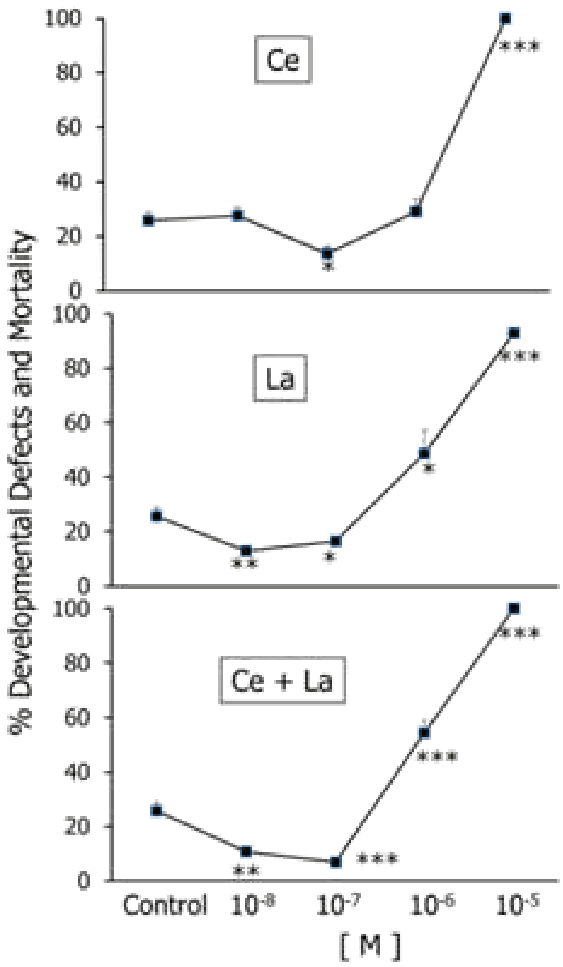


Fig. 2. Percent developmental defects and larval mortality in the offspring of Ce-, La- or Ce+La-exposed S. granularis sperm.

Biography

Over 150 articles in peer-reviewed journals, mostly as first or corresponding author and of 22 book chapters; editor of 2 books; 11 contract reports, over 40 meeting presentations, and multi-decade long experience in international lecturing.

Established experience both in environmental research and, in the recent decade, studies focusing on the adverse effects of rare earth elements (REEs) and on the present and prospect use of REEs in agronomy and zootechny.

Coordinator or participant in EC- and a NATO-supported projects, including study design, project management, and writing reports. Experience in interacting with national and international scientists by interfacing the respective expertise.

An over 25 year-long experience in peer-review for journals and as referee for research funding agencies has contributed to enhance GP's skills in critical judgement and editorial work. Currently maintaining and extending international contacts, in publication, university lecturing and in lab work.

The Second Law of Thermodynamics for Open Systems

Pulat A. Tadjibaev and **Orifjon M. Tojiboev**

Branch of the National Nuclear Research University, Uzbekistan

By solving the Fokker–Planck equations, the distribution functions of heavy particles in a thermostat of light particles (Rayleigh gas) with and without external sources of heavy particles were previously obtained. From the obtained non-stationary distribution functions, having determined entropy according to L. Boltzmann, analytical expressions for entropy production in open and closed systems were found. The first time introduce the concept of the production of negentropy. If heat is removed from a system, entropy decreases due to the outflow of entropy from the system or the flow of negentropy into the system. Introducing ordered heavy particles into the system reduces entropy, i.e. produces negentropy. The production of negentropy is to be expected in self-organizing systems. Therefore, the production of negentropy should be understood as the negative production (absorption) of positive entropy. In nonlinear thermodynamics, irreversible processes not only produce entropy, but can also absorb it, i.e. produce negentropy. The term "negentropy production" is introduced to emphasize the absorption of entropy by irreversible processes. Thus, the generally accepted opinion, that the entropy produced in a stationary nonequilibrium state is compensated by the outflow of entropy (the flow of negentropy) is not fulfilled in the considered model. In a stationary state. The entropy produced is compensated by the negentropy produced. The algebraic sum of productions entropy and negentropy are defined as the generalized entropy production. It is shown; that the sign of the generalized entropy production determines the direction of relaxation of an open system, and the equality to zero of the generalized entropy production ensures the entropy balance and the stationary state of the system. The second law of thermodynamics in open systems is formulated as, when an open system relaxes into a nonequilibrium stationary state, the generalized entropy production decreases in absolute value and is equal to zero in a stationary nonequilibrium state.

Biography

Born on February 20, 1950 in Pakhtaabad, Andijan region of the Republic of Uzbekistan. In 1974 he graduated from the Faculty of Physics of Tashkent State University with a specialization in "Theoretical Physics". From 1974 to 2022, he worked at various scientific and pedagogical institutions of Uzbekistan, such as the Department of Thermophysics of the Academy of Sciences of Uzbekistan, the Institute of Nuclear Physics of the Academy of Sciences of Uzbekistan, the Tashkent Electrotechnical Institute of Communications, etc.

In 1988, he defended his PhD thesis on the topic "Diffusion theory of translational and vibrational relaxation in gas systems with particle sources" under the guidance of Professor A.I. Osipova (MSU). Diploma of Candidate of Physical and Mathematical Sciences FM No. 034443 issued by the USSR Higher Attestation Commission on March 1, 1989.

Currently I am an associate professor at the Department of Natural Sciences, Branch of the University "MEPhI National Nuclear Research", Tashkent, Uzbekistan Married, I have a daughter and three sons.

Anthropogenic Accumulation Based on Chemometrics of The Radionuclide 40k In Tropical Soils in The Northeast Brazil

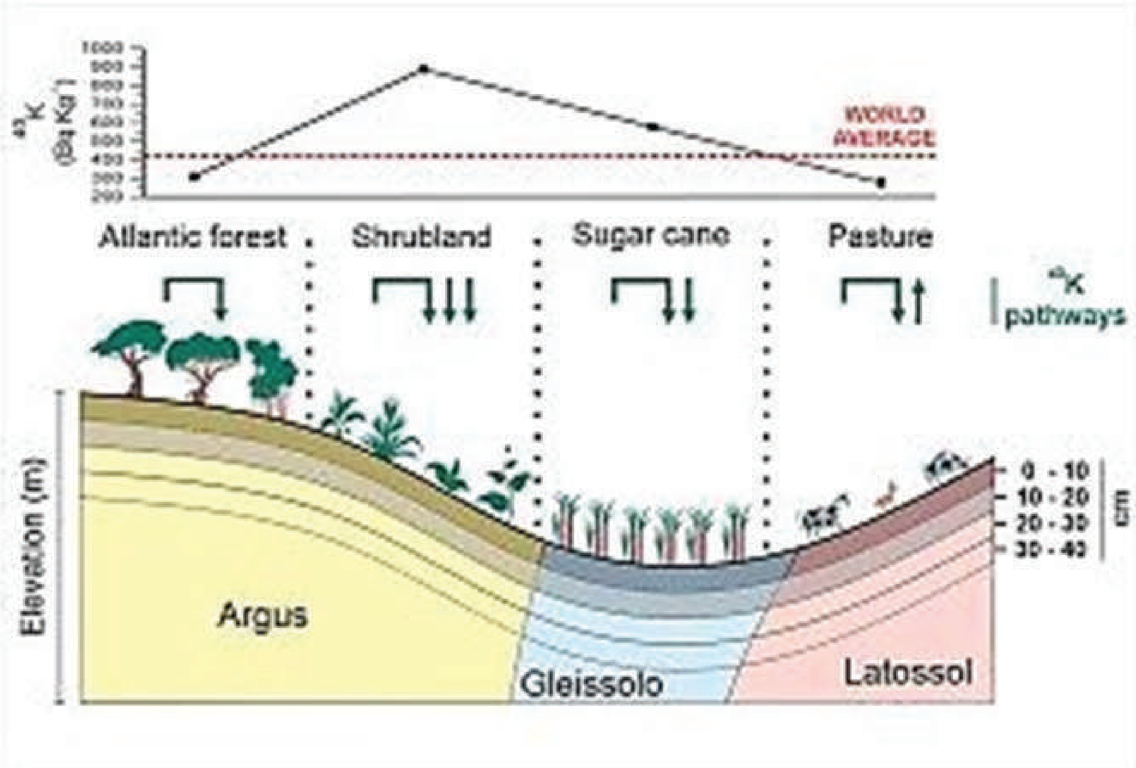
Otavio Pereira dos Santos Júnior[1] and **Alex Souza Moraes**[2]

[1]*Federal Institute of Education, Science and Technology, Brazil*
[2]*Rural Federal University of Pernambuco, Brazil*

Anthropogenic Accumulation Based on Chemometrics of the Radionuclide 40K in Tropical Soils in the Northeast Brazil, Otavio Pereira dos Santos Júnior, R. Arq. Luis Nunes, 822, bl 1B – ap 104 – Imbiribeira – Recife – Pernambuco – Brazil, Alex Souza Moraes, R. Dom Manuel de Medeiros, s/n – Dois Irmãos – Recife – Pernambuco – Brazil.

The continuous use of fertilizers can increase the levels of radionuclides in the soil, and their accumulation and concentration are related to their characteristics and to the different processes of use and occupation of the soil. The work presented results of a study to evaluate the accumulation of 40K, in an area of the Zona da Mata of Pernambuco, Northeast of Brazil. The 40K activity concentration was measured by high resolution gamma spectrometry in 108 soil samples, as well as

the organic matter content and granulometric distribution. The results showed that the 40K activity reached a value of 1843 $Bq.Kg^{-1}$, with arable soils showing levels above the world average value (USNCEAR). A higher prevalence of 40K was observed in arable soils, regardless of soil type, organic matter content, depth or texture. Agricultural activities increased at levels of ^{40}K to different degrees, depending on the type of crop used, with an accumulation factor of up to 4 times greater than soils not impacted by agricultural activities. The radiochemometric diagnosis made it possible to draw up a strategic management plan to improve family farming management practices, in order to maximize production efficiency, promote the conservation of natural resources and preserve the environment.



Biography

Professor of the Degree Course in Chemistry – Federal Institute of Education, Science and Technology

Campus Vitória de Santo Antão – Pernambuco – Brazil.

Graduated in Chemical Engineering, Specialist in Educator Training, Master in Environmental Technology, PhD in Energy and Nuclear Technologies.

Thermochemical Degradation of Waste Sludge From the Soybean Processing Industry for the Production of Bio-Oil

Marcelo Pedroza

Tocantins Federal Institute of Education, Science and Technology, Brazil

The objective of this work was to obtain bio-oil through the pyrolysis of residual sludge from the soybean processing industry. The biomass was characterized by immediate and instrumental analysis (Elemental Analysis, Lignin, Cellulose and Hemicellulose, Scanning Electron Microscopy – SEM, Infrared Spectroscopy and Thermogravimetric Analysis). The laboratory scale pyrolytic plant consists of a stainless steel fixed bed reactor heated by a reclining split furnace using heated water vapor as carrier gas. In thermochemical pyrolysis processes, the following parameters were studied: reaction temperature (360 to 640°C) and heating rate (23 to 37°C/min). The bio-oil obtained was characterized using classical and instrumental analytical techniques (density, pH, gas chromatography coupled with mass spectrometry and solubility testing). The maximum yield of pyrolytic liquid was around 61.15%, being obtained under the following conditions: (a) temperature of 550°C and (b) heating rate equal to 30°C/min. The lowest bio-oil yield observed was 39.89% obtained at 350°C and reactor heating rate of 25°C/min. The bio-oil had an acidic pH and density varying between 1 and 1.3 g/mL, being totally soluble in chloroform and dichloromethane solvents. The following chemical functions were identified in the constitution of the bio-oil of this research: (a) phenols, (b) C19 alcohol, (c) carboxylic acids with short and long chains (C6, C8, C16 and C18) and (d) esters (C11, C17, C19 and C23). Sulfur compounds were not found in the samples of the pyrolytic liquid, which points to the possibility of applying this product as a biofuel or even used as an input in the chemical industry.

Advancements in Iron-Selective Bioflocculation from Red Mud: A Comprehensive Study on Enhancing Iron Grade and Recovery through Parameter Optimization

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Red mud, an alkaline residue from converting bauxite to alumina, is a significant concern due to its large production volume (0.7 to 1.5 tons per ton of alumina) and pH (10 to 12.5). This material contains valuable metals, such as iron, aluminum, and titanium, offering potential for beneficiation. Recent studies focus on iron extraction through selective bioflocculation, a method using cost-effective and environmentally sustainable bioreagents from bacteria and their metabolites. This approach represents a promising avenue for utilizing red mud, aligning with broader goals of resource efficiency and environmental stewardship.

The objective of this study was to determine the optimal conditions for selectively bioflocculating iron from red mud using a factorial design approach. The investigation focused on three variables: slurry concentration (with levels of 10, 20, 40, 80 g/L), bioflocculant dosage (at 5%, 10%, 15%, 20% v/v), and the particle size fraction of dry red mud in the slurry (+65, -65+200, -200 mesh). A settling test method was employed in a 100 mL measuring glass, with a 5-minute settling duration, using the bacterium Bacillus nitratireducens strain SKC/L-2 as the selective bioflocculant. The iron concentration and recovery in the sediment were assessed as key parameters, with experiments conducted in triplicate.

The study determined the most optimal parameters as follows: a slurry concentration of 10 g/L, a bioflocculant dosage of 20% v/v, and a dry red mud particle size fraction of -200 mesh. The aforementioned parameters resulted in the generation of a sediment with an iron concentration of 63.66 ± 9.53% and a corresponding iron recovery of 74.49 ± 9.50%. The experimental findings demonstrate that the selective bioflocculation of iron from red mud is an effective method for generating a concentrate with an iron content that meets the requirements for iron and steel production.

Biography

Dr. Edy Sanwani serves as an Associate Professor at the Department of Metallurgical Engineering, Faculty of Mining and Petroleum Engineering, at the Institut Teknologi Bandung (ITB), Bandung, Indonesia. He completed his undergraduate studies in Metallurgical Engineering at ITB in 1992, followed by a Master's Degree in coal utilization technology in 1997 from the same university. In 2006, he earned his Ph.D. in Minerals Process Engineering from the Julius Kruttschnitt Mineral Research Centre at The University of Queensland, Australia. Dr. Sanwani has held leadership roles at ITB, including the head of the undergraduate program in Metallurgical Engineering from 2010 to 2011, and the head of the master's program in Metallurgical Engineering from 2016 to 2020. Since 2006, he has also been the head of the minerals processing laboratory within the Department of Metallurgical Engineering at ITB. His teaching and research since 2006 have focused on areas such as ore and slag comminution, ore flotation and bioflotation, and the flocculation and bioflocculation of red mud.

How Important Is the Metal-Free Catalytic Knoevenagel Reaction in Medicinal Chemistry?

Nader Ghaffari Khaligh

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The Knoevenagel condensation is a fundamental reaction in the synthesis, as it is a prominent route in the generation of α, β-unsaturated compounds/carboxylic acids. It provides versatile products/intermediates for organic, pharmaceutical, fine chemicals, and cosmetic sciences through catalytic protocols. Various catalysts, including organocatalysts, polymers, ionic liquids, bio-based, and carbon-based catalysts, have been reported for the Knoevenagel condensation via conventional, i.e., heating and non-conventional strategies such as microwave, ultrasonics, ball-mill, photochemical and electrochemical methods. This condensation has proved to be a significant driving force in many multi-component and multi-step reactions demonstrating its extensive use in synthesizing biologically fascinating molecules predominantly in medicinal chemistry. In addition, the most recent research has focused on designing new heterogeneous or homogeneous catalytic approaches that follow green principles and overcome environmental concerns. The current presentation summarizes recent studies (2021-2022) using metal-free catalytic Knoevenagel condensation reaction, producing molecules of pharmacological interest with biological activities, such as anti-cancer, antitumor, antioxidant, antimalarial, and antimicrobial activity. It also provides aspects of structure-activity relationships (SARs), the optimal reaction conditions, selectivity, the desired product yield, and the merits and limitations of some methods.

Biography

He received his Ph.D. in Organic chemistry from the University of Guilan, Iran, in 2013. His publications, including 146 papers, reviews, and mini-reviews, and the chapters in two books are focused on heterogeneous and homogeneous catalysis, sustainable chemistry, green chemistry, energy, synthesis of heterocycles, and multi-task reagents. He has been elected as World's Top 2% Scientist Career-Long Citation Impact and World's Top 2% Scientists by Stanford University in 2019-2022. He is the executive editor, section editor, and associate editor of three international journals. He is a member of editorial board of several international journals.

Contextualized Teaching of Chemistry to Promote Active Citizenship

Sebatana M.J

North-West University, South Africa

Most countries – including Nepal, Australia, India, South Africa, and United States, have realized the need to include contextualization of content in the teaching and learning of science concepts in their science curricula (Cornerstone of Tech Prep [US], 1999; Department of Basic Education [South Africa], 2011; Kanika et al., 2020; National Council of Educational Research and Training [India], 2006; National Curriculum Board [Australia], 2009; Pangemanan, 2020; Samuel et al., 2022; Tytler & Hobbs, 2011; Wagle, Luitel & Krogh [Nepal], 2023). However, there are no clear guidelines on how contextualization of content can be achieved in the science classroom. Contextualized teaching "seeks adequate linkage of the school curriculum to local realities and community experiences" (Wagle et al., 2023, p. 1). In the author's view, engaging learners through a contextual teaching and learning strategy such as problem-based learning (PBL) might promote active participation such that students may possess the knowledge, skills and dispositions deemed necessary to fulfilling their roles as citizens. This empirical study followed a qualitative case study approach. This study was conducted in the North West, one of nine provinces in South Africa. In the selected school, there was only one Grade 10 chemistry class, and the teacher teaching this class was chosen for this study. A scenario with an issue which affects students in this particular region was explored as it contextualized intended chemistry concepts, in turn, provided students with relevant strategies to address that issue in real life. Findings showed that after students were taking through contextualized teaching, they could show abilities to expand situational knowledge into chemistry content to predict and explain chemistry concepts – showing that traits of active citizenship.

Biography

Dr Judicial Sebatana is a lecturer at the North-West University, in South Africa where he teachers Chemistry and supervises postgraduate studies. He is also a researcher at the same institution where his interests include Problem-Based Learning, Inquiry-Based Learning, Blended Learning and Pedagogical Content Knowledge under the Self-Directed Learning Research Unit. Dr Sebatana is a member of various organizations such as Golden Key International Honor Society, Southern African Association for Research in Mathematics, Science and Technology Education (SAARMSTE) and National Association for Research in Science Teaching (NARST). He is currently serving as an executive committee member of The UNESCO Chair on Open Educational Resources. Dr Sebatana was awarded with Fulbright Scholarship and have received other awards as an active partner with the Ministry of Education Mathematics, Science and Technology Unit in South African.

Design Of a Peptide with High Affinity and Specificity for Integrin αvβ6 for use in Cancer Treatment and Diagnosis

Mauricio Urquiza, Daniela Benavides-Rubio and **Silvia Jiménez-Camacho**

Chemistry Department, Faculty of Sciences, Universidad Nacional de Colombia, Colombia

The integrin αvβ6 plays a role in cell adhesion and migration, it is expressed at low levels in healthy adult epithelial tissue but it is up-regulated during tissue repair, embryogenesis, and carcinogenesis. High levels of αvβ6 expression are associated with metastasis, tumor invasion, and a decrease in the median survival time of patients. Thus, integrin αvβ6 is a potential target for cancer treatment and diagnosis. There are several reported peptides that binds with high affinity to this integrin, one of them is the peptide A20FMDV2 exhibits high selectivity and affinity for the αvβ6 integrin, allowing αvβ6+ tumor detection using positron emission tomography (PET). We have reported a peptide derived from EBV gH protein that was discovered to bind with high affinity to this integrin but also to αvβ8 integrin. This synthetic peptide presented a random coil structure in aqueous solution. We have modeled the interaction of this peptide with the integrin avb6 using CLUS pro, calculating its binding energy, and comparing it to the energies of different integrins. Based on this data, the sequence and the structure of several analog peptides were designed and their theoretical binding to this integrin was calculated. Based on this analysis a peptide with higher affinity was designed, this peptide was synthesized by solid phase labeled with rhodamine at the N-terminus and purified by HPLC. This peptide has been tested in binding assays to integrin αvβ6 and to integrin αvβ6+ cell lines showing high affinity and high specificity to these cell lines. This peptide is being using to deliver information to tumor cells expressing this integrin, for example, chimeric peptides containing that peptide attached to NKB inhibitor peptide induces apoptosis of integrin αvβ6 integrin + cell lines.

Peptide	Energy without rhodamine	Energy with rhodamine
VEB_1	-734,3	-809,0
VEB_2	-763,7	-833,8
VEB_3	-806,1	-1023,6
VEB_4	-774,7	-934,6

Biography

A professional skilled in structure, function, interaction and thermodynamics of peptides and proteins. Antibody-, MHC-, and cytokine-biological function, study of the immune response *in vivo* and *in vitro* in humans and animals. Additionally, in malaria parasite, human Papilloma virus and Epstein-Barr interactions with host cells, cancer caused by EBV and HPV, specifically cervical cancer and B-cell lymphomas. Professional activities include the

publication of articles related to parasitology, virology, immunology, cancer, molecular biology and peptide-protein structure; grant applications in the same fields, teaching immunology. Previously, Postdoc at University of California San Diego, in the Moores Cancer center; working in the study of the immune response induced by Ad-ISF35 in humans and mice. Later, Postdoc at the department of Biophysics and Biophysical chemistry working in expression, purification and determination. Currently, associate professor in the Universidad Nacional de Colombia, principal investigator in research projects focused on designing peptides with antitumor activity against integrin αvβ6 positive tumor cells and peptides for modulating the immune response.

Hydrocarbon Industry Sustainability in Perú

Manuel Martin Ego Aguirre Madrid

Universidad Nacional de Ingeniería, Perú

Hydrocarbons in Peru to date are the main source of energy. In recent years, various factors have caused the fall in production and the decrease in reserves, this coupled with socio-environmental problems related to the activities of the industry initiated in times prior to environmental regulation, coupled with international commitments regarding emission reduction. The lack of a transversal understanding of the problem of the industry from the point of view of the externalities that are generated motivates the present research, which, because it is a complex problem in the management of externalities, requires different tools and views both in space and time. A model with an economic foundation of cooperative approach based on the internalization of externalities in optimal control models that serve as a basis for building sustainable long-term relationships by integrating the impact of externalities is formulated. To visualize in economic terms the impact of externalities, numerical simulations of industry situations are presented that demonstrate the importance of controlling and avoiding externalities in the long term. Finally, the contribution of this work consists in the formulation of a line of economic thought regarding the economy of natural resources with the problem of the hydrocarbon industry in Peru, which can be replicated in extractive industries in general or in energy sources.

Biography

Doctor candidate in Sciences with Mention in Energy studies (UNI); Magister Scientiae in Economics of Natural Resources and the Environment by UNALM; Geologist Engineer (UNI). Doctoral studies in Economics of Natural Resources and Sustainable Development (UNAM-Mexico and UNALM); Diploma in Business Administration (ESAN); Diploma in National Security and Defense (UTP-Ministry of Defense); Diploma in Foundations, Development and Sustainable Management of Hydrocarbons (PUCP-CAREC). Consultant with 30 years of experience in energy and environment in the public and private sector in transnational companies and infrastructure megaprojects such as Shell-Camisea, Schlumberger-Perupetro Hydrocarbons Data Bank; Camisea Peru LNG-CBI Gas Export Project. Researcher in community relations management and efficient management of natural resources. Visiting Professor at Universidad Nacional Agraria La Molina and Associate Professor at Universidad Antonio Ruiz de Montoya.

Investigating Sasol Coal Characteristics for Power Plant Boiler Firing using Thermal Gravimetric and CHNS Analytical Techniques

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The operational efficiency of a coal-fired boiler is strongly dependent on the type of coal fuel used for firing the boiler. The coal quality is based on its characteristics i.e., organic, inorganic chemical composition, and heating value. This study investigates the operational effectiveness of the coal-fired boiler used for steam generation operated by Sasol synfuel limited in Secunda Mpumalanga province in the Republic of South Africa based on the coal used as the primary feedstock for firing the boiler. The coal samples were collected for laboratory analysis to determine their characteristics i.e., proximate, ultimate analysis, and heating values. And evaluate how the coal characteristics affect the boiler's operational efficiency. These coal samples were analysed using the CHNS technique to determine their percentage elemental composition (Carbon, Hydrogen, Nitrogen, Sulphur, and Oxygen) and thermal gravimetric analysis (TGA) to determine the sample's inorganic constituents (moisture content, volatile matter, mineral matter, fixed carbon content, ash content). The international organisation of standardisation (ISO) method was used to calculate the coal sample's proximate analysis. In applying the analysed results on the boiler performance, a structured designed questionnaire was used to collect data on the temperature and output steam pressure changes during the boiler operation at Sasol synfuel operations in Secunda, Mpumalanga. The data was collected for 30 days. The results from the analysed laboratory coal samples and the statistical data in this study indicated that the coal used for firing the boiler(s) is composed of suitable characteristics and the boiler performance can be increased by routine regular maintenance and replacement of the ageing heat transfer tubes.

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Level of Agreement and Correlation Between the Estimated Hemoglobin A1c Results Derived by Continuous or Conventional Glucose Monitoring Systems Compared with the Point-of-Care or Laboratory-Based Measurements: An Observational Study

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Introduction: Hemoglobin A1C (HbA1c) is an important marker for diabetes care management. With the increasing use of new technologies such as continuous glucose monitoring (CGM) and point-of-care testing (POCT), patients and their physicians have been able to monitor and continuously check their blood glucose levels in an efficient and timely manner. This study aimed to investigate the level of agreement between the standard laboratory test for HbA1c (Lab-HbA1c) with point-of-care testing (POCT-HbA1c) and glucose monitoring index (GMI) derived by intermittently scanned CGM (isCGM) or estimated average glucose (eAG) derived by conventional self-monitored blood glucose (SMBG) devices.

Methods: A cross-sectional study was conducted at the Diabetes Treatment Center, Prince Sultan Military Medical City, Saudi Arabia, between May and December 2020 with 81 patients with diabetes who used the isCGM system ($n = 30$) or conventional finger-pricking SMBG system ($n = 51$). At the same visit, venous and capillary blood samples were taken for routine HbA1c analysis by the standard laboratory and POCT methods, respectively. Also, for isCGM users, the GMI data for 28 days (GMI-28) and 90 days (GMI-90) were obtained, while for SMBG users, eAG data for 30 days (eAG-30) and 90 days (eAG-90) were calculated. The limits of agreement in different HbA1c measurements were evaluated using a Bland-Altman analysis. Pearson correlation and multivariate linear regression analyses were also performed.

Results: Based on the Bland-Altman analysis, HbA1c levels for 96.7% and 96.1% of the patients analyzed by the POCT and the standard laboratory methods were within the range of the 95% limit of agreement in both isCGM and conventional SMBG users, respectively. About 93.3% of the GMI measurements were within the 95% limit of agreement. Also, about 94.12% of the eAG-30 and 90.2% of the eAG-90 measurements were within the 95% limit of agreement. Moreover, the correlation analysis revealed a statistically significant positive correlation and linear regression among Lab-HbA1c, POCT-HbA1c, GMI, and eAG in both conventional SMBG and isCGM users (all $p < 0.001$). These positive results persisted significantly after adjusting for different factors (all $p < 0.001$).

Conclusion: GMI derived by isCGM or eAG derived by conventional SMBG systems, as well as the POCT-HbA1c measurements, showed a high level of agreement; therefore, we recommend them as potential methods for diabetes monitoring, especially when a rapid result is needed or with patients with uncontrolled diabetes or on intensive insulin therapy.

A Novel Hybrid Compound Bis (4-Fluorobenzylammonuim) Tetrachloridozincate: Synthesis, Physico Chemical Caracterisation, Optical and Photoluminescence Properties

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[2]Laboratory of Material Sciences and Environment, University of Sfax, Tunisia
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A novel organic-inorganic hybrid material $[C_7H_9NF]_2ZnCl_4$ was obtained by slow evaporation at room temperature and characterized by single crystal X-ray diffraction. The compound has monoclinic space group P21/n with the following cell parameters: α = 15.1956(10) Å, β = 7.2108(3) Å, c = 36.103(2) Å, β = 93.1(6)°, V= 3950.1 Å3 and Z = 8. The crystal structure consists of tetrahedral $[ZnCl4]_2$- anions and 4-fluorobenzylammonuim [C7H9NF]+ cations connected by hydrogen bonding N–H...Cl, C–H...Cl, π-π, and van der Waals interactions, which ensure the stability of the crystal packing, forming layers laying approximately within the (101) planes. Powder XRD demonstrates the remarkable phase purity of both crystals. Infrared spectroscopy confirms the presence of the organic moiety in the structure, and the material exhibits thermal stability up to 180°C. Hirshfeld surface analysis reveals the significance of hydrogen bonds and electrostatic interactions in the material cohesion, while 2D fingerprint plots indicate the contributions of the H...Cl and H…H intermolecular interactions. The material also displays diffuse absorption, indicating the existence of optical direct allowed transition mechanisms with the band gap energy equal to 4.33 eV. Its photoluminescence spectrum extends over all visible band when it is excited by a Ultra-violet radiation owing these properties; the compound is promising for optical devices.

Characterization of Traditional Wagashi Cheese and Effect of the Addition of Probiotic Lacticaseibacillus or Enterococcus Strains on the Biophysical and Biochemical Features of Probiotic-Enriched Wagashi Cheeses

Sèdo Eudes L. Anihouvi[1,2,3] and **Harun Kesenkaş**[1]

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[2]*Lanmesyen n'dùdù Research Group, Benin*
[3]*Department of Food Science, University of Abomey-Calavi, Benin*

The present study aimed at characterizing traditional Wagashi cheese while defining as well the contribution of probiotic Lacticaseibacillus or Enterococcus strains to the biophysical and biochemical features of probiotic Wagashi cheeses vacuum packed and stored at 4°C for 30 days. The strains were added to the cheese during production and their effect on proteolysis, lipolysis, color, and textural features during refrigerated storage was assessed throughout storage using standard methods. All the parameters were affected by storage and strains. Proteolysis of traditional Wagashi cheese ranged between 0.4 and 0.75 mg/mL serine while those with added probiotics were between 0.12 and 0.98 mg/mL serine. As for lipolysis, values were comprised between 4.77 and 8.03 and 3.01–10.34% oleic acid for traditional and probiotic Wagashi cheese respectively. L. rhamnosus and L. plantarum were found to have a higher peptidolysis and lipase activity respectively. However, their addition didn't affect the cheeses' whiteness. Color parameters were affected by hardness, chewiness, and the dyeing process. The cheeses' textural features except for springiness were affected by storage time, strains, and proteolysis. The present work shows the relevance of improving the scientific knowledge of both traditional and probiotic Wagashi cheese.

Biography

Eudes Anihouvi is a food scientist and founder of Lanm□sy□n n'dùdù, an R&D center providing proposals, grants, and article writing/reviewing. New food product development and tailored research are also proposed as services. Lanm□sy□n n'dùdù and Eudes Anihouvi's research focuses on Food Technology, Food microbiology, Food chemistry, and Functional foods with an emphasis on developing edible coatings, enzymes and starter culture, dairy-free, and dairy-based functional foods using probiotics strains and bioactive compounds. I look forward to collaborating with you and providing tailored solutions to your demands.

The Challenges of Academic Recovery in Large First-Year Chemistry Courses

A. Karaksha

Griffith University, Australia

The course Chemistry 1 is offered in the Foundation Year for a variety of Health Programs at Griffith University, Queensland, Australia. The course enrols between 500 – 700 students every year with a wide range of assumed knowledge. Students with little to no chemistry and/or math background usually struggle with the course, resulting in a high fail rate of 20-25%.

To reduce the fail rate and support students in the course, an Academic Recovery Program (ARP) was initiated in 2019. Risk markers for academic failure were established which identified students at-risk early, including those repeating the course, and recruited them into the ARP.

Academic Recovery Mentors: Mentors are carefully selected high-achieving senior students who received formal training and are empowered with the skills necessary for supporting at-risk students.

The ARP has been offered to more than 1500 students in the past five years. The uptake from students is a key challenge with less than 40% of students engaging with the program. Nonetheless, the outcomes of the ARP are really encouraging:

Student outcomes: During the academic year 2021, 217 at-risk students were invited to participate in the ARP. 81 students engaged, of which 80% passed the course. Among the 136 students who did not engage, only 15% passed. A similar trend was observed in 2022, where 82.5% of students who engaged with ARP passed the course.

Student retention: We identified 30 students between Trimester-1 2020 – Trimester-2 2022 to be at mid to high risk levels of dropping their university studies before engaging with the ARP. After engaging with the ARP, only three of them dropped from their studies while the other 27 students remained active in their university degrees.

Student satisfaction: The ARP helped students feel more confident about their university studies. Confidence in understanding the course increased from 2.25/5.0 at the start of the program to 4.875/5.0 towards the end. Students noted, "These sessions gave me the confidence I needed to continue on in the trimester".

In conclusion, the academic recovery program might be an important tool to support at-risk students to overcome the overwhelming study load by creating a more student-friendly atmosphere, which enhances their learning experience, help boost confidence and release their full potential.

Biography

Dr Abdullah Karaksha completed his Bachelor of Pharmacy at the Aleppo University, Syria in 2005 and then moved to Australia to complete his Master of Medical Research (Clinical Pharmacy) in 2009 and then Doctor of Philosophy in 2014 at Griffith University, Australia.

Abdullah's research interest is using interactive online e-tools to improve student performance, preference and engagement with the curricula. Abdullah has published several articles and conference proceedings in the area of Scholarship of Leaning and Teaching. Abdullah's attest project is to support struggling students by implementing risk markers to monitor student progression. Abdullah developed an academic recovery program that supports hundreds of students in foundation year health programs.

Improving the Properties of High-Strength Steel for Critical Components by Microscopic Additions of Vanadium and Nitrogen

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Azerbaijan Technical University, Azaerbaijan

Currently, an important national economic task is to increase the reliability and durability of machines, mechanisms and structures, and reduce their metal capacity. In metallurgical terms, this task is determined by the chemical composition, structure and composition of the structural steels used. The traditional way to increase the complex properties of steel is to alloy it with such scarce elements as nickel, molybdenum, chromium, titanium, etc. However, in recent years the same effect has been achieved through microalloying of steel with carbonitride-forming elements such as (Ti,, V, Nb, Zr, B and N), which refine the grain structure of steel and cause dispersion hardening, due to which the characteristics of strength, ductility and toughness simultaneously increase.

Issues of microalloying of structural steels, especially weldable low-alloy steels, have been sufficiently fully studied and described in the literature.

At the same time, it should be noted that microalloying of structural steels subjected to strengthening heat treatment has not been sufficiently studied. In particular, the issues of complex microalloying with carbonitride-forming elements of high-strength, improveable steels with increased strength, as well as steels based on low-carbon martensite, have been little studied. Recently, due to the shortage of natural resources, interest in microalloying structural steels with carbonitride-forming elements has resurfaced.

And in connection with the above, the study of microalloying and the development of new effective structural steels were the main goal of this research.

In this work, the influence of microadditives of vanadium and nitrogen on the complex properties of medium-carbon high-strength nickel-cobalt steel grade 30N9K4 after various heat treatment conditions was investigated. It has been established that additional microalloying of medium-carbon high-strength steel with vanadium and vanadium together with nitrogen has a significant effect on the kinetics of austenite transformation during continuous cooling. The addition of vanadium and vanadium together with nitrogen into 30N9K4 steel causes a shift of the bainite region to the right - into the region of lower cooling rates and refines the austenite grains compared to the original 30N9K4 steel.

The noted features of the influence of additional alloying on the structural transformations of 30N9K4 provide a high complex of strength and toughness properties after quenching and various tempering modes. The most noticeable effect of the carbonitride forming elements vanadium and nitrogen is observed at high tempering temperatures (500-600°C). The greatest hardening effect is observed after tempering at 550 °C.

Modification of 30N9K4 steel with a carbonitride phase not only helps to maintain high strength, but also significantly increases the complex of viscosity properties after quenching and high tempering.

Determination of Inorganic Chemical Parameters in Drinking Water in Districts of the Province of Puno in the Region Puno-Peru

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[3]*Ministerio de Salud, Dirección Regional de Salud, Red de Salud Puno, Peru*
[4]*Departamento de Gestión y Ciencias Sociales, Universidad Nacional de Juliaca, Peru*
[5]*Departamento Académico de la Facultad de Ingeniería Económica, Universidad Nacional del Altiplano, Peru*

The inorganic chemical parameters in drinking water that include heavy metals are substances that exist in nature very widespread, nevertheless toxic metals such as lead, cadmium, arsenic, mercury, are very harmful to human health and to all forms of life, these toxic metals are silent contaminants. Therefore, the present study aims to determine the presence of inorganic chemical parameters in the drinking water from districts of the province of Puno. The results were compared based on the parametric test T-student and the non-parametric tests Kolmogorov-Smirnov. Finding the highest values (mg/L) in districts as Capachica Ba (0.8458) and Pb (0.5255), Manazo Al (3.08) and Pb (0.0185), San Antonio de Esquilache Fe (0.49) and Pb (0.9513), Vilque As (0.0193) and Pb (15.34), and Pichacani As (0.0193) and Pb (0.0215), as it is observed the samples do not comply with the regulation of the quality of drinking water in Peru, making it unsuitable for human consumption.

Biography

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Real-Time Power Theft Monitoring and Detection System with Double Metering System

Celimpilo Lindani Zulu

Richards Bay, KwaZulu-Natal, South Africa

Power system networks consist of operational losses, namely non-technical losses, and technical losses. Losses such as cable faults, transformers, overhead lines, and others used to distribute electricity are called technical losses. Losses such as illegal electrification schemes, meter tampering, and illegal connections are categorized as non-technical losses. The published proposed solution on “Real-time power theft monitoring and detection system with double connected data capture system” focuses on solving both issues identified as meter tampering and illegal connections. In the literature review, the proposed systems to address both issues (meter tampering and illegal connections) are discussed and the gaps are identified. The proposed system offers auto detection whenever power imbalances are measured by the smart meters between the distribution pole grids and/or distribution pole grid/node and consumer houses. Each smart meter is programmed using an Arduino ATMega328P microcontroller with a GSM module for wireless communication and sending of data to the cloud storage (MATLAB Thing-Speak Internet of Things channels display). GSM (Global System for Mobile Communication) is also used to send SMS notifications to the authority office. Software design was done using Proteus Design Suite v.8.10 SP3 software for simulation results while practical design was constructed for prototype measurement results. Whenever power imbalances are measured by the system, the authority office receives an alert and then analyses the power measurement results sent to the cloud storage (MATLAB Online, Thing-Speak Internet of Things channels display). After analyses, action is then taken against a particular consumer for meter tampering or an illegal connector for illegal connection.

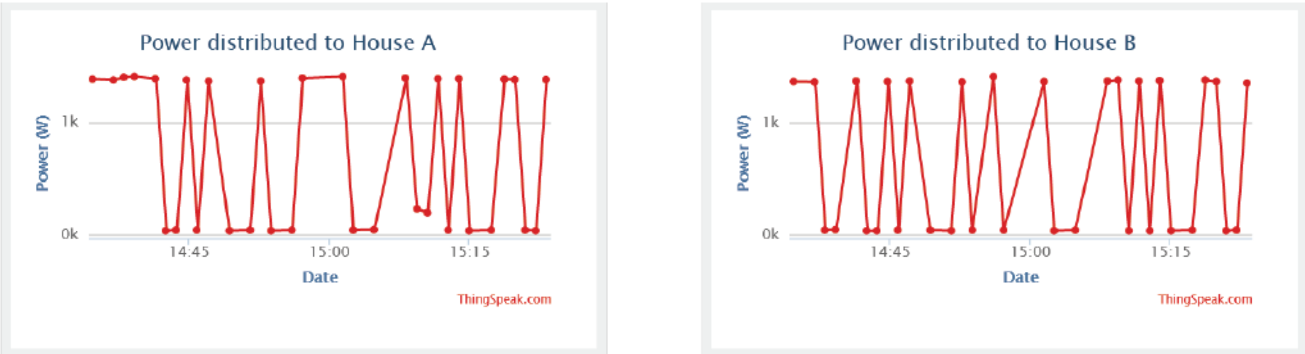

Figure 1: *House A and House B, power distributed from the pole node.*

Figure 2 below indicates a datasheet of captured electric data displayed on the cloud storage. As shown below, datasheet 1 - displays the total power measured supplying both consumer house A and consumer house B from pole grid/node 2, while datasheet 2 – displays power differences measured at pole node 2 [1].

Figure 2: *Pole 2 sum of power distributed to houses and power difference measured.*

Therefore, the measured power losses at pole grid/node 2 are caused by illegal connections and are detected and measured by the pole grid/node smart meter at pole node 2, and the revenue losses are known. The measured power losses are 1157.99W and 1339.20W.

Biography

Figure 1 below indicates a datasheet of captured electric data displayed on the cloud storage (MATLAB Online, Thing-Speak Internet of Things channels display). As shown below, datasheet 1 - displays power supplied from pole grid/node 2 of port A to consumer house A, while datasheet 2 – displays power supplied from pole grid/node 2 of port B to consumer house B [1].

Effect of Tableting Process on Physical Properties and Environmental Performance

Amna Ramzy[3], **Doaa Abdelkader**[1], **Rahaf Mohammed**[1], **Rana Hesham**[1] and **Mai Rady**[2]

[1]*Faculty of Pharmaceutical Engineering, German International University, Egypt*
[2]*Faculty of Pharmacy and Biotechnology, German University in Cairo, Egypt*
[3]*Faculty of Engineering and Material Science, German University in Cairo, Egypt*

Pharmaceutical industry is one of the largest global impactors on the environment due to the large greenhouse gases emissions (GHG). One of the largest scale productions in this field is the oral tablets production. This research investigates on a protype scale factory the effect of alternating parameters such as compression forces, granulation temperature and humidity during on microcrystalline cellulose tablets physical and drug release properties. The other dimension investigated in this study is the life cycle assessment (LCA) of the drug production process according to ISO 14040/14044 standards with Cradle-to-Gate boundaries and functional unit set to one batch of produced tablets.

Results show that hardness of the tablets increased with the increase of the compressive forces. On the other hand, the humidity uptake decreased by increasing the compressive forces. LCA results show a recognizable environmental impact of the tablets production as well also in the porotype scale due to the high energy consumption in production stages.

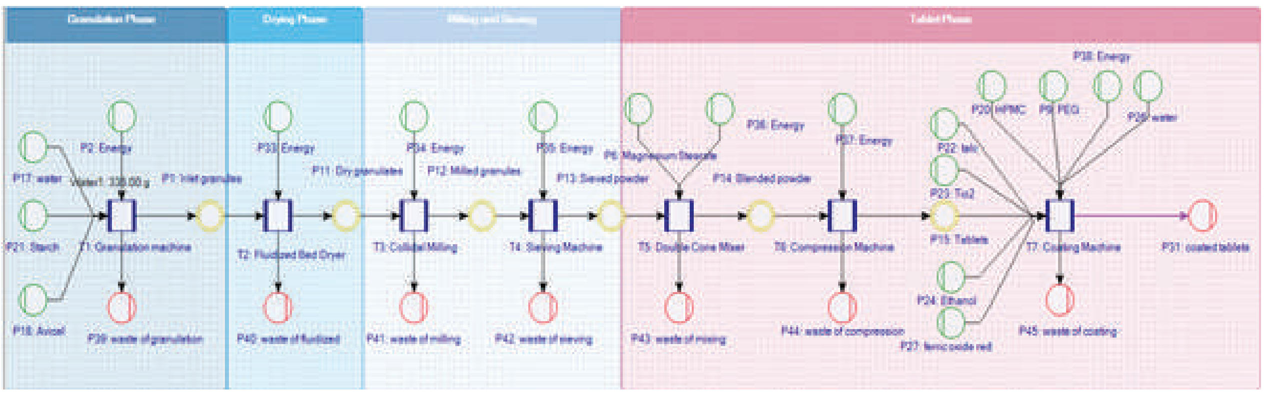

Figure 1: *Modelling of Tablets Production Process*

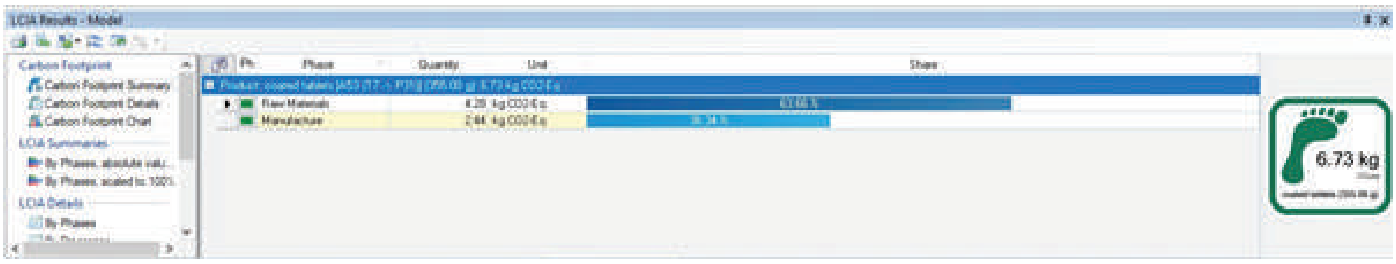

Figure 2: *Carbon Footprint per batch of produced tablets*

Biography

Materials Engineering University Professor and Researcher with international exposure in the field of Polymer materials and composites. Hands-on experience in management of Innovation Networks and European funded Capacity Building projects. PhD in Materials Engineering from Clausthal University of Technology – Germany. More than 50 peer-review publications, book chapters and conference presentations in the fields of Sustainability and Materials Innovation.

Study of Humidity Intake with Respect to Packing Properties

Rahaf Mohammed[1], **Mai Rady**[2] and **Amna Ramzy**[3]

[1]*Faculty of Pharmaceutical Engineering, German International University, Egypt*
[2]*Faculty of Pharmacy and Biotechnology, German University in Cairo, Egypt*
[3]*Faculty of Engineering and Material Science, German University in Cairo, Egypt*

Tablets are crucial in our daily life as they are favored for their ease of administration, precise dosing, cost-effectiveness, flexibility, and patient compliance. Tablet production can be done in many ways and different methods may be used, each with its own advantages and limitations. This study focuses on investigating the effect of different compression forces used during the compaction stage throughout tablets production on tablet properties and humidity uptake in tablets. 3 different compression forces were applied to produce 3 batches of microcrystalline cellulose tablets separately, and each batch was tested for the applicable mechanical and release properties as well as the humidity intake and moisture content. A sample of these tablets were taken and weighted immediately after production, then they are stored under 75% relative humidity in humidity chambers for 2 weeks to monitor the moisture content being absorbed. The tests conducted in this paper followed the USP standards, and they include hardness test, friability test, and disintegration test. Tablets were tested 3 times during the 2-week interval, first is when the tablets are out of production, second is on tablets being stored for 1 week in the humidity chamber, and third time is on tablets being stored for 2 weeks in the humidity chamber. Results show that as the compression force increased the tablets hardness and disintegration time increased, however the friability decreased. Tablets stored under 75% relative humidity for 2 weeks show that the tablets hardness decrease, however friability and disintegration increase.

Biography

Rahaf Mohammed, a 21-year-old senior pharmaceutical engineer at the German International University in Egypt, hails from Kuwait, where she was raised among three sisters. With high honors from A'takamul International School, Rahaf's passion for pharmaceutical engineering stems from its unique blend of engineering principles and pharmaceutical sciences. Over the past three years, she has honed her skills in communication, problem-solving, leadership, and creativity. Rahaf's commitment to the field is evident through her summer training at Future Pharmaceutical Industries and participation in a two-week summer workshop in Germany titled "Pharma Industry and Go Green." Eager to expand her knowledge and skills, Rahaf is dedicated to making a positive impact on society through scientific innovation in the pharmaceutical industry.

Study of The Compression and Packing Properties of Powdered Materials

Doaa Moustafa[1], **Mai Rady**[2] and **Amna Ramzy**[3]

[1]*Faculty of Pharmaceutical Engineering, German International University, Egypt*
[2]*Faculty of Pharmacy and Biotechnology, German University in Cairo, Egypt*
[3]*Faculty of Engineering and Material Science, German University in Cairo, Egypt*

Powder compression is a fundamental process that involves compacting powder particles into a solid form. This process is crucial in the pharmaceutical industry as tablet compression is a key unit operation for developing solid oral dosage forms. The compression and packing properties of powdered materials are crucial determinants of tablet quality in pharmaceutical manufacturing. This study investigates the influence of varying compression forces, particle sizes and drying temperatures on the physical attributes of tablets, aiming to optimize tablet formulation and improve production efficacy. In this study, Microcrystalline Cellulose tablets were prepared using the wet granulation method. Three different compression forces were applied to produce three different batches of tablets. Similarly, three different particle sizes, fine, medium and coarse, of the powder mixture were used to test the effect of particle size on tablet properties. In addition, the study tested the effect of different drying temperatures on tablet compression. SEM imaging was used to quantify the particle sizes. The tablets were tested for their mechanical and release properties. The tests included hardness, friability and disintegration testing. All tests conducted in this study followed the USP standards. The results reveal that increasing the compression force leads to in an increase in tablet hardness and disintegration time but a decrease in friability. Moreover, smaller particle sizes resulted in stronger tablets. However, the effect was not significant for the medium and coarse particle sizes. Optimizing the drying temperature was found to be crucial for the tableting process as it affects the overall tablet strength.

Biography

Doaa Moustafa Mohamed, a 22-year-old pharmaceutical engineering student at the German International University in Egypt, hails from Qatar, where she was born and raised. Recognized for her academic prowess, Doaa has been honored with an academic excellence award from both The German International University and The DAAD German Academic Exchange Service, solidifying her status as a top-ranked student. Her commitment to academic excellence is further underscored by her participation in an exchange student program in Berlin, Germany. Currently residing in Egypt to pursue her passion for pharmaceutical engineering, Doaa is dedicated to expanding her knowledge and contributing to the field. With a keen interest in the intersection of science and engineering, she looks forward to making meaningful contributions to the pharmaceutical industry in the future.

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Potential Serum Biomarkers for Early Detection of Diabetic Nephropathy

Tarek Kamal Motawi[1], Nagwa Ibrahim Shehata[1], Mahmoud Mohamed ElNokeety[2] and **Yasmin Farid El-Emady[3]**

[1]*Biochemistry Department, Cairo University, Egypt*
[2]*Department of Internal Medicine, Cairo University, Egypt*
[3]*The Holding Company for Biological Products & Vaccines (VACSERA)*

Aim: Diabetic nephropathy (DN) is considered as one of the diabetic complications affectingup to 40% of patients with type 1 or type 2 diabetes. In clinical practice, the frequentlyused markers of renal disease and progression are serum creatinine, estimated glomerular filtration rate (eGFR) and albuminuria.

The aim of this study is to determine new biomarkers in human serum which are promising for early detection of DN.

Methods: This study included 50 patients with type 2 diabetes mellitus (T2DM) and 25 clinically healthy individuals. The patients were divided into two groups; group I included 25 T2DM patients with normoalbuminuria, and group II consisted of 25 T2DM patients with microalbuminuria.

In all groups, neutrophil gelatinase-associated lipocalin (NGAL), b-trace protein (bTP) and microRNA- 130b (miR-130b) were estimated.

Results: The serum levels of NGAL and bTP were significantly elevated in T2DM patients with microalbuminuria (group II) compared with T2DM patients with normoalbuminuria (group I) and control subjects but there was no significant difference between group I and control subjects.

Serum miR-130b level was significantly decreased in patients with T2DM (groups I and II) compared with healthy control subjects, with a higher decrease in their levels in group II compared with group I.

Conclusion: Our results suggest that serum NGAL and bTP as tubular and glomerular markers respectively, together with serum miR-130b may be independent and reliable biomarkers for early detection of DN in patients with T2DM.

Reducing Construction Waste in The Construction Life Cycle of Industrial Projects During Design Phase by Using System Dynamics

Ahmed Abdel Kader Mohamed Farid, Ahmed Nouh Meshref and **ELsayed Abdel Fattah Ahmed Elkasaby**

Civil Engineering Department, Benha University, Egypt

There is tremendous growth in the construction of industrial projects in Egypt, resulting in a substantial quantity of construction waste during the industrial projects construction life cycle (CLC). This research assumes that managing the factors of construction waste will inevitably reduce its quantity during the CLC using building information modeling (BIM) and lean design.

The aim of this paper is to evaluate the impacts of two techniques (Designing Out Waste and (Design Strategies) based on qualitative factors using the BIM/Lean design concepts in the design phase which could reduce construction waste in the CLC of industrial projects. To achieve this aim, the research presents a comprehensive analysis of the factors of construction waste using system dynamics. A model was proposed that serves as a decision-support tool to ensure construction waste reduction in the CLC. The model in this study includes eight causal loop diagrams giving the professionals better understanding for the objectives to reduce construction waste. This model has been processed using Any Logic software with a stock-flow diagram to create the system dynamics model. Finally, the validation and implementation are demonstrated using a case study for the suggested model. The case study's findings improved the model's confidence in order to utilize it for quantitative analysis. It has been further assessed for its impact in two proposed scenarios to reduce construction waste. The system dynamic model in this study contributes to better practices and proper decisions in the construction field.

Ashwagandha Root Extract’s Phenolic Compound Counteracts Alloxan’s effects on Oxidative Stress, Inflammatory Cytokines, and Peripheral Neuropathy in Rats

Heba A. Hashem, Zohour I. Nabil and **Heba N. Gad EL-Hak**

Zoology Department, Suez Canal University, Egypt

Despite advances in understanding the intricate pathophysiological mechanisms underlying peripheral nerve injury, there are still few proven cures. Finding potential alternative therapies is necessary because conventional therapies have associated side efects and poor efcacy. In this regard, a study was conducted that ofered substitute therapeutic agents in place of the alloxan injection. The target study pathway after alloxan injection is oxidative stress and infammatory pathways, according to the study point. It argues that multitarget therapies must be developed to combat infammation brought on by diabetic complications. Alloxan (150 mg/kg) was injected intraperitoneally to cause diabetes in the DC group. The treatment with ashwagandha root extract (100 and 200 mg/kg/day) began 6 weeks after the diabetes was induced and lasted for 6 weeks in total. After the treatment, behavioral tests known as the hot plate test (HBT) and narrow beam test (NBT) were conducted. Glucose and creatine phosphokinase (CPK) levels in the blood, as well as oxidative, antioxidant, and pro-infammatory cytokines, were measured. Histological analysis of the pancreas and sciatic nerve was conducted. Response times to thermal pain during HPT were signifcantly faster under ashwagandha root extract treatments. The total time required to cross the beam during NBT signifcantly decreased in both the treated diabetic groups with ashwagandha extract. About glucose level, CPK, oxidative stress biomarkers, and pro-infammatory cytokines, the treatment group receiving ashwagandha root extract attenuated the changes brought on by diabetes. Histological examination revealed that the pancreas damage caused by diabetic animals and the altered infltration of infammatory cells in the sciatic nerve were both reversed by ashwagandha root extract. As a result of our research, ashwagandha root extract, which is rich in phenolic compounds, may help with traditional therapeutic agents for the treatment of infammation brought on by diabetic complications.

Development of Novel Cholinesterase Inhibitors: Computational and Experimental Studies

Singh S. K. and **Bajad N. G.**

Pharmaceutical Chemistry Research Laboratory, Department of Pharmaceutical Engineering & Technology, Indian Institute of Technology (Banaras Hindu University) India

Objectives: To design, synthesis and evaluate the cholinesterase inhibitors for the treatment of Alzheimer's disease (AD). AD is a multifactorial neurodegenerative disorder that leads to progressive mental, behavioral and functional decline including learning ability. Acetylcholinesterase (AChE) and Butyrylcholinesterase (BuChE) is an intriguing therapeutic targets for Alzheimer's disease.

Methods: In order to design the novel potential cholinesterase inhibitors, we have allowed the scaffold hopping guided MTDL strategy. A series of the compounds containing n-aryl piperazine scaffold were experimentally synthesized and evaluated for the biological activity. The molecular docking, and MD simulation studies were performed to identify important features and binding patterns of the active compounds. The compounds with promising *in silico* results subjected for the further *in vitro* AChE and BuChE studies.

Results: Out of all the synthesized molecules, lead compound were found to be potent AChE inhibitors with IC50 values in micro molar range along with significant BuChE inhibition. The structure-activity relationship and molecular docking revealed the significance of para-substituents on the n-aryl piperazine in the potent compounds. The molecular docking and dynamics simulation studies represented the binding mode analysis and protein-ligand stability of the optimal compound with AChE and BuChE.

Conclusions: Amongst all the tested derivatives, lead-bearing para substitution at n-aryl piperazine scaffold exhibited potent AChE inhibitory property with significant inhibition of BuChE. Overall the results indicated that the dual-targetable derivatives bearing n-aryl piperazine may be potential novel therapeutic agent for the management of AD.

Biography

Singh S. K. is currently HAG Scale Professor of Pharmaceutical Chemistry at the Department of Pharmaceutical Engineering & Technology, Indian Institute of Technology (BHU), Varanasi, India. He received his Ph.D. from the Department of Pharmaceutics, IT (BHU), Varanasi. He has more than 25 years of teaching and research experience in drug discovery. His research area includes the development of new chemical entities and isolation of active constituents from medicinal plants for major diseases/disorders by both conventional and advanced techniques. He has published more than 100 research and review articles in different reputed peer-reviewed journals.

Bajad N.G. is currently working as Ph.D. research scholar at the Department of Pharmaceutical Engineering & Technology, Indian Institute of Technology (BHU), Varanasi, India.

Exploring the Exceptional Properties of Polypropylene/Polystyrene grafted Natural Rubber (NR g PS) Blends

O. Egharevba[1], S.K. Ong[2], F.E. Okieimen[3] and **I.H. Ifjen[1]**

[1]Rubber Research Institute of Nigeria, Nigeria
[2]Universiti Kuala Lumpur-Malaysian Institute of Chemical and Bioengineering Technology, Malaysia
[3]University of Benin, Nigeria

Polystyrene was grafted onto deproteinized natural rubber (DPNR) using melt-mixing and graft copolymerization procedures, respectively, before being blended with polypropylene (PP). The effects of these methods on the morphology and mechanical behaviour of the resulting blends were then examined, along with the loading requirements necessary to obtain the desired blend attributes of the polystyrene-grafted natural rubber (NR-g-PS). At a 20% NR-g-PS loading in the PP-matrix; PP which was previously a stiff and strong thermoplastic, was successfully modified into a more stiff and tough thermoplastic elastomer in accordance with the nature of the obtained stress–strain properties. Tensile strength (TS) and modulus (E) of blends were shown to decline, however elongation at break (EB) increased with increased NR-g-PS loading. Unmodified PP had flexural strengths and modulus of 45.9 and 1475.6 MPa, respectively; these values decreased with increasing NR-g-PS loading. Impact strength of unmodified PP was 25.8 kJ/m2 , whereas impact strength of materials containing 10, 20, 30, and 40% NR-g-PS was 33.9, 35.2, 29.7, and 16.0 kJ/m2 , respectively. Unmodified PP had a melt flow index (MFI) of 14.1, while loadings of 10%, 20%, 30%, and 40% NR-g-PS resulted in values of 19.4, 20.7, 12.3, and 7.6 g/10 min. loading of 20% NR-g-PS in PP-matrix produced the best combination of mechanical characteristics. Adhesion, a sign of good compatibility, was visible in SEM images of specimens with surfaces that had been tensile fractured. Impact strength was improved overall by 37% using the produced thermoplastic elastomer.

Biography

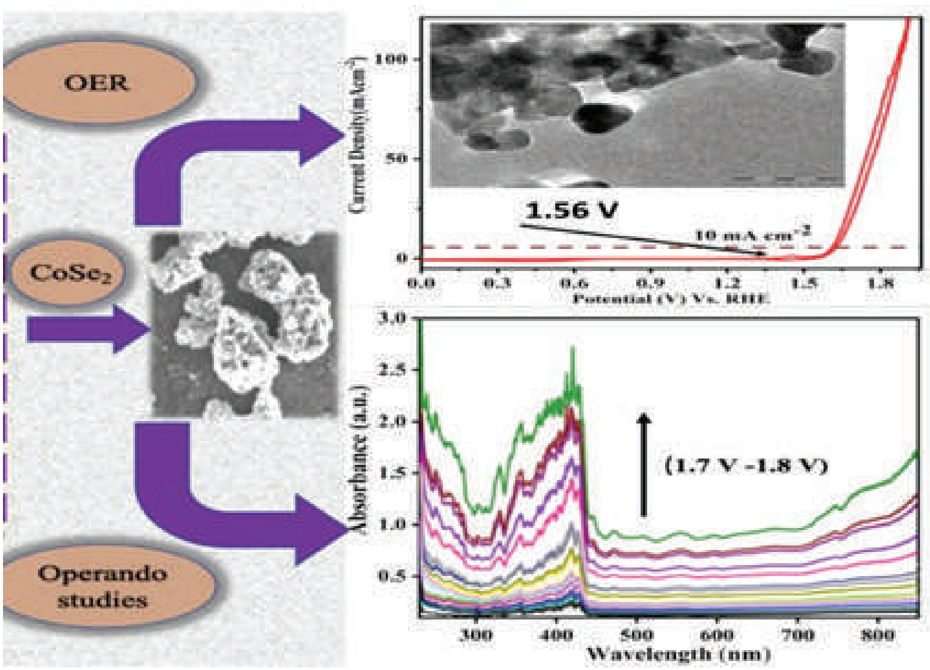
Dr. Owen Egharevba, born 6th May 1973, is a professional member of the Institute of Chartered Chemists of Nigeria (ICCON), with special professional interest in the chemical modification of polymers; Organic synthesis; Renewable materials development and Environmental sustainability. He obtained B.Sc. (Hons.) Chemistry from the Abrose Alli University, Ekpoma in 1999; M.Sc. (Analytical/Industrial Chemistry), M.Phil. and Ph.D. Chemistry (with specialization in polymers) in 2004, 2011 and 2015, respectively. He has received trainings such as the "International Training on Natural Rubber Production and Processing Technology of the Department of International Cooperation, Ministry of Science and Technology of the People's Republic of China held at CATAS (2009); Doctoral research attachment at the University Kuala Lumpur Malaysian Institute for Chemical and Bioengineering Technology, Malaysia (2013); Dr. Owen Egharevba joined the service of the Rubber Research Institute of Niger (RRIN) in August, 2005 and is currently an Assistant Director (Research) and Programme leader, Product development (Rubber Technology). He has over 40 scholarly publications in peer reviewed journals and held various Management and Committee membership positions in RRIN.

An Operando Spectro-Electrochemical Study of N-enriched CoSe2 Nanostructures Towards OER

Manisha Malviya

Material synthesis and fuel cell technology lab, Department of chemistry, Indian Institute of Technology, India

In past research metal selenides have reported versatile results in the field of water splitting. Cobalt di-selenide has received much attention in the oxygen evolution reaction (OER) due to its excellent results towards OER. To excel the catalysis reaction capability, herein we have reported CoSe2@pMF-R nanostructures in which the freshly prepared CoSe2 nanostructures were decorated on the surface of pMF-R (polymerized melamine paraformaldehyde resin). The bonds between cobalt and nitrogen were well formed, which is maintaining the improved charge transfer channels to annihilate the barriers between the GC (glassy carbon) electrode surface and active sites of CoSe2. The nanostructures of



$CoSe_2$ were decorated on the pMF-R substrates and evinced most of the potential active sites of $CoSe_2$ during electrochemical processes. Because of the coaction of $CoSe_2$ and pMF-R, the OER calibration of the $CoSe_2$@pMF-R catalyst has shown a low onset potential 1.56 V and it maintains 10 mA cm-2 current density at 1.608 V. The exceptional compositional and structural characteristics of $CoSe_2$@pMF-R composite are responsible for their outstanding electrochemical performance.

Monocyte HLADR And Immune Dysregulation Index as Biomarkers For COVID-19 Severity and Mortality

Namrata P Awasthi

Dr. Ram Manohar Lohia Institute of Medical Sciences, India

Background: Immune dysregulation in COVID-19 is the major causal factor associated with disease progression and mortality. Role of monocyte HLA-DR (mHLA-DR), neutrophil CD64 (nCD64) and Immune dysregulation index (IDI) were studied in COVID-19 patients for assessing severity and outcome. Results were compared with other laboratory parameters.

Methods: Antibody bound per cell for mHLA-DR, nCD64 and IDI were measured in 100 COVID-19 patients by flow cytometry within 12 h of hospital admission. Thirty healthy controls (HC) were included. Clinical and laboratory parameters like C - reactive protein (CRP), Procalcitonin (PCT), Absolute Lymphocyte count (ALC), Absolute Neutrophil count (ANC) and Neutrophil to Lymphocyte ratio (NLR) were recorded. Patients were followed up until recovery with discharge or death.

Results: Parameters from 54 mild (MCOV-19), 46 severe (SCOV-19) and 30 HC were analysed. mHLA-DR revealed significant and graded down regulation in MCOV-19 and SCOV-19 as compared to HC whereas IDI was lowest in HC with increasing values in MCOV-19 and SCOV-19. For diagnostic discrimination of MCOV-19 and SCOV-19, IDI revealed highest AUC (0.99). All three immune parameters revealed significant difference between survivors (n = 78) and non-survivors (n = 22). mHLA-DR < 7010 and IDI > 12 had significant association with mortality. Four best performing parameters to identify patients with SCOV-19 at higher risk of mortality were IDI, NLR, ALC and PCT. Conclusion: mHLA-DR and IDI, in addition to NLR and ALC at admission and during hospital stay can be utilized for patient triaging, monitoring, early intervention, and mortality prediction. IDI reported for the first time in this study, appears most promising. Immune monitoring of 'in hospital' cases may provide optimized treatment options.

Biography

Prof. Namrata P Awasthi has established Hematology Laboratory services for the tertiary care teaching institute which offers under graduate, post graduate and post doctoral certification courses in sub specialties of Pathology.

She did her MBBS in 2001, MD Pathology in 2006, Senior Residency in Lab Hematology in 2009.

Research areas of interest include Hemophilia and inhibitors, FNA-Flow cytomtery in Non Hodgkin Lymphoma, Immunophenotyping of plasma cells, and non-hematological applications of flow cytometry like assessment of DNA damage by Gamma H2AX measurement, DNA Ploidy by Flow cytometry in Liquid based Cytology in Cervical Cancer, Circulating tumor cell detection in Gall bladder Cancer, CD64 and HLADR in Sepsis and Covid 19, detection of malignant epithelial cells in effusion fluids. She has more than 50 publications in national and international peer reviewed journals.

Recipient of 6 awards in international and national conferences, she is a member of academic societies including ISLH, ISTH, TCS, IAPM, ISHBT, IAC, MPAI, member of ISTH Lectures & award committee. She is actively involved in teaching, training, research and administrative work in her institute.

The Integrative Approach of Learning Chemical Engineering Thermodynamics by Using Simulation-Based Exercises

Krunal Suthar[1] and **Milind Joshipura**[2]

[1]UPL University of Sustainable Technology, India
[2]Nirma University, India

One figure and one table can be included in your results and discussions. The active learning integrative approach of simulation-based exercises along with the core course would help undergraduate students with more engaged learning. The present study describes the simulation approach using an open-source process simulator with the help of three simulation-based exercises. The first one exemplifies the importance of the selection of an appropriate fluid package. The second exercise presented in the study shows the effect of using optimized and default values of binary interaction parameters on VLE prediction of alcohol-ester systems. The small interactive simulation-based problems with expected outcomes were presented in the third exercise which makes the learning more engaging and interesting. The current study highlights an integrative approach to inculcating critical thinking and self-learning abilities using small simulation-based exercises while learning chemical engineering thermodynamics. Finally, a survey with closed- and open-ended questions was used to gather the opinions of students on the presented exercises. A short communication is needed that sheds light on the integrative approach of learning process simulation complementing thermodynamic theory learning.

Biography

Dr. Krunal J. Suthar, Ph.D., Chemical Engineering, is a member of the Indian Institute of Chemical Engineering (IIChE) and has worked with various industries including Enviro Technology Limited (worked on developing Struvite formation technology for removal of ammoniacal nitrogen from CETP wastewater), Sunrise polymers and CSMCRI – CSIR. At present, he is an assistant professor and Head in the Department of Chemical Engineering at the UPL University of Sustainable Technology where he has served for the last 11 years in the fields of heat integration, thermodynamic properties prediction, and computer-aided process synthesis. He has handled various portfolios including students' startups, and examination cells, and worked on various funded research, and consultancy projects. At present, he is guiding a couple of research scholars, working on synthesizing green eutectic solvents for the separation of polar-nonpolar compounds, Empirical modeling of thermophysical properties of deep eutectic solvents.

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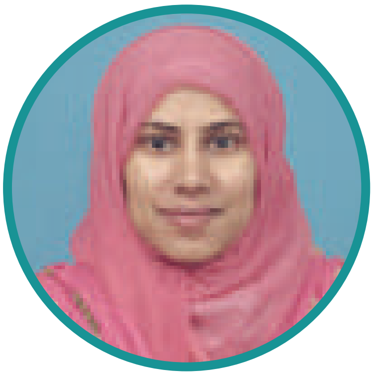

Blockchain-Enabled Smart Agriculture: Enhancing Data-Driven Decision Making and Ensuring Food Security

Shahla Andleeb[1], Khalil Ur Rehman[1], Maryam Ashfaq[1], Nida Akram[2] and **Muhammad Waqar Akram[3,4]**

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[2]*Department of Business Administration, GC Women University, Pakistan*
[3]*Ningbo China Institute for Supply Chain Innovation- MIT Global Scale Network, China*
[4]*Jiangxi University of Finance and Economics, China*

Agriculture plays a vital role in global food security, but conventional practices have led to environmental degradation and health risks due to excessive use of agricultural nutrients and chemicals. In this era of increased consumer awareness and preference for organic food, the challenge lies in making informed choices amidst various crop production options. To address this, the present research introduces a groundbreaking study that utilizes blockchain technology to record and trace information on crop production from seeds to end-user consumption, enabling easy consumer choices. This study introduces a model that integrates Internet of Things (IoT) sensors to monitor the impact of selected chemicals and nutrients used in agriculture to enhance production yields. To ensure sustainability, the study employs the low-energy adaptive clustering hierarchy (LEACH) protocol, which optimizes energy consumption and network stability, thereby avoiding disruptions. Results indicate that different fertilizers affect soil physical properties such as temperature and moisture. These parameters are monitored using the Agriculture Vercel App, equipped with temperature, moisture, and light sensors in agricultural fields. The app provided threshold readings via alert notifications, revealing significant fluctuations in temperature (12%–43%) and moisture (83%–41%) concentrations upon the application of specific fertilizers like "Agricultural lime" and "Calcium Ammonium Nitrate." Our IoT-based model is linked with private blockchain technology to prioritize consumer choice and facilitate transparency. This integration enhances food security while mitigating environmental degradation risks. By providing a comprehensive record of crop production practices, our model empowers consumers to make informed decisions aligned with their health and environmental concerns. This research demonstrates the potential of combining IoT and blockchain technologies to revolutionize agriculture, ensure sustainable practices, and promote food security. The findings offer significant implications for policymakers, farmers, and consumers, fostering a more sustainable and health-conscious approach to agriculture worldwide.

Biography

Shahla Andleeb is a dedicated advocate for environmental activism and global food security, positioning herself as a catalyst for positive change. Early in her career, she demonstrated a profound connection to nature and a nuanced understanding of the delicate balance between human activities and ecosystem health. Driven by a sense of responsibility, Shahla pursued academic degrees that provided her with a robust foundation to address challenges posed by climate change, resource depletion, and the increasing demand for food in a growing global population.

Her commitment extends beyond theoretical knowledge, as Shahla actively seeks opportunities to translate her understanding into impactful, real-world initiatives. With a passion for fostering sustainable practices, she aims to contribute to the well-being of communities worldwide through her advocacy and practical endeavors.

Synthesis, Characterization, DFT Studies and Molecular Docking Investigation of 2-oxo-ethyl piperidine pentanamide-derived sulfonamides as Anti-diabetic Agents

Fredrick C. Asogwa[1], **Ekoh C. Ogechi**[2], **H. Louis**[1], **Ugwu D. Izuchukwu**[3], **Chioma G. Apebende**[1] **Eze U. Florence**[3], **Martins C. Ekeleme**[1], **Ezugwu A. James**[3], **Onyinye J. Ikenyirimba**[1], **Alexander I. Ikeuba**[1], **Aniekan E. Owen**[4] and **Okoro U. Chris**[3]

[1]*Computational and Bio-Simulation Research Group, Department of Pure and Applied Chemistry, University of Calabar, Nigeria*
[2]*Department of Industrial Chemistry, Evangel University, Nigeria*
[3]*Department of Pure & Industrial Chemistry, University of Nigeria, Nigeria*
[4]*Department of Chemistry, Akwa Ibom State University, Nigeria*

Introduction: Diabetes mellitus (DM) is a syndrome of metabolic disorder usually due to a mixture of hereditary, life style and environmental factors that results in high blood sugar levels and can increase the risk of other severe ailments like cancer, stroke, and cardiovascular disease[1]. The most prevalent kind, type 2 diabetes [2] is directly responsible for 1.5 million deaths worldwide each year. Globally, target has been set to halt the rise in diabetes by 2025. Hence, the need for the development, optimization and screening of more efficient bioactive therapeutic targets.

Result and Discussion: The present study is focused on the synthesis, characterization, DFT Studies, and in silico biological evaluation of novel benzenesulfonamides as antidiabetic agents. The compounds were synthesized and characterized experimentally using the NMR, FT-IR and HRMS while the molecular electronic structure properties were investigated using DFT-based theoretical methods at the M06-2X/6−311++G (d, p) level of theory. The results of the calculated vibrational energies were in perfect agreement with those of the experimental frequencies for different functional groups. The natural bond orbital (NBO) analysis was also carried out to study the intramolecular charge transfer interactions and energies of stabilization. Molecular docking simulation showed that the compounds; 3-Methyl-2-(4-methylphenylsulfonamido)-N-(2-oxo-2(piperidin-1-yl) ethyl) pentanamide (MMOPEP), 3-Methyl-N-(2-oxo-2-(piperidin-1-yl)ethyl))-2-(phenylsulfonamido) pentanamide (MOPEPP) and, 3-Methyl-2-(4-nitrophenylsulfonamido)-N-(2-oxo-2-(piperidin-1-yl)ethyl) pentanamide (MNOPEP) fitted tightly to the amino acid residues binding sites of insulin inhibiting protein receptors (7m17) with an average binding affinity of − 6.9 kcal/mol, − 6.6 kcal/mol, − 6.7 kcal/mol respectively, thereby stimulating the release of insulin from functioning pancreatic beta cells which will in turn, lower blood glucose.

Conclusion: This study provides a platform for scrutiny and clinical trials of benzenesulfonamide-based drugs as antidiabetic agents.

Biography

Chioma Apebende lectures at the Department of Chemistry, University of Calabar, Calabar. She holds a B.Sc. Degree in Chemistry, University of Nigeria, Nsukka 2005, Post Graduate Diploma in Education from Usmanu Danfodiyo University, Sokoto 2010 and M. Sc. in Organic Chemistry, University of Calabar, Calabar 2017. Her areas of research interest include; Natural Products Chemistry and Chemical Synthesis using more environmentally friendly methods. Currently she is a Ph.D. student working with Prof Olugbuyiro J.A.O at Covenant University, Ota, Ogun State, Nigeria on the topic" Isolation and characterization of drug-like candidates from ficus sur targeting IKK1 kinase enzyme in treating cervical cancer" Gloria is a researcher, she has authored and coauthored articles published in a referred journal indexed in Scopus.

Assessment of the Physicochemical Properties, Pollution and Health Risk Associated With Trace Metals in the Waters of the Ebolowa Municipal Lake Basin (Central Africa)

Daniel Florent AKONO

Department of Earth Sciences, University of Yaoundé I, Cameroon

Because of their toxicity, the pollution of aquatic environments by trace metals is receiving particular attention around the world. The management of industrial and domestic waste is one of the factors that encourages the arrival of these elements in aquatic environments. The aim of this study is to assess the degree of trace metal pollution (As, Cd, Cr, Cu, Fe, Pb, and Zn) and the carcinogenic and non-carcinogenic health risks in the waters of the Ebolowa municipal lake. To do this, 21 water samples were collected from the LME and its tributaries, Mfoumou and Bengo'o. In situ pH, electrical conductivity, and TSS were measured. The results show that the pH (5.8–8.14) and EC (47.3–217.0 μS/cm) values comply with WHO standards. The TSS values (60.9–620) are higher than these standards, suggesting pollution. The distribution of mean values for TMEs in the water is as follows: Zn (269.5 μg/L) > Cu (87.6 μg/L) > Fe (20.0 μg/L) > Pb (7.5 μg/L) > As (5.0 μg/L) > Ni (4.2 μg/L). The values for the toxic load of ETMs (12.8–52.1) illustrate low toxicity. The non-carcinogenic health risk index values (0.3–1.5) suggest a potential risk. The carcinogenic health risk values are between 10-3 and 10-4, suggesting no risk. Statistical analyses show that Fe, Ni, and As concentrations are linked to human activities. The Mfoumou River therefore appears to be the main source of allochthonous input of TMEs to the lake. The absence of a proper waste management policy is the main cause of water degradation in the study area.

Biography

Daniel Florent Akono, PhD, is a dedicated researcher with a focus on environmental sedimentology. Having recently defended his doctoral thesis, his work centers on palaeoenvironmental and palaeogeographic reconstructions, with a specific emphasis on the impact of human activities on aquatic environments in urban areas. His research delves into the intricate interactions between sediments and the water column, particularly focusing on trace metals and their concentrations, and the subsequent consequences on the environment and biological components.

Currently, Daniel serves as a science teacher in secondary education, but harbors aspirations of transitioning into higher education to further pursue his passion for research and teaching. Despite being a beginner in the field of research, he has co-authored seven scientific publications and is eager to expand his knowledge and expertise. Daniel is actively seeking opportunities for a postdoctoral position to continue his academic and research journey.

A Mesenteric Cystic Lymphangioma in A 16 Months Boy, When the Clinical Picture Does Not Tell the Whole Story. A Case Report

Mayas A Yousif

Imam Zain El Abidine Hospital, Iraq

Mesenteric cystic lymphangiomas (MCL)s are benign tumors which arise from the lymphatic vessels and represent 5-6% of all pediatric benign tumors. A case of mesenteric cystic lymphangioma in a 16-month boy is presented. The lack of clinical and initial radiological clues indicating the presence of the cyst are highlighted.

Pleuropulmonary Blastoma Type I Presenting as A Tension Pneumothorax: A Case Report and Review of The Literature

Rafat Ibrahim AbuAyyash[1] and **Yousef Abu Asbeh**[2]

[1]*Al-Quds Medical School, Palestine*
[2]*Department of Thoracic Surgery, Al-Ahli Hospital, Hebron, Palestine*

Pleuropulmonary blastoma is a very rare, aggressive, embryonal pulmonary malignancy that mostly affects children under the age of 5. According to the histological features, three subtypes of pleuropulmonary blastoma have been recognized: type I (purely cystic), type II (grossly visible cystic and solid elements), and type III (purely solid).

We report a case of a 10-month-old male infant with type I pleuropulmonary blastoma, who was clinically misdiagnosed with pneumothorax, that he presented complaining of shortening of breath, fever, and cough. Radiographs of the patient showed right pneumothorax, so he had managed accordingly in another center without improvement. Then Computed Tomography showed a huge right upper lobe sepated pneumocyst, which was treated surgically and the diagnosis was confirmed by combining the imaging and the histopathological examination as PPB type I.

PPB is a relatively rare tumor, and it is important to put pleuropulmonary blastoma with their subtypes within the differential diagnoses of any pulmonary lesion in children below the age of 5 or 6 years, as the early diagnosis will help to give early management. Hence, the patient may have a better outcome.

Biography

Rafat Ibrahim AbuAyyash, born in Bethlehem, Palestine in 1999, is a Palestinian medical doctor on the path to making a significant impact in the field of healthcare. In 2023, Rafat graduated from Al-Quds University, showcasing a commitment to academic excellence. Currently undertaking his internship in a governmental hospital in Hebron, Palestine, he is gaining invaluable practical experience.

Rafat is not only a practitioner but also an active contributor to medical research. His involvement in writing numerous research papers, as well as presenting, writing, and publishing case reports, demonstrates a passion for advancing medical knowledge and sharing insights with the broader healthcare community.

As Rafat continues his journey in the medical field, his dedication to learning, practicing, and contributing to the scientific discourse positions him as a promising and ambitious medical professional in Palestine.

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Effect Of Alkaline Treatment on Mechanical Characterization Of PALF-SISAL Fiber Reinforced Composites

Chandrashekhar S Malalli and **B. R. Ramji**

Department of Industrial Engineering and Management, BMS College of Engineering, India

Natural fibers have been a focus for biodegradable and recyclable polymer composites recently been the center of attention among researchers because of excellent properties such as low cost, low density, high specific strength, and modulus. Surface modifications and variations in the fiber diameters are major factors that influence the fiber adhesion performance inside the matrix. Experiments have been performed to further the development of natural fiber reinforced polymers as a replacement for glass fibers. In this article, natural fibers (NFs) with different size ranges of diameters and the effect of alkali treatment on their mechanical characteristics have been studied. The treated and untreated fibers morphological characterization are reported. In addition, the tensile properties of a single fiber and composites were consisting of discontinuous random oriented short fibers both with and without chemical modification were studied. The results showed that NFs are amenable to chemical modification particularly in the fine fiber case. Because alkali treatment of the NFs was able to provide a good adhesion within the matrix, the tensile strength, elastic modulus, and the fiber-matrix interaction of the composite were improved. This article clearly defines different diameters and chemical treatments have a crucial effect on the tensile properties of composites.

Biography

Chandrashekhar S Malalli, an ADF (All India Council for Technical Education Doctoral Fellow) hailing from Bengaluru, India, is a dedicated researcher in the field of bio-composites and material characterization. In 2018, he completed his master's degree from RV College of Engineering, establishing a strong foundation for his academic pursuits.

Since 2019, Chandrashekhar has been actively engaged in research, focusing on bio-composites and material characterization. His commitment to advancing knowledge in these areas is reflected in his publication of research papers in peer-reviewed journals. Chandrashekhar's work contributes to the understanding and development of innovative materials with applications in various industries.

As a doctoral fellow at BMS College of Engineering, Bengaluru, Chandrashekhar continues to make significant strides in his research, showcasing a passion for scientific exploration and a dedication to contributing valuable insights to the academic community.

Fe-Zeolite Catalyst for Ozonation of Pulp and Paper Wastewater for Sustainable Water Resources

Muhammad Sagir[1], **HMS Munir**[1], **Nadeem Feroze**[2] and **Naveed Ramzan**[2]

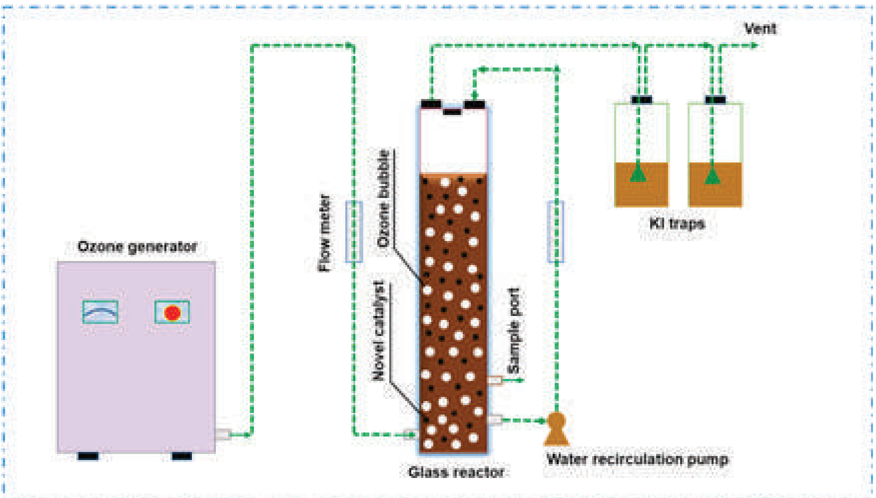
[1]Department of Chemical Engineering, Khwaja Fareed University of Engineering and Information Technology (KFUEIT), Pakistan
[2]Chemical Engineering Department, University of Engineering and Technology, Pakistan

The pulp and paper industry consumes enormous quality of freshwater, leading to wastewater. It must be treated to remove pollutants, particularly residual dyestuffs, before releasing them to water bodies to avoid adverse environmental effects. The traditional wastewater treatment methods used for the pulp and paper industry are less efficient in colour and chemical oxygen demand (COD) removal. The current study is aimed at developing a novel catalyst for the catalytic ozonation of pulp and paper wastewater with better colour and COD removal for sustainable resources of clean water. The proposed catalyst is impregnated by iron on natural zeolites. Various parameters such as catalyst dose, pH, ozone dose, initial COD concentration, and reaction time are studied and optimized. The performance was evaluated by comparing the results with the single ozonation process (SOP) and catalytic ozonation process (COP). The highest COD and colour reduction efficiencies have been achieved, i.e., 71%, and 88% at a natural pH of 6.8. The proposed process achieved higher COD and colour efficiencies than the single ozonation process and catalytic ozonation process using raw zeolites. The improvement in efficiencies are 23% and 29% for SOP and 17% and 19% for COP, respectively. Hence, the results proposed the sustainability and applicability of COP to treat paper and pulp sector effluent.

Table 2. Characteristics of the wastewater before and after heterogeneous catalytic ozonation process.

Parameters	Before treatment	After treatment
pH	6.8	7.2
Chemical oxygen demand (COD)	400 mg/L	116 mg/L
Colour	Dark brown	Colourless
Odour	Burnt sugar	Odourless

Fig. 1. Schematic representation of catalytic ozonation system for pulp and paper industry wastewater treatment.



Biography

Prof. Dr. Muhammad Sagir has over 17 years of professional/administrative/teaching/ research experience. He has been working in Malaysia & Pakistan. Currently working as Professor at the Institute of Chemical & Environmental Engineering, Khwaja Fareed University of Engineering & Information Technology, Rahim Yar Khan. Also working as Registrar on additional charge basis at the university. He is involved in 4 different Research projects as PI, Co-PI & collaborator and has also been a part of a number of research projects completed in various capacities. Dr. Sagir has supervised a number of MPhil students' thesis and a few numbers of MPhil students are currently under his supervision. He has published "200 plus" Journal papers" in International Peer Reviewed Journals with high impact factors. Also, others, over 40 abstracts in International Conferences. Dr. Sagir has a total impact factor of over "400" and his research works have been cited over 2400 times in peer review press with an H-Index of "50+". He is also editor of many impacts factor journals.

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Copper nanoparticles green synthesis and characterization as anticancer potential in breast cancer cells (MCF7) derived from Prunus nepalensis phytochemicals

Samuel Shiferaw Biresaw

Wollo University Dessie Ethiopia, Ethiopia

The green synthesis of nanoparticles from bioactive compounds have attracted a wide range of application, due to increased drug efficacy and less toxicity in the nanosized mediated drug delivery model. In this study, we have fabricated copper nanoparticles (CuNPs) from the fruits of Prunus nepalensis (P. nepalensis) extract. Therefore, the aim of present study was to investigate the anticancer ability of P. nepalensis fruit phytochemical copper nanoaprticles (PNFPCuNP) on cancerous human breast cell line (MCF-7) and healthy (MCFA10) cell lines. Crystalline CuNPs of P. nepalensis synthesis was confirmed by different physicochemical analytical techniques such as UV–Visible Spectroscopy (UV–Vis); Fourier-Transform Infrared Spectroscopy (FT-IR); Scanning Electron Microscopy (SEM); and Transmission Electron Microscopy (TEM). Nanoparticle Size was found to be ranging from 35 to 50 nm with the average size of 42.5 nm. Further, after synthesized compounds were tested anticancer activity on human breast cancer cell lines. Following 72 h treatment to PNFPCuNP, the expression of apoptotic marker genes (P21, p53, P14/P19, Caspase-3) were studied in MCF-7 cells treated at 100 to 200 µg of PNFP-CuNP. Our results showed that PNFP-CuNP increased the gene expression of apoptotic genes in a dose-dependent manner. The real-time PCR data showed a significant upregulation in p53, Bax, caspase-3, and caspase-9 and down regulation in the mRNA expression of Ras and Myc genes in MCF-7 cells exposed to PNFP-CuNP. Collectively, the data from this study stated that P. nepalennsis fruit extract phytochemical derived nanoparticles induced apoptosis via the up regulation of tumour suppressor genes and down regulation of oncogenes in MCF-7 cells. Finally, our study confirmed the CuNPs synthesis from P. nepalensis fruit phytochemical, which showed environmental friendly anticancer activity.

A Bismuth-Based (III) Hybrid Perovskite as A Highly Air- Stable, Potential Absorber with Photoconductive Response

Asma Khan

Department of Chemistry, Abbottabad University of Science and Technology, Pakistan

Organic-inorganic hybrid perovskites materials (CH3NH3PbI3) are recently great attention in the field of optoelectronic and photovoltaic devices. But, the stability and toxicity issues of the lead have seriously affected its commercial application. Here, we described a novel lead-free hybrid bismuth-based compound, [tert-butylammonium]2 [Bi2I9] (TBI), which adopts a one- dimensional perovskite-like manner containing the corner-sharing BiI6 octahedra structure. TBI displays outstanding light-absorbing properties with a gradual absorption edge at 632 nm, and optical bandgap of □1.96 eV which is lower than the bandgap of CH3NH3PbBr3 and its semiconducting properties were steadily confirmed by the positive temperature-dependent conductivity along with the prominent photo-conductive responses in the range of (20 °C) 320– 420 K (80 °C). In addition, TBI also shows brilliant phase stability from 1 day to 48 days in the open atmosphere, being much higher than CH3NH3PbI3. This result suggests the potentials of TBI as the excellent absorber for photovoltaic and solar cell applications.

Thermodynamic Modeling and The Inhibitory Role of Methanol in The Formation of Carbon Dioxide Gas Hydrate

S. Porgar

Department of Chemical and Polymer Engineering, Islamic Azad University, Iran

The upcoming research aims to investigate the thermodynamic model presented to predict the conditions for the formation of carbon dioxide hydrate in the presence and absence of inhibitory substances. The inhibitory substance in the current research will be methanol with a weight percentage of the offending agent between 5% and 20%. The obtained results confirmed that the model will be able to predict the conditions for the formation of pure carbon dioxide hydrate with high accuracy. Also, to ensure the accuracy of the results, the obtained results were compared with the available experimental and laboratory data, which in this field Also, the results indicated that the results of this research can be used with a very good percentage of confidence. Also, the highest error percentage obtained was 5% and the lowest error percentage of the available results with experimental data was 2.33%.

Biography

S. Porgar is a highly skilled chemical engineer who holds a Ph.D. and research, education, and process engineering are his three main passions. He has published seven books and thirty papers, and he has five years of experience as a process engineer and seven years of experience as a lecturer. He also has a diversified skill set and a steadfast dedication to furthering the discipline of chemical engineering. Thermal performance and the creation and optimization of nanofluid preparation are his areas of expertise. He has made significant contributions to the scientific community through his long list of publications and active participation in academic conferences. For the past seven years, he has the honor of lecturing at prestigious universities in addition to pursuing his research. It has been a really fulfilling experience to coach students as they explore their own research interests and to share his enthusiasm for chemical engineering with them.

He is motivated and results-driven individual looking for fresh chances to use his chemical engineering knowledge. He is excited to have a big effect, whether it's by mentoring young engineers, applying his skills in a process engineering capacity, or helping to advance innovative research. His excellent analytical, problem-solving, and communication abilities allow me to perform well in interdisciplinary teams, and I thrive in dynamic, collaborative workplaces.

Crystal structure studies, Hirshfeld surface analysis, 3D energy frameworks, computational studies, and docking analysis of a 2-(4-nitrophenyl)-2-oxoethyl 2-methoxy benzoate

Dileep C. S.

Department of Physics, Vidyavardhaka College of Engineering, India

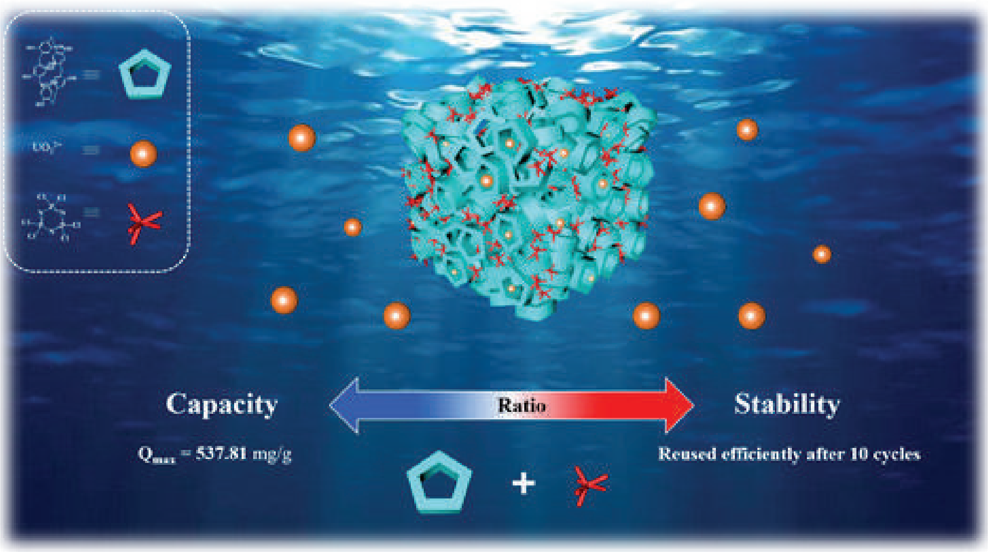
The compound 2-(4-nitrophenyl)-2-oxoethyl 2-methoxybenzoate, was synthesized and characterized using conventional analytical techniques. The compound which has molecular formula C16H13NO6 crystallizes in the monoclinic crystal system with the space group P21/n. The crystal structure is stabilized by C–H…O intermolecular interactions. Hirshfeld surface analysis confirms the presence of C–H…O intermolecular hydrogen bond interactions. Molecular orbital analysis was studied to know the chemical reactivity of the molecule using DFT calculations. MEP analysis shows the chemical reactive sites around oxygen and hydrogen atoms. Molecular docking studies were carried out for the compound with the 1KZN protein, which demonstrated that the molecule has a good binding affinity with the protein target. The results obtained are very encouraging.

Synthesis of Pillar [5] Arene and Phosphazene-Linked Porous Organic Polymers for Highly Efficient Adsorption of Uranium

Mehdi Hassan[1] and **Weitao Gong**[2]

[1]Department of Chemistry, University of Baltistan, Pakistan
[2]State Key Laboratory of Fine Chemicals, School of Chemical Engineering, Dalian University of Technology, China

It is crucial to design efficient adsorbents for uranium from natural seawater with wide adaptability, effectiveness, and environmental safety. Porous organic polymers (POPs) provide superb tunable porosity and stability among developed porous materials. In this work, two new POPs i.e. HCCP-P5-1 and HCCP-P5-2 were rationally designed and constructed by linked with pillar[5]arene macrocycle as the monomer and hexachlorophosphate as the core via a macrocycle-to-framework strategy. Both pillar[5]arene-containing POPs exhibited higher uranium adsorption capacity than previously reported counterparts. Especially, HCCP-P5-1 has reached 537.81 mg/g which is greater than most POPs that have been reported. Meanwhile, the comparison between both HCCP-P5-1 and HCCP-P5-2 can illustrate that the adsorption capacity and stability could be adjusted by the monomer ratio. This work provides a new idea for designing and constructing uranium adsorbents from macrocycle-derived POPs.\



Biography

Dr. Mehdi Hassan is currently working as Assistant Professor in the Department of Chemistry, University of Baltistan, Skardu. He received his master's degree in chemistry from University of Karachi, Pakistan. After Master he joined as research fellow in ICCBS University of Karachi. Dr. Mehdi Hassan completed his PhD degree in Organic Chemistry from the School of Chemical Engineering Dalian University of Technology, China. During his stay at the Dalian University of Technology, he has developed several effective research collaborations in his research field i.e. Supramolecular smart responsive materials, Coordination chemistry, Catalysis, Nano materials and computational Chemistry groups in UK, China, and several top National Institutions in Pakistan. His research has been published in well reputed and high impact International Journals e.g. European Journal of Chemistry, Catalysis Science & Technology, Royal Chemical Society Landon, Asian Journal of Organic Chemistry etc.

Super-Dispersive Demultiplexer Design Using a Positive-Negative Refraction Boundary and Hetero-Photonic Crystals

Saeed Pahlavan

Tarbiat Modares University, Iran

In this talk, I report a novel approach in optical demultiplexer design by performing wavelength separation in hetero photonic crystals (HPC) with an oblique boundary. In the first step, demultiplexing is done like ordinary demultiplexers by employing wavelength dispersion in photonic crystals. In the second step, contrary to ordinary demultiplexers, the oblique boundary in the HPC changes the components of the Bloch wave vectors of the propagating wave. This effect, if engineered properly, leads to ultra-high separation angles. A beam divergence of 133 degrees is obtained for an incident spectrum of λ= [1521nm, 1550nm].

This design technique can be further improved by inducing a positive-negative refraction boundary in the first crystal. I propose a systematic approach to equi-frequency contour (EFC) engineering to design a photonic crystal with such a boundary to boost the refractive properties of the crystal. Mathematical techniques are employed to turn the EFC engineering process into a mechanical procedure free of trial-and-error steps. The refracted beams in the first crystal impinge on an oblique interface of a second crystal to experience a change in Bloch wavenumbers resulting in even greater refraction angles so that a novel super-dispersive two-step optical demultiplexer is made. A beam divergence of 161 degrees is obtained for an input spectrum of λ= [1474nm, 1550nm].

Biography

Dr. Saeed Pahlavan acquired his PhD from Tarbiat Modares University, Iran working on optical metamaterials based on photonic crystals and their applications in optical communication technologies. He continued to work on vertical-cavity surface-emitting lasers and their numerous applications especially in optical communications as a postdoctoral researcher at TMU. Right now, he is a lecturer and lab admin at TMU. He has published various papers in semiconductor optical amplifiers, optical metamaterials, optical demultiplexers, and vertical-cavity lasers.

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Nonlinear Time History Analysis on Irregular RC Building on Sloping Ground

H. Singh

GNDEC, India

This work is an attempt to understand the behavior of structures on hill slopes. Due to the unavailability of flat land, the construction of buildings on sloping land is started.

Objectives: To study the seismic behavior using nonlinear time analysis of irregular structures on sloping terrain.

Scope: The study covers nonlinear analysis of buildings on sloping ground with and without shear walls

Results: Figure 1 provides a plot view of the various configurations studied. The corresponding deflection behavior is shown in Fig. 2.

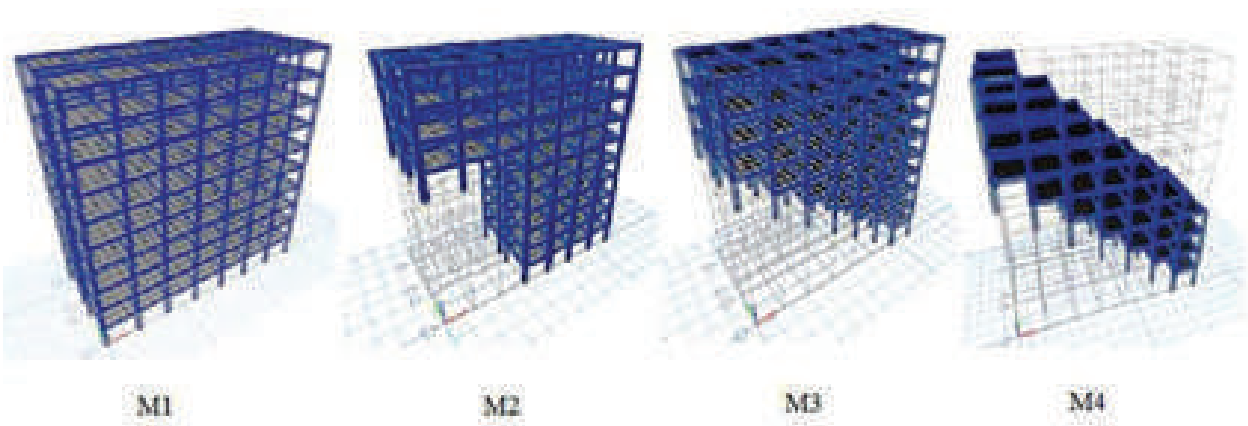

Fig. 1 *3D render view of the M1, M2, M3 and M4 models*

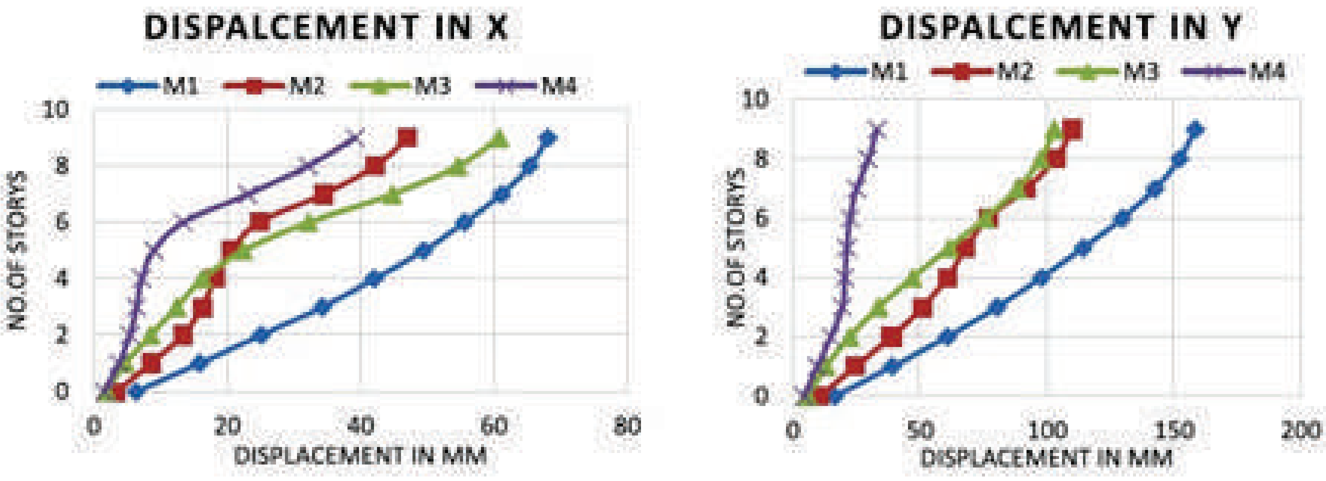

Fig. 2 Shifts in the X and Y direction.

Biography

Dr. Harpal Singh is a distinguished figure in the field of Civil Engineering, renowned for his expertise in structural dynamics and earthquake engineering. With a remarkable career spanning 37 years, he currently serves as the Deputy Director at GNDEC Ludhiana, a position he has held since November 1998. Dr. Singh holds a Ph.D. in Civil Engineering, focusing on the response of reinforced concrete frames with infilled panels under earthquake excitation. His academic journey began with a Bachelor's and Master's degree in Civil Engineering, further specializing in structures.

Throughout his career, Dr. Singh has actively engaged in research and development, leading numerous sponsored projects and publishing extensively in reputable international and national journals. He is recognized for his contributions to the field, with numerous awards and medals both nationally and internationally. Dr. Singh's commitment to academia is evident through his supervision of Ph.D. and M.Tech. students, as well as his participation in conferences and delivery of expert lectures worldwide. He remains an esteemed member of several professional bodies, contributing significantly to the advancement of structural engineering.

Valorization Of Faecal Sludge and Organic Waste to Improve Sanitation and For Soil Amendment in Bobo-Dioulasso, Burkina Faso

E. Amankwah[2], **O. N. S. Christiane**[1], **E. A. Awafo**[3] and **S. Sodre**[4]

[1]*Department of Civil and Environmental Engineering, University of Energy and Natural Resources, Ghana*
[2]*Department of Environmental Management, University of Energy and Natural Resources, Ghana*
[3]*Department of Agricultural and Bioresources Engineering, University of Energy and Natural Resources, Ghana*
[4]*Department of Sanitation and Health, Burkina Faso*

Organic waste management is one of the major challenges facing Burkina Faso especially faecal sludge and this is as a result of inadequate sanitation infrastructure. This study is to assess the possibility of converting organic waste to energy and organic fertilizer in Bobo-Dioulasso. Samples of faecal sludge from nine different trucks, a two-litre abattoir waste and 1 kg of fruit and vegetable waste were collected and their physicochemical parameters were analysed at ONEA Laboratory in Burkina Faso. The laboratory results reveal that 100% faecal sludge (FS) introduced into the digester after 25 days of mesophilic digestion at 37 ◦C produced 4.37 l/kg of biogas, with 23% of CH_4 and 1.3% and 44.2% of Total Solids (TS) and Volatile Solids (VS) respectively. A faecal sludge of 90% with slaughterhouse waste of 10% introduced yielded 17.3 l/kg of biogas with 44.4% of CH_4 content and 2.38% and 61.42% of TS and VS respectively. A combination of 90% faecal sludge with 10% of fruits and vegetables waste produced 29.4 l/ kg of biogas with 42% of CH_4, 4.72% of TS and 72.18% of VS. However, it was found that the settled sludge and semi-solid material collected for the same tests with respective TS (8.62%) and VS (69.1%) produced a good yield of 54.4 l/kg of biogas with 51% of CH_4. The study also revealed that the decanted waste material was more profitable for energy recovery from faecal sludge. Field surveys to assess social impacts showed that 82.8% of the households were in support of a biogas production plant and are willing to pay for biogas for cooking. The study concludes that the valorization of organic waste into biogas is a good solution for solving sanitation problems and contributes to energy supply in Bobo-Dioulasso.

Biography

Dr. Emmanuel Amankwah is a Senior Lecturer with over 15-year teaching and research experience. He is at the university of Energy and Natural Resources and has served on various committees and boards. Dr. Amankwah teaches Undergraduates, Masters and PhDs using the CBT approach. He has served as facilitator and consultant on several programmes and projects both locally and abroad and has also served as an Internal and External Assessor of a wide range of theses at the Postgraduate level. Dr. Amankwah has worked with other colleagues in executing funded projects both nationally and internationally. Among the projects are TALIF, NUFFIC, CIDA, EC, BMBF and CIM funded projects. He is a Counselor and a member of the Ghana Psychological Council (GPC). His research interest is in the areas of soil and water conservation, irrigation, environmental and resources management, waste management, agriculture and climate change. He has several publications to his credit.

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PEERS ALLEY MEDIA

Effect Of Gd Doping at the B-site on The Structure, Bandgap and Dielectric Properties of $SrLaLiTeO_6$

P.S. Ramu Murthy[1] and **Kapil Salkar**[2]

[1]DCTs Dhempe College of Arts and Science, India
[2]Ganpat Parsekar College of Education, India

$SrLaLiTe_{1-x}Gd_xO_6$; x = 0,0.1,0.2,0.3 were investigated for their structural, optical and dielectric properties. The compositions were found to be monoclinic with the $P_{21/n}$ space group. Rietveld refinement of the X-ray data revealed a change in the cell volume and monoclinic cell angle β. The x = 0 composition exhibited the ordered double perovskite structure $SrLaLiTeO_6$ with Li+ and Te^{6+}.Tolerance factor and tilting angle calculations indicated a change in symmetry due to tilt of the octahedra and bending of Li-O-Te/Gd. FTIR studies confirmed that molecular bonds are present in the double perovskite structure. UV-visible reflectance measurements revealed a drop in the band gap energy indicating that the doped compositions have a better ability to conduct. SEM and EDX studies showed all compositions having an almost uniform distribution in terms of their shape, particles were grouped together and confirmation of the element composition. Impedance spectroscopy studies indicated that the AC conductivity increases as the frequency increases. Single dielectric relaxation is also seen to be present in all compositions due to a decline in the grain resistance R_g. Cole-Cole plots revealed a non-Debye type of relaxation phenomena due to imperfections in all compositions. Dielectric studies indicated a decrease in the dielectric constant and loss with increasing frequency due to a drop in net polarization.

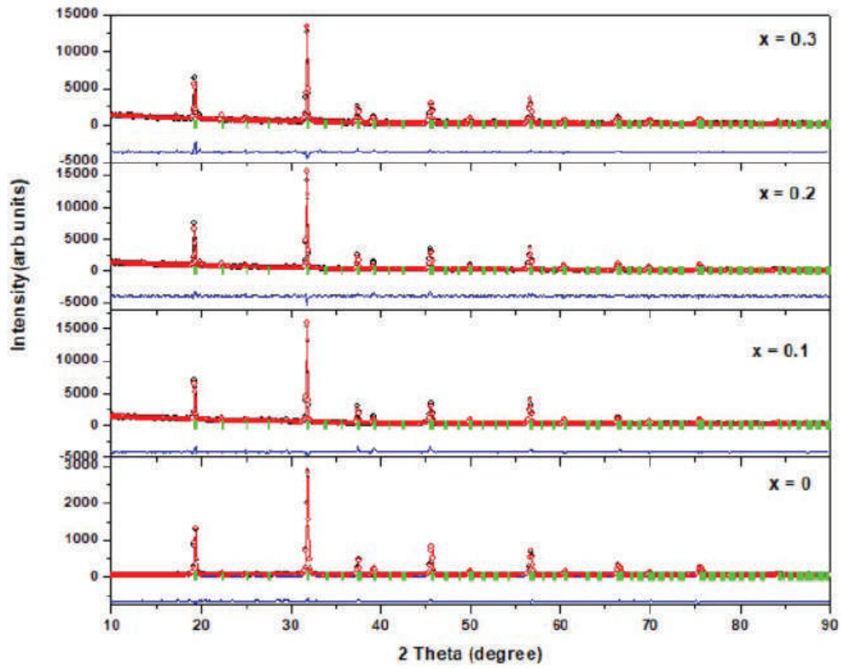

Fig.1: *Rietveld refined XRD patterns for $SrLaLiTe_{1-x}Gd_xO_6$; x =0, 0.1, 0.2,0.3. The circles in black represent the raw data, the red bold line represents data calculated and the blue line indicates the deviation of raw data from the data by calculation. Bragg reflections are represented by the green lines.*

Composition 'x'	0	0.1	0.2	0.3
λ_{abs} (nm)	290.48	359.67	354.8	339.42
$E_{g\ abs}$ (eV)	4.26	3.44	3.50	3.57
$E_{g\ tauc}$ (eV)	4.29	3.43	3.50	3.56

Table 1: *Band gap energy for $SrLaLiTe_{1-x}Gd_xO_6$; x = 0, 0.1, 0.2, 0.3. $E_{g\ abs}$ values of band gap is acquired using the Kubelka-Munk function while $E_{g\ tauc}$ values are acquired from Tauc plot.*

Biography

P. S. Ramu Murthy, Ph.D is an Associate Professor from the Department of Physics at DCTs Dhempe College of Arts and Science. He currently heads the department and has a teaching experience of 33 years. His areas of interest include Condensed Matter Physics and Material Science and his research is currently focused on looking at materials that have a broad energy band gap and characteristics of emitting light that can play a major role in optoelectronics for the development of semiconducting devices.

5th Edition of
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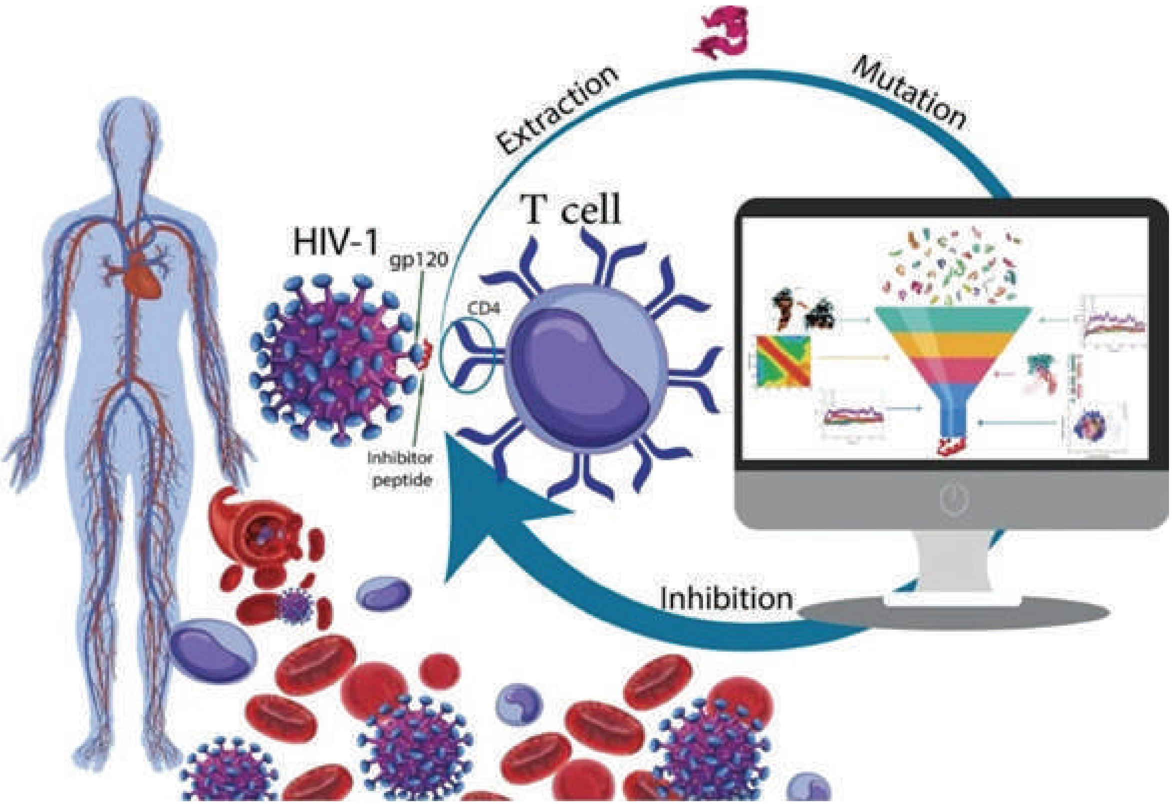
March 25-26, 2024

Inactivation Of Cell-Free HIV-1 By Designing Potent Peptides Based on Mutations in The CD4 Binding Site

F. Sabzian Molaei[1], M.A. Ahmadi[2], Z. Nikfarjam[3] and **M. Sabzian Molaei**

[1]*Department of Biology, Bu-Ali Sina University, Iran*
[2]*Social Determinants of Health Research Center, Lorestan University of Medical Sciences, Iran*
[3]*Department of Biology, Oberlin College, USA*

Human immunodeficiency virus type 1 (HIV-1) is a major global health problem, with over 38 million people infected worldwide. Current anti-HIV-1 drugs are limited in their ability to prevent the virus from replicating inside host cells, making them less effective as preventive measures. In contrast, viral inhibitors that inactivate the virus before it can bind to a host cell have great potential as drugs. In this study, we aimed to design mutant peptides that could block the interaction between gp120 and the CD4 receptor on host cells, thus preventing HIV-1 infection. We designed a 20-amino-acid peptide that mimicked the amino acids of the CD4 binding site and docked it to gp120. Molecular dynamics simulations were performed to calculate the energy of MMPBSA (Poisson–Boltzmann Surface Area) for each residue of the peptide, and unfavorable energy residues were identified as potential mutation points. Using MAESTRO (Multi AgEnt STability pRedictiOn), we measured $\Delta\Delta G$ (change in the change in Gibbs free energy) for mutations and generated a library of 240 mutated peptides using OSPREY software. The peptides were then screened for allergenicity and binding affinity. Finally, molecular dynamics simulations (via GROMACS 2020.2) and control docking (via HADDOCK 2.4) were used to evaluate the ability of four selected peptides to inhibit HIV-1 infection. Three peptides, P3 (AHRQIRQWFLTRGPNRSLWQ), P4 (VHRQIRQWFLTRGPNRSLWQ), and P9 (AHRQIRQMFLTRGPNRSLWQ), showed practical and potential as HIV inhibitors, based on their binding affinity and ability to inhibit infection. These peptides have the ability to inactivate the virus before it can bind to a host cell, thus representing a promising approach to HIV-1 prevention. Our findings suggest that mutant peptides designed to block the interaction between gp120 and the CD4 receptor have potential as HIV-1 inhibitors. These peptides could be used as preventive measures against HIV-1 transmission, and further research is needed to evaluate their safety and efficacy in clinical settings.



Graphical Abstract

Biography

Fatemeh Sabzian Molaei is a protein biophysicist with a passion for drug discovery. Her expertise lies in the field of designing inhibitory peptides to target specific proteins aiming to develop novel therapeutic strategies against viral infections and other disorders.

Improving The Bearing Capacity of Marine Clay Using Polyurethane Piles

Samaila Saleh
Hassan Usman Polytechnic Katsina, Nigeria

This paper examines the potential of polyurethane piles to increase the bearing capacity of marine clay. An evaluation was conducted on the performance of marine clay stabilised with embedded polyurethane piles under vertical stresses using three-dimensional finite element modelling and small-scale physical model testing. The study investigated the impact of the length ratio and area ratio of the polyurethane piles placed in the marine clay matrix. In addition, thorough examinations of failure modes were carried outusing c/φ reduction technique. The bearing capacity of marine clay treated with polyurethane piles was significantly improved, according to the results. Notably, the bearing capacity increased in direct proportion to pile length and area ratio increases. For example, when marine clay is treated with polyurethane piles using an area ratio of 0.28, significant improvements are seen compared to untreated marine clay. These improvements range from 42% to 259%, corresponding to length ratios of 0.25 to 1.00. Furthermore, the analysis of failure patterns revealed a significant reduction in lateral displacement, reaching as high as 91%, when utilising length ratio of 0.5 and area ratio of 0.13 polyurethane pile treatment. Moreover, the study emphasised a clear relationship between the length ratio of the polyurethane piles that are embedded and the safety factor of the stabilised soil. The safety factors exhibited significant enhancements, increasing from 1.1 to 1.3 as the length ratio increases from 0.25 to 0.75. All things considered, the results demonstrate the effectiveness of using polyurethane piles to enhance the bearing capacity of marine clay and provide information on how to best optimise pile size for increased stability and safety when designing and building foundations in marine clay settings.

Biography

Samaila Saleh, a Nigerian Civil Engineer from Katsina, has an exceptional academic record and vast professional expertise in transportation and geotechnical engineering. Saleh possesses a PhD, a Masters, and a Bachelor's degree in Civil Engineering from top universities worldwide, such as Universiti Teknologi Malaysia and Bayero University Kano. He has successfully combined his academic achievements with his practical knowledge and skills. Saleh has led several infrastructure projects in his career, focusing on the stability, efficiency, and safety. He holds several jobs, including being a Senior Lecturer at Hassan Usman Polytechnic Katsina and holding important positions in engineering professions, where he collaborates with organisations such as UBEC, COREN, and numerous construction companies. Saleh has made significant scientific contributions in the fields of civil and geotechnical engineering. These achievements are evident in his numerous publications in reputable journals and conference proceedings. Saleh is dedicated to promoting quality in civil engineering through his memberships in professional organisations such as the Nigerian Society of Engineers and his involvement in important engineering committees and conferences. He possesses a diverse range of skills, including expertise in tools such as AutoCAD, Civil 3D, ArcGIS, and Plaxis 3D, in addition to being fluent in both Hausa and English.

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PEERS ALLEY MEDIA

Comparative Analysis of Monocropping and Mixed Cropping Systems on Selected Soil Properties, Soil Organic Carbon Stocks and Simulated Maize Yields in Drought-Hotspot Regions of Rwanda

Leonidas Hashakimana

Rwanda Agriculture and Animal Resources Development Board, Rwanda

Rainfed agriculture which is the mainstay of the Rwandan economy has been severely affected by prolonged droughts and climate change impacts, resulting in severe food insecurity. In the Eastern Province, adopting monocropping (MnC) systems at dissent driven by the CIP may critically worsen the rain-fed agricultural gains against mixed cropping (MxC) systems in drought conditions. Therefore, this study aimed to analyze and compare soil organic carbon (SOC) stocks and simulated maize biomass and grain yields under MnC and MxC systems in Kayonza District, Rwanda. Soil samples ($n = 96$) were collected in 0–30 and 30–60 cm depths following the stratified simple random sampling technique. The SOC stocks were determined following the guidelines of the FAO of 2018. The biomass and grain yield for the past 20 years (2001–2021) was simulated using a calibrated and validated AquaCrop model (version 6.1) using daily climate data obtained from RMA, and maize crop, raw soil, and land management features collected at the field. The data were analyzed using IBM SPSS software (version 25). The results show that the SOC stocks of MxC soils were significantly ($p < 0.001$) higher (67.4 ± 1.8 tC ha−1) than those of the MnC soils (52.0 ± 3.8 tC ha−1). The depths avowed more highly significant ($p < 0.001$) SOC stocks in topsoils (0–30 cm depth) than that of the subsoils (30–60 cm depth) in the two cropping systems. This indicates that MxC sequesters more carbon and revamps soil C pools than the MnC system. The results also indicate that the simulated biomass and grain yields were highly significantly ($p < 0.001$) higher more and stable in MxC than in MnC fields for the entire past 20 years. Harnessing these findings, as C pools were monitored and analyzed in this study, N-bio-chemistry dynamics should also be conducted thereby comparing its environmental pools and impacts to both below and above-ground ecotones.

Differential Pulse and Square-Wave Voltammetry as Sensitive Methods For Electroanalysis Applications

Gullit Deffo[1], **Thierry Flavien Nde Tene**[1], **Liliane Medonbou Dongmo**[1], **Sherman Lesly Zambou Jiokeng**[1,2] and **Ranil Clement Tonleu Temgoua**[1,3]

[1]*Electrochemistry and Chemistry of Materials, Department of chemistry, University of Dschang, Cameroon*
[2]*Institut für Anorganische Chemie und Strukturchemie, Heinrich-Heine-Universität Düsseldorf, Germany*
[3]*Higher Teacher Training College, University of Yaoundé 1, Cameroon*

A brief description of differential pulse voltammetry and square wave voltammetry as the most sensitive and more used techniques for electroanalysis has been investigated in this article. According to the large literature information available for these two methods, a self-consistent description has been done firstly by giving a short introduction to the voltammetry techniques. The next step was to briefly describe the principle of these techniques supported by graphs. To make it easier to understand by the readers, practical examples of the situations where these two methods have been used for the electroanalysis were also described.

Biography

Gullit Deffo is a researcher in electrochemistry/materials chemistry at the research unit of noxious chemistry and environmental engineering (RUNOCHEE) in the Department of Chemistry, University of Dschang (Cameroon). He was a PhD Scholar in the Department of Chemistry, University of Dschang (Cameroon) and part time PhD scholar in the Department of Chemical Sciences, Tezpur University (India) under DBT-TWAS post graduate fellowship. He obtained his PhD Degree in electrochemistry/materials chemistry in 2023, his B.Sc. Degree in Inorganic Chemistry in 2014 and M.Sc. in 2016 from University of Dschang. His current research interests are the development of wearable sensors, lab on chip, electrochemistry coupled to liquid chromatography and mass spectrometry, amperometric sensors and biosensors based on conducting and nano-porous materials like metal-organic frameworks.

In Quest of Small Molecules as Dengue NS2B-NS3 Protease Inhibitor Using In-Silico Molecular Docking

D. M. Nahar[1], P. B. Mohite[1], S. J. Tauro[1] and **M. A. Kanyalkar[2]**

[1]St. John Institute of Pharmacy and Research, India
[2]Principal K. M. Kundnani College of Pharmacy, India

Objective: To address the escalating threat of Dengue virus (DENV) and the absence of effective vaccines or antiviral medications, this study aims to design potential lead molecules targeting the NS2B-NS3 protease, a critical non-structural protein in DENV. The primary goal is to identify promising candidates through computer-aided drug design (CADD) and synthesize potential protease inhibitor possessing anti-dengue activity.

Scope: The study involves designing and analyzing about eight hundred compounds, including derivatives based on diverse scaffolds like cinnamic acid, chalcone, chalcone-cinnamic acid hybrids, substituted benzimidazole, and 2-amino-4-substituted thiazole. Emphasis is placed on assessing binding interactions with the NS2B-NS3 protease through molecular docking, along with cytotoxicity and *in-vitro* inhibitory activity evaluation.

Methodology: The research involves the utilization of CADD techniques to design compounds based on phytoconstituents and Nitazoxanide. Molecular docking is conducted using NS2B-NS3 protease structures (PDB ID: 2FOM) to analyze binding interactions, including H-bonding, hydrophobic, and ionic interactions, along with determining binding energy. Selected compounds are further synthesized, and their cytotoxicity and *in vitro* anti-dengue activity are evaluated.

Results: The designed molecules from 2-aminothiazole, cinnamic acid, chalcone, and their hybrids, as well as benzimidazole derivatives, exhibit varying degrees of inhibitory activity against the NS2B-NS3 protease. Selected compounds are synthesized and showed promising results in *in-vitro* anti-dengue activity. All designed molecules exhibit a significant reduction in viral titer and demonstrate non-cytotoxicity. Among the molecules, 4-phenylthiazol-2-amine (T1), 2-(4-tert-butylphenyl)-1H-benzo[d]imidazole (I5), and (2-(4-tert-butylphenyl)-1H-benzo[d]imidazol-1-yl) (phenyl)methanone (D3) emerge as

particularly promising. These compounds exhibit good protease inhibitory activity in the sub-micromolar range (IC50 = 5.5μM, 5.2μM, & 8.04μM, respectively), indicating robust antiviral potency.

Conclusion: This study contributes to the ongoing search for effective anti-dengue medicines by proposing potential lead molecules targeting the NS2B-NS3 protease. The diverse set of designed compounds, their molecular interactions, and the observed inhibitory activities offer valuable insights for further exploration and development of anti-dengue therapeutics.

Biography

Currently, she is serving as an Assistant Professor in Pharmaceutical Chemistry at St. John Institute of Pharmacy and Research, affiliated with the University of Mumbai. She completed her M Pharmacy and have 13 years of teaching experience, guiding eight M Pharmacy students. Pursuing a PhD at the University of Mumbai, her focus is on "Development of Antiviral agents using Structure Aided Drug Design, Synthesis, and Evaluation." Her research interests include Synthetic Chemistry, Computer-Aided Drug Design, Microwave-assisted Drug Synthesis, and Analytical Method Development, emphasizing the synthesis and evaluation of novel pharmacologically active entities and antimicrobial agents. She has presented posters and papers at national and international conferences, and she hold life memberships in Indian Society for Technical Education (ISTE) and Indian Pharmaceutical Association (IPA), along with registration with the Maharashtra State Pharmacy Council of India.

Hydrodynamic and rtd Studies for the Treatment of Textile Effluent Using Tapered Inverse Fluidized Bed Reactor

Anand Kishore Kola and **H. Upender**

Department of Chemical Engineering, National Institute of Technology Warangal, India

In the present research, determination of immersed heater to bed heat transfer coefficient, and related hydrodynamics were carried out at different bed angles (80 and 6.80) of tapered inversed fluidized bed reactor. Carboxyl methyl cellulose (CMC) was used to change the water viscosity by power law model. The hydrodynamics were compared at two different bed angles. Furthermore, minimum fluidization velocities were carried out for different apparent viscosities of the liquid and different bed angles and the results were compared with previous models. The heat transfer coefficient was found to be increasing with increased liquid velocity and bed voidage respectively. It was also found that the bed voidage was high for high diameter particles. A correlation was developed for bed expansion ratio and independent parameters using Response surface methodology (RSM) of design expert v.9. Tapered inverse fluidized bed hydrodynamics have been investigated both experimentally and numerically for the first time in literature. A numerical study has been conducted using computational fluid dynamics (CFD), ANSYS Fluent 17.2. Different low-density spherical polymer particles; low density polyethylene (LDPE), high density polyethylene (HDPE), and Polypropylene (PP) were used as solid media with the aid of water. Eight water velocities have been considered with three initial bed heights (0.04, 0.075, and 0.1m) of solid particles at two angles of tapered fluidized bed reactor (TIBR). The expanded bed height and bed void fraction have been determined. It was compared with different drag functions such as Gidaspow, Syamlal O'Brien, and Wen-Yu in CFD. The multiphase flow simulation of CFD was studied using Eulerian–Eulerian approach. The experimental results were also compared with the results of Ansys fluent 17.2 of CFD simulations in 2 &3 dimensional geometry. The effects of bed expansion ratio and bed pressure drop on the performance of bed were also investigated both experimentally, and numerically. The Gidaspow drag function was used for numerical investigations in CFD simulations and also to analyse the effect of elasticity of particle collision on the hydrodynamic characteristics of a TIBR patched with 900 kg/m3 particles. The simulation is conducted using Eulerian multi fluid model, which is combined with the solid particle kinetic theory. The coefficients of exchange are determined by applying Gidaspow drag function. The numerical findings were confirmed with experimental data (bed height and Voidage) and demonstrated that the model is capable of predicting hydrodynamics of TIFBR. To determine the impact of elasticity of solids collision, various estimated values of restitution coefficient (RC) (0.85 to 1.0) were used in the numerical and their results were observed in detail. Simulations were done for two various solid-phase wall boundary (0.5&1.0) conditions. Bubble development was not found for perfectly elastic collision. The evolution of the bubble started when the restitution coefficient was set below 1.0, and the space occupied by the bubbles in the bed grown with a decrease in the restitution coefficient. In the present work, computational investigation, residence time distribution (RTD) characteristics of liquid tracer in two phase tapered inverse fluidized bed with solid materials of three different densities (900, 930, and 970 kg/m3) at two different bed angles (α) of 8o & 6.8o have also been studied. The results were obtained by carrying out experiments for Propionic acid as pulse tracer; water as fluid media and solid particles which have lower density than water as solid media. The mean residence time and dispersion coefficient have been investigated at different parameters such as superficial liquid velocity, particle size and particle density and bed angle experimentally. The tracer mass fractions were validated with CFD using a commercial CFD software. The radial and tangential profiles of tracer in mass fraction were studied by varying fluid velocity, initial bed height and density of solids using CFD simulations. It was indicated that the liquid tracer mean residence time and axial dispersion coefficient depend effectively on particle density, bed angle, and superficial liquid velocity. Based on the experimental data, empirical correlation has been developed for mean residence time of tracer using RSM. The current work also aimed to analyze the removal of pollutants from textile effluent using raw wheat bran adsorbent prepared by coating low-density Polypropylene (PP) particles by batch experimental studies. The batch adsorption studies were performed for 36 hrs. The central composite design (CCD) technique was utilized to ascertain the impact of initial concentration, adsorbent dose, and pH on the removal of dye, COD, Turbidity and DO enhancement. The data obtained from experimental parameters were analyzed through the fitting of kinetic models like isothermal. The obtained coated raw wheat bran on PP was tested as an adsorbent. Prepared raw wheat bran was characterized by FTIR, SEM, and EDS. The obtained raw wheat bran has 58.53% carbon content. The prepared adsorbent was used to remove different pollutants from the prepared synthetic textile wastewater containing azo dye. Experiments have been conducted in batch adsorption processes with different parameters such as initial dye concentration, pH, airflow timing, and adsorbent dose on removal effectiveness of dye, COD, turbidity removal, and DO enhancement. Isotherm models such as Freundlich, Langmuir and Temkin were applied to batch experimental data for removal of azo dye, COD, Turbidity, and DO enhancement.

Biography

Educational Qualifications: B.Tech, M.Tech & Ph.D (Chemical Engg) and MBA (HRM)

Teaching & Research Experience: More than 24 Years (Since 26th Feb., 1999)

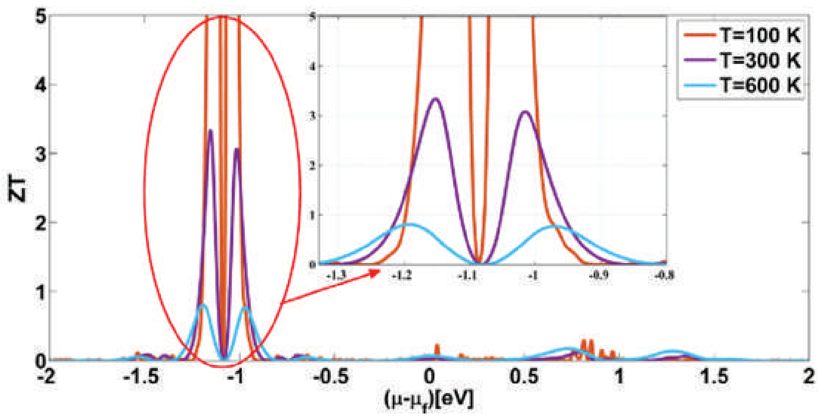
Areas of teaching & research expertise: Waste water treatment, Membrane separations, Pollution control and environmental engineering, Nanotechnology, Energy and Pharm & fine chemicals.

Improved Thermoelectric Properties of AB Stacking Bilayer Graphene by Sr-Intercalation According to Chemical Potential

Sanae Hassine, O. Farkad, F. Elfatouaki, R. Takassa, A.E. Mouncharih, O. Choukri, A. Ouahdani, E.A. Ibnouelghazi and **D. Abouelaoualim**

Faculty of Sciences Semlalia, Cadi Ayyad Universit, Morocco

Density Functional Theory (DFT) ab initio calculations and the self-consistent full potential linearized augmented plane wave (FP-LAPW) approach and Boltztrap2 package's semi-classical Boltzmann transport equations (BTE) were employed to inverstigate the electronic and TE properties of AB stacking bilayer graphene (BG) with Sr-intercalation. The results revealed that the Srontium intercalation could alter electronic and TE properties, breaking the BG's symmetry and lifting degeneracy between the charge neutrality point and Fermi level. Morover, Sr-intercalation in AB stacking BG demonstrated high Seebeck coefficient values for both n-type and p-type behavior and lower thermal conductivity leading to an increased figure of merit (3.3 at room temperature). These findings suggest that Sr-intercalated material in BG possesses relevant TE device properties. Additionally, at very low temperatures (100 K), the Sr-intercalated material displayed exceptional thermoelectric characteristics, making it suitable for electricity generation from waste heat or microelectronics cooling.



Analysis of Distributed Generation and Electric Vehicles Planning

Pankaj Kumar Dubey

Department of Electrical Engineering, Kamla Nehru Institute of Technology, India

Given the swift change in popularity of using green technology to promote the development of an environmentally friendly world. The utilization of electric-powered equipment, such as electric cars, is rising. Distributed generation can be used to lessen the strain that such technology places on the existing power networks. This review article discusses how distribution networks should coordinate distributed generation and electric automobiles. In this review study, the most recent advancements will be examined utilizing information from research papers. In addition, an experimental case study of sixteen bus charging and discharging techniques was included, along with information on the market state, future potential, and a comparison of DGs, EVs, and optimization techniques.

Biography

(Pankaj Kumar Dubey received a B. Tech degree in electrical and electronics engineering from Babu Bhola Singh College of Engineering and Technology, Prayagraj, U.P, India, in 2019, and an M. Tech. in electrical engineering (power systems) from Kamla Nehru Institute of Technology, Sultanpur, U.P. in 2022. Currently, he is pursuing a Ph. D. in electrical engineering (Power Electronics & Drives) and also working as a guest lecturer at the Kamla Nehru Institute of Technology, Sultanpur, U.P. He will be available at pankajdubeysangamboy@gmail.com. He has published 2 research articles in SCI(E) journals. He has published 6 chapters, 2 patents, and 2 IEEE conference papers. He has 10 research organization memberships and also works as a reviewer in 10 research journals including Scopus, IEEE, and Google Index journals Hi research gate and google scholar ID are https://www.researchgate.net/profile/Pankaj-Kumar-Dubey and https://scholar.google.com/citations?user=0DNFoSkAAAAJ&hl=en.

Regulatory Role of Lexa in Modulating Photosynthetic Redox Poise and Cadmium Stress Tolerance in The Cyanobacterium, Anabaena Sp. PCC7120

Yogesh Mishra[1], **Akanksha Srivastava**[1], **Arvind Kumar**[2], **Subhankar Biswas**[1], **Vaibhav Srivastava**[3] and **Hema Rajaram**[2,4]

[1]*Department of Botany, Institute of Science, Banaras Hindu University, India*
[2]*Molecular Biology Division, Bhabha Atomic Research Centre, India*
[3]*Division of Glycoscience, Department of Chemistry, School of Engineering Sciences in Chemistry, AlbaNova University Centre, Sweden*
[4]*Homi Bhabha National Institute, India*

Strategies developed by organisms to overcome disruption in redox poise of photosynthetic electron transport chain (pETC) are important for its survival under abiotic stress. The process needs to be tightly regulated for optimal functioning. While the redox poising processes are well known in cyanobacteria, understanding of their regulatory network is lacking. Since LexA is one of the known global regulators of stress response in the cyanobacterium Anabaena sp. PCC7120, its role in pETC redox poising was investigated using cadmium (Cd) as an abiotic stressor to disrupt photosynthesis. Assessment of the photosynthetic responses of recombinant Anabaena strains, AnlexA+ (LexA-overexpressing) and AnpAM (vector control), under unstressed and Cd-stressed conditions using transmission electron microscopy (TEM) and chlorophyll a fluorescence, indicated that some pETC redox poising responses, including PSII photodamage, energy dissipation, PSI photoprotection, and NDH-mediated cyclic electron flow were decreased in AnlexA+ under unstressed conditions. Disturbance in pETC redox poise during Cd stress observed in Anabaena was accentuated upon overexpression of LexA. The decreased photodamage of PSII and increased photoinhibition of PSI in AnlexA+ in the presence or absence of Cd stress, correlated well with the changes in pETC complexes observed in blue native (BN)-PAGE and the regulation of over 70 of the 90 pETC component genes by LexA demonstrated through transcript, electromobility shift assay (EMSA), and bioinformatics studies. In a nutshell, LexA has been identified as one of the regulators involved in the streamlining of pETC redox poising responses under normal growth and during abiotic stress through transcriptional regulation of some of the redox-controlled pETC component genes.

Biography

Yogesh Mishra did his PhD from Banaras Hindu University in 2008. During his PhD research he had examined the effect of heat and UV-B stress on a filamentous cyanobacterium Anabaena doliolum at molecular level. After that he moved to Umea Plant Science Centre Umea, Sweden and joined the group of Prof. Stefan Jansson. During his more than five years of stay at Umea he has not only published articles in reputed journals but also, he had gained expertise higher plants molecular biology. To strengthen his expertise in the area of abiotic stress and hormone signaling, he joined the group of Prof. Koncz at Max Planck Institute for Plant Breeding Research (MPIPZ), Cologne, Germany as a post–doctoral researcher. He retuned back to India in 2014 as a group leader and currently trying to unravel the molecular mechanism of abiotic stress tolerance and signaling in cyanobacteria and plants using interdisciplinary approaches.

Microbiomes for Bioremediation of PAHs and their role in Plant Growth Promotion-An approach for Sustainable Agriculture

Mahendra K. Gupta

School of Studies in Botany and Microbiology, Jiwaji University, India

The growing concern over environmental pollution, particularly from polycyclic aromatic hydrocarbons (PAHs), necessitates innovative and sustainable approaches to mitigate their impact. This study explores the potential of harnessing microbiomes as a dual-purpose solution for PAH remediation and plant growth promotion in sustainable agriculture. Microbiomes, comprising a diverse community of microorganisms, possess inherent capabilities to degrade PAHs and enhance soil health, reducing the reliance on chemical interventions. Bioremediation strategies leverage the metabolic potential of native or introduced microorganisms to break down PAHs into less toxic compounds while simultaneously fostering plant growth through nutrient cycling, disease suppression, and stress tolerance. This integrated approach aligns with sustainable agriculture principles by reducing environmental pollution, enhancing soil fertility and improving crop productivity. However, successful implementation requires careful consideration of site-specific conditions and continuous monitoring to optimize microbiome-based strategies. Embracing microbiomes for PAH bioremediation and plant growth promotion offers a promising avenue toward a more sustainable and ecologically friendly agricultural future.

Biography

Professor Mahendra K Gupta, born on 20th July, 1967, holds M. Phil. and Ph.D. degree of Rani Durgavati University, Jabalpur. Presently serves as Professor and Head of School of Studies in Botany, Jiwaji University, Gwalior MP (Accredited A++ grade by NAAC) and also having additional responsibility of Regional Director, Madhya Pradesh Bhoj (open) University, Gwalior with 30 years of teaching and 34 years of research experience with many administrative responsibilities.

He has coordinated and successfully completed many academic and research projects funded by UGC, DST, MPHEQIP (World Bank funded), MPCST etc. Also a Fellow of various academic bodies like Indian Botanical Society, International Congress of Environmental Research, Life member of Indian Science Congress, Association of Microbiologist of India, Mushroom Society of India and others.

Prof Gupta is referee, reviewer and member, editorial board for many reputed national and international journals. He has conferred many academic and scientific awards and recognition like Shri K M Rao award-2020 for Entomological Science by DRDE, Eminent Scientist of the year award-2016, and Scientist of the year award-2014 in the field of Environmental Microbiology by Foundation for Science and Environment, Kolkata etc. Chaired many scientific sessions, delivered many invited lectures as resource person and also visited abroad for research and academics. He is guiding students for Ph D and Master degree for research in the field of Environmental Microbiology and Biotechnology and published more than 60 research papers in reputed journals, 10 books authored, 01 edited book, 11 book chapters in internationally recognized publishing books and developed 04 training modules. Also introduced and developed UGC approved module for certificate course in 'Water Quality Monitoring'.

His contribution to Higher Education and research area in Environmental Microbiology and Biotechnology deserves a special mention.

Ab Initio Study of Structural, Mechanical and Electronic Properties Of 3d Transitional Metal Carbide in Cubic Rocksalt (Rs), Zincblende (Zb), And Cesium Chloride (Cc) Structures by Using LDA And GGA Approximation

Ehsan H. Sabbar[1], **Hazim A. Al Zubaidi**[2], **Aous H. Kurdi**[3], **Isam M. Ibrahim**[4] and **Iftikhar M. Ali**[4]

[1]*Electrical Engineering, University of Anbar, Iraq*
[2]*Department of Medical Physics, Al-Karkh University of Science, Iraq*
[3]*Madenat Alelem University College, Iraq*
[4]*Department of Physics, College of Science, University of Baghdad, Iraq*

This study rigorously investigates three 3d transition metal carbide (TMC) structures via LDA and GGA approxima- tions. It examines cohesive energy (Ecoh), Vickers hardness (Hv), mechanical stability, and electronic properties. Notably, most 3d TMCs exhibit higher cohesive energy than nitrides, and rs-TiC demonstrates a Vickers hardness of 25.66 GPa, outperform- ing its nitride counterpart. The study employs theoretical calculations to expedite research, revealing mechanical stability in CrC and MnC (GGA) and CrC (LDA in cc structure), while all 3d TMCs in rs and seven in zb structures show stability. Charge transfer and bonding analysis reveal enhanced covalency along the series, influenced by the interplay between p orbitals of carbon and d orbitals of the metal. Most 3d TMCs exhibit metallic properties, excluding zb-TiC and zb-FeC in all phases. An inverse correlation between elastic constant C44 and electronic states near the Fermi level (EF) emerges, guiding applications and design. This study efficiently uncovers 3d TMC properties, offering insights for applications and design.

Methods: We employed the Vienna ab initio Simulation software (VASP) to perform computations based on density func- tional theory (DFT). Our approach incorporated both the projector augmented wave (PAW) and PW91 general gradient approximation (GGA) methods within the local density approximation (LDA).

Biography

Condensed Matter Physics/Materials Science Theory

2018 Ph.D. from Department of physics and astronomy | College of Natural Sciences | The University of Toledo | Toledo OH, USA.

2014 M.Sc. from Department of physics and astronomy | College of Art and Sciences | Westrn Michigan University | Kalamazoo MI, USA.

2010 M.Sc. from Department of physics | College of Sciences |Baghdad University | Baghdad, Iraq.

2007 B.Sc. from from Department of physics | College of Sciences |Baghdad University | Baghdad, Iraq.

Selected A-Glucosidase Inhibitors with Antimicrobial Potential Isolated from *Gardenia aqualla*

Jean Noël Nyemb[1], Samuelson Martin Luther King Boum Bindebe[2], Bernard Dabole[1], Alembert Tchinda Tiabou[3], Emmanuel Talla[5] and **Jamshed Iqbal[5]**

[1]Department of Refining and Petrochemistry, Faculty of Mines and Petroleum Industries, University of Maroua, Cameroon
[2]Department of Chemistry, Faculty of Science, University of Ngaoundere, Cameroon
[3]Institute of Medical Research and Medicinal Plants Studies (IMPM), Ministry of Scientific Research and Innovation, Cameroon
[4]Department of General, Organic and Biomedical Chemistry, University of Mons, Belgium
[5]Centre for Advanced Drug Research, COMSATS University Islamabad, Pakistan

Gardenia aqualla (Rubiaceae) is a pantropical medicinal plant, that has been used to treat type 2 diabetes in many regions of Africa including Cameroon. In the present study we have evaluated antidiabetic and antimicrobial properties of pure compounds isolated from the leaves and seeds of Gardenia aqualla. Extracts were obtained by successive maceration in EtOAc and MeOH. Isolation and chemical characterization of compounds were carried out using chromatographic and spectroscopic methods (1D and 2D NMR, and MS). Extracts and isolated compounds were subjected to α-glucosidase inhibitory activity using the microplate assay method. Antibacterial and anticandidal activities of isolated compounds were performed by the broth microdilution method against four bacterial strains (Salmonella Typhi ATCC6539, Pseudomonas aeruginosa ATCC9721, Escherichia coli, and S. Typhi isolate) and four strains of yeast (Candida albicans ATCC9002, Candida parapsilosis ATCC22019, Candida krusei and Candida albicans isolate). Results: The phytochemical investigation of the extracts of G. aqualla afforded fifteen compounds identified as Nonacosanol (1), Tetratriacontanol (2), Octatriacontanol (3), Pentapentacontene (4), β-sitosterol (5) and stigmasterol (6), Daucosterol (7), Ursolic acid (8), Uvaol (9), 3β,19α,23β,24α-tetrahydroxyurs-12-en-28-oic acid (10), Lupenone (11), Oleanolic acid (12), Vanillin (13), Vanillic acid (14) and D-mannitol (15). The results of the α-glucosidase inhibitory assay revealed that all the tested compounds showed dose dependent inhibition and some of them were found to be comparable to acarbose. Some of the compounds also showed significant antimicrobial activity. The α-glucosidase inhibitory activities exhibited by some compounds isolated from this plant confirm its ethnomedicinal use in the management of diabetes mellitus.

Biography

Jean Noël NYEMB is a Lecturer at the National Advanced School of Mines and Petroleum Industries of The University of Maroua, Cameroon. He studied Applied Chemistry and Organic Chemistry at the University of Ngaoundere (Cameroon) where he obtained his B.Sc. (2009) in Applied Chemistry and his M.Sc. (2012). He later obtained a PhD (2019) in Organic Chemistry/Natural Products Chemistry at the University of Yaounde 1 (Cameroon), after having been a PhD Fellow at the COMSATS University Islamabad in Abbottabad (Pakistan) (2016-2017) where he worked with Prof. Dr. Jamshed Iqbal, under the TWAS-UNESCO Postgraduate Program. In 2015 and 2022, He was granted by the International Foundation of Science (IFS). His research activities have been focused on lead identification from Cameroonian medicinal plants for infectious and non-communicable diseases. He has been working with collaborators to identify and develop new drug molecules and to design phytomedicines from partially purified plant extracts.

Quadratic Generalized Spectrum Approximation and Its Application to The Quadratic Pencil of Schrödinger

S. Kamouche and **H. Guebbai**

Laboratoire des Mathématiques Appliquées et de Modélisation, Université 8 Mai 1945 Guelma. Algeria

The computation of the spectrum of an operator finds various applications, from quantum mechanics to biology. It is used in optics for the analysis of light spectra, in engineering for signal processing and the study of electromagnetic waves, in computer science for data analysis and quantum algorithms, in chemistry for spectroscopy, in economics and finance for time series analysis, and in biology for the analysis of biological signals. The computation of the spectrum of an operator, as an application of spectral theory, constitutes a powerful mathematical tool crucial in understanding, analyzing, modeling, and optimizing complex systems in diverse fields such as mathematics, physics, engineering, economics, geophysics, quantum computing, chemistry, optics, and biology. The purpose of this work is to establish a theoretical and numerical framework to apply the generalized spectrum approximation method to the quadratic spectral problem presented as follows:

$\lambda^2 Ax + \lambda Bx + Cx = 0$, where A,B,C are bounded operators defined on Banach space into itself and λ is a spectral parameter.

We develop a tool to prove the generalized quadratic spectrum convergence in the sense of both properties U and L gives by

- If $\lambda_n \in sp(A_n, B_n, C_n)$ and $\lambda_n \to \lambda$ then $\lambda \in sp(A, B, C)$
- If λ is a generalized quadratic eigenvalue of finite type isolated in sp (A ,B ,C), there is a sequence $\lambda_n \in sp(A_n, B_n, C_n)$ such that $\lambda_n \to \lambda$.

under the norm and the collectively compact convergence modes. Moreover, we apply numerical tests on the quadratic pencil of Schrödinger's operators. The performance and the accuracy of our method is illustrated in the comparison between the exact and the approximate eigenvalues represent in the following figure:

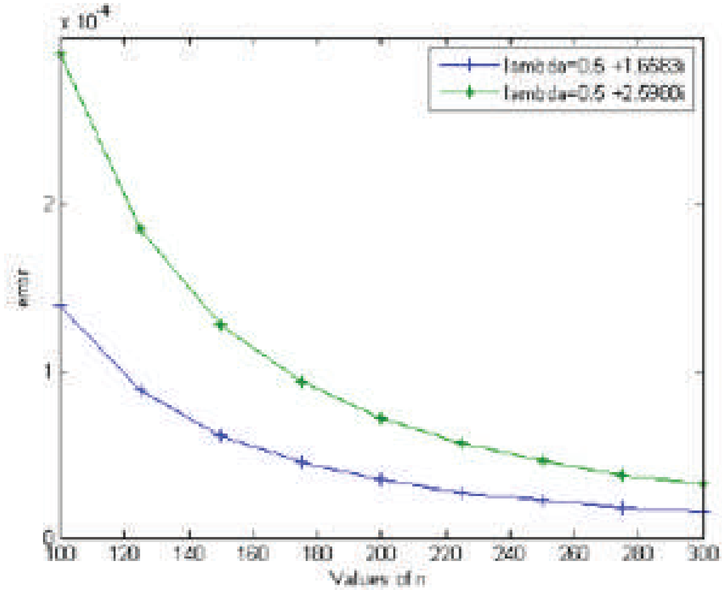


Figure 1: The error behavior of the generalized quadratic spectrum approximation method.

Biography

Somia KAMOUCHE, a PhD student in applied mathematics and a member within the Laboratory of Applied Mathematics and Modeling at the University of May 8th, 1945, in Guelma. Her research focuses on spectral theory, operator theory, and integral and integrodifferential equations. Her commitment reflects her determination to contribute to the advancement of mathematical knowledge and to solve real-world problems through in-depth analytical methods. As an active member of the academic community, she pushes the boundaries of mathematical understanding, exploring advanced concepts, and developing models applicable in various fields. Her passion for applied mathematics is driven by the desire to tackle stimulating intellectual challenges. Her academic journey demonstrates her dedication to acquiring in-depth expertise in spectral theory, operator theory, and integral equations. Her research aims to broaden the understanding of mathematical foundations and explore new perspectives for a significant impact in applied sciences.

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Effect Of Stress on Electronic, Optical, Elastic and Mechanical Properties of Potassium Tantalum Oxide $KTaO_3$: A DFT Study

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[1]Institute of Mechanical and Manufacturing Engineering, Khwaja Fareed University of Engineering and Information Technology, Pakistan
[2]Department of Physics and Mathematics, Superior University, Pakistan
[3]Department of Physics, GC University, Pakistan

The ultimate purpose of this study is to perform a wide-ranging analysis of electronic, optical structural, elastic, and mechanical properties of cubic structured Potassium Tantalum Oxide (KTaO3) by applying the stress (0, 20, 40, 60) GPa. The computational Generalized Gradient Approximations (GGA) technique is applied on cubic (KTaO3) with Perdew Burke Ernzerhof (PBE) exchange. With applied stress, an increase in bandgap from (1.624 – 1.871 eV) is found. The partial densities of states (PDOS) for bulk Potassium Tantalum Oxide KTaO3, Potassium (K), Tantalum (Ta), and Oxygen (O) are also predicted. In the valence band range, the dominating peaks for KTaO3 at 0, 20, 40, and 60 GPa are due to p-states. The noteworthy variations in optical parameters such as absorption I(ω), optical conductivity σ_1 (ω) real and σ_2 (ω) imaginary, dielectric function ε_1 (ω) real and ε_2 (ω) imaginary, loss function L(ω), reflectivity R(ω) and real/imaginary refractive index n(ω) are found with varying stress range from 0–60 GPa. The values of elastic constants are predicted (4.1741 Å to 3.8890 Å) computationally by using energy deformation equations when stress is applied at 0–60 GPa. Several mechanical features such as the bulk modulus (161.0911 – 426.1323), shear modulus (99.4505 – 153.3127), Young modulus (247.4334 – 410.6864) are increased with increasing stress (0–60 GPa). In mechanical ratios like Pugh, Poisson, and Frantsevich, ductile behaviour is found from 20–60 GPa, while at 0 GPa, the material is brittle. The anisotropic nature is detected in the estimated results of (KTaO3). Moreover, our predicted results unveiled that the chosen material is good for optoelectronic devices due to its high refractive index, absorption, reflectivity, and conductivity.

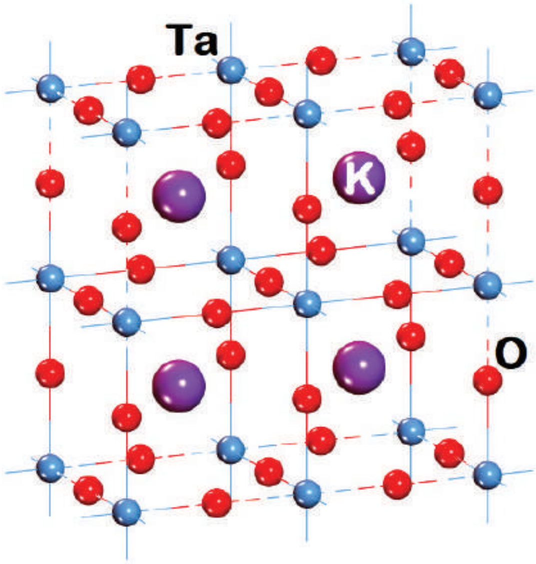

Figure 1. *Supercell cubic structure of Potassium Tantalum Oxide (KTaO3)*

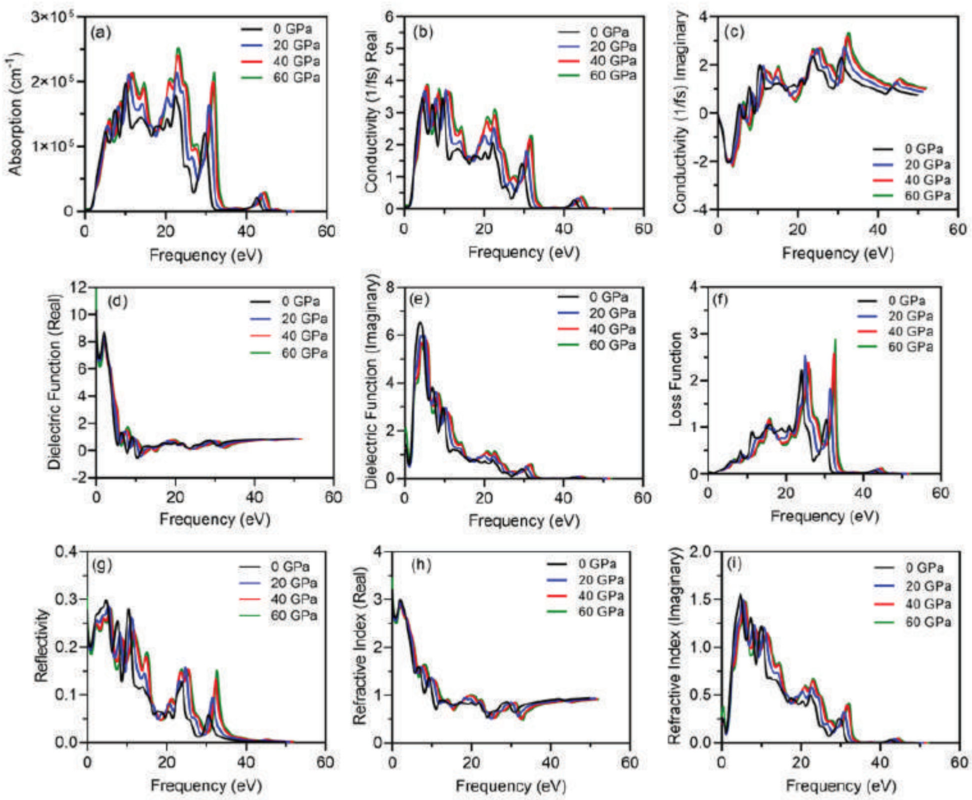

Figure 2. (a) Absorption, (b) conductivity real part, (c) conductivity imaginary part, (d) dielectric function real part, (e) dielectric function imaginary part, (f) energy loss function, (g) reflectivity, (h) real part refractive index and (i) imaginary refractive index of KTaO3

Biography

Dr. Muhammad Ijaz Khan with academic background, earning his PhD in Mechanical Engineering from Ruhr Universitaet Bochum, Germany, in February 2014. Prior to that, he completed his M.Phil. in Physics at GC University Lahore, Pakistan. He served as an Assistant Professor at The University of Lahore, Pakpattan Campus, since February 2016, He is working as assistant professor in the Department of Mechanical Engineering at KFUEIT, Rahim Yar Khan, Pakistan. His research expertise spans Fluid Mechanics and Computational Materials Science. With a focus on these domains, he has contributed significantly to the field and garnered several publications in reputable international journals. His work reflects a commitment to advancing knowledge in fluid dynamics and computational materials science.

PEERS ALLEY MEDIA

Revolutionizing Soil Remediation: Harnessing The Potential of Chicken Manure Digestates for Petroleum Hydrocarbon Contamination

S. U. Oghoje[1,2], **C. I. Omoruyi**[3], **C. Ejeomo**[4], **J. E. Ukpebor**[2] and **I. H. Ifjen**[5]

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[2]*Department of Chemistry, Faculty of Physical Sciences, University of Benin, Nigeria*
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[4]*Departments of Chemistry, Faculty of Science, Michael and Cecilia Ibru University, Nigeria*
[5]*Department of Research Outreach, Rubber Research Institute of Nigeria, Nigeria*

This study aimed to assess the effectiveness of chicken manure digestates (CMD) in bioremediating soils contaminated with hydrocarbons. The experiment involved three levels of nutrient stimulation using CMD (0%, 10%, and 20%) and two levels of petroleum hydrocarbon-polluted soils (5% and 10% concentration). The nutrient and microbiological composition of the locally sourced contaminated soil was analyzed. Total petroleum hydrocarbon (TPH) concentrations were measured at regular intervals (0, 14, 28, 56, 84, 168, and 336 days) before and after the treatment using gas chromatography with fame ionization detection (GC-FID) following standard protocols. The study revealed that CMD exhibited significant potential as a source of hydrocarbon-utilizing microbes, with total hydrocarbon-utilizing bacteria (THUB) and total hydrocarbon utilizing fungi (THUF) reaching values of 1.6 × 104 and 1.3 × 104 colony-forming units per gram (cfu/g, Table 1), respectively. These findings suggest that CMD can serve as an effective inoculant for bioremediation of hydrocarbon-contaminated soils and related biodegradable contaminants. Comparatively, the 20% CMD treatment exhibited 52% and 35% remediation rates for the respective pollution levels, while the 10% CMD treatment showed superior TPH degradation at day 56, with removal rates of 59% and 39% for the 5% and 10% polluted soils, respectively. However, over longer cleanup durations (e.g., day 168), higher TPH removal rates of 83% and 66% were observed for the aforementioned samples. Notably, the 20% CMD stimulation demonstrated better long-term bioremediation performance, especially for high levels of hydrocarbon pollution, while the 10% CMD stimulation proved more effective for short-term remediation. Overall, this study highlights the efficacy of CMD as an organic stimulant for the removal of organic contaminants from soils, particularly in bioremediation applications.

Tables 1: Microbial Counts of soils and the nutrients supplements prior to treatments

Samples	THB	THUB	THF	THUF
Unpolluted soil (UPS)	7.0 x 10^3	3.0 x 10^3	1.2 x 10^4	5.0 x10^3
HC Polluted soil (PSC)	1.4 x 10^4	7.0 x 10^3	1.5 x 10^4	1.2 x 10^4
Layers manure Digestates	1.5 x 10^4	1.6 x10^4	1.4 x10^4	1.3 x 10^4

THB = Total heterotrophic bacteria; THF = Total heterotrophic fungi.

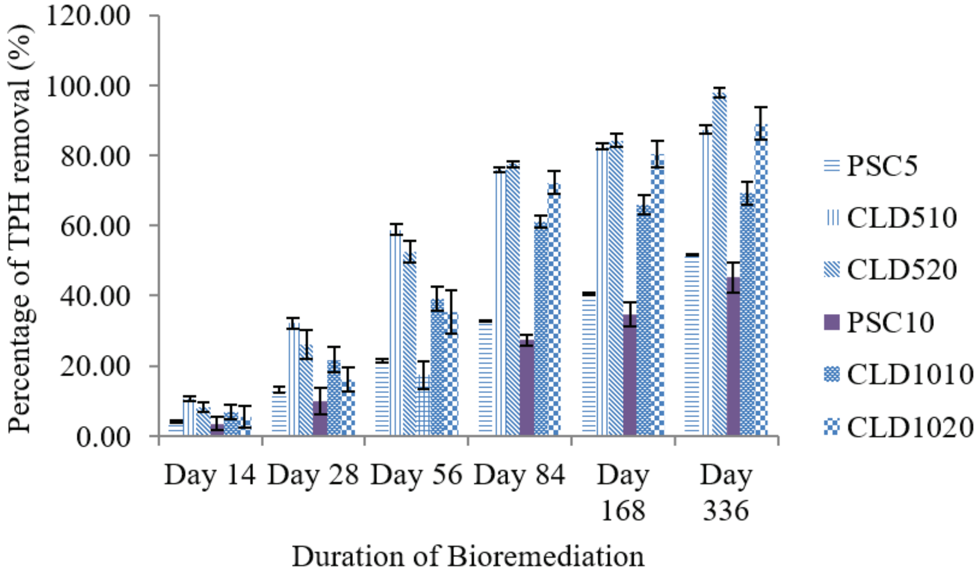

Figure 1: *Percentage removal of TPH at different periods of remediation*

Boron-Based Drug Repositioning: Targeting Arginase for Enhanced Healing in Venous Leg Ulcers

Naveen Kumar V[1] and **Tamilanban T**[2]

[1,2]*Department of Pharmacology, SRM College of Pharmacy, SRM Institute of Science and Technology, India*

Objectives: This study aims to explore the potential of a boron-based drug, Tavaborole, targeting Arginase for treating venous leg ulcers through in silico predictions and *in vitro* assays.

Scope: The research involves a comprehensive literature review to identify FDA-approved boronated drugs suitable for in silico analysis. Molecular docking studies utilize the Glide module of Schrodinger v12, assessing interactions between the optimized crystal structure of human arginase I enzyme and selected ligands. *In vitro* assays on macrophage cells further investigate Tavaborole's wound healing potential and its impact on arginase activity.

Methods: Molecular docking studies with Schrodinger v12 and Gromacs 2020.6 platform for molecular dynamics simulations were employed. *In vitro* assays, including MTT assay, scratch assay, arginase inhibitory assay, ROS assay, and nitric oxide assay, were conducted on RAW 264.7 cells to evaluate Tavaborole's cytotoxicity, wound healing potential, and modulatory effects on arginase activity and nitric oxide production.

Results: The Schrodinger tool reveals Tavaborole's superior binding characteristics with a Glide score of -3.957 and energy values of -22.177 kcal/mol towards the arginase-1 enzyme compared to L-arginine (-3.379, -16.729) and L-norvaline (-3.141, -15.688). Molecular dynamics systems revealed stability in the docked complex for 500 ns. Tavaborole demonstrated concentration-dependent cytotoxicity, significant wound healing effects, inhibition of oxygen free radicals production, and arginase inhibitory potential on macrophage RAW 264.7 cells.

Conclusion: The study underscores the significance of boron-based drugs, particularly Tavaborole, in chronic wound healing. Molecular docking studies and *in vitro* assays provide evidence of Tavaborole's superior binding characteristics and therapeutic potential in targeting Arginase-1 for venous leg ulcer treatment. The results support the promising field of drug repositioning for effective and cost-efficient treatments in chronic wound management.

Biography

Naveen Kumar V is a Doctoral Research Scholar under the supervision of Dr. T. Tamilanban in Department of Pharmacology, SRM College of Pharmacy, SRM Institute of Science and Technology at Kattankulathur, Chengalpattu, Tamil Nadu, India. His research interests are cardiovascular diseases, oncotherapeutics, neurodegenerative disorders, computer-aided drug design, zebrafish model and bio-applications of graphene-based nanomaterials. He has published to three research papers, and one review article in Elsevier and Frontiers. He has qualified Graduate Pharmacy Aptitude Test (GPAT)-2020 and received TEREE Dr.A.P.J. Abdul Kalam Young Research Fellowship 2019-2020 and SRM Phoenix Project award 2020 – student category on biomedical applications of graphene-based materials. He received 5 prizes/award for the best presentations in various international and national scientific events. He served as a reviewer for Developmental Neurobiology journal, Wiley Publisher.

Palladium Nanoparticles Incorporated Graphitic Carbon Nitride Nanosheets for Visible Light Catalytic Reforming of Biomass for Hydrogen Evolution

Beena Mathew, Neenamol John and **Chinnu R Thara**

School of Chemical Sciences, Mahatma Gandhi University, India

Photocatalytic H_2 production has become of paramount importance due to the depletion of fossil fuels and environmental contaminants. Biomass photoreformation is a revolutionary and distinctive method for both sustainable H2 production and biomass valorization with limitless solar energy. However, this sustainable approach is typically associated with harsh reaction conditions, inadequate selectivity, and a limited amount of biomass conversion. Porous ultra-thin g-C_3N_4 carbon nitride nanosheets decorated with small Pd nanoparticles ((PdNPs < 5nm) were fabricated and their exceptional application in photocatalytic biomass reforming was investigated. The nanocomposites synthesis involves two-steps: (i) primarily thin g-C_3N_4 nanosheets were prepared with the thermal exfoliation method, and (ii) thiol-capped Pd nanoparticles are wet impregnated into g-C_3N_4 nanosheet support. PdNPs can serve as photocatalysts under visible-light irradiation, it is expected that the photocatalytic performances of g-C_3N_4 nanosheet can be further improved after loading of PdNPs. The loading weight percentages were changed from 0.2, 0.35, and 0.5% to examine the impact of Pd loading. By making the g-C_3N_4 photocatalyst into a 2D nanosheet structure, the inherent flaws can be somewhat overcome. Additionally, by adding noble metal nanoparticles, the photocatalytic performance existing can be greatly improved. A large amount of the sun's radiation is in the form of visible light (45%) and ultraviolet region (5%) and hence we have focused on the utilization of abundant visible light for biomass reforming. Our composite photocatalyst showed excellent visible light activity with H_2 generation rate of 1839.84μmolg-1h-1 within four hours of continuous irradiation and it is almost 27 times higher than undoped g-C_3N_4 nanosheets. For better understanding, three different Pd loading on g-C_3N_4 nanosheets were prepared, and glucose reforming efficiency was studied. In this pursuit of a better H_2 evolution visible light active photocatalyst, g-C_3N_4 nanosheet generated at various pyrolysis temperatures loaded with optimized Pd weight percentage is also explored.

Biography

Dr. Beena Mathew received her Ph.D. in Chemistry from Mahatma Gandhi University, Kerala, India. She was a JSPS Postdoctoral fellow at Kyushu University, Japan. Presently, she is a Senior Professor of Physical Chemistry at the School of Chemical Sciences and also Dean of the Faculty of Science at Mahatma Gandhi University. She is the former Director of the School of Chemical Sciences at Mahatma Gandhi University. Dr. Mathew supervised 40 research students and has 206 publications. The current research areas include green synthesis of nanoparticles and quantum dots, nanomaterials-based optical and electrochemical sensors for diverse applications, computational aspects of electrochemical and fluorescence sensing applications of nanomaterials, nano photocatalysts for wastewater remediation, metal nanoparticles doped photoactive supports for hydrogen generation through photocatalytic water splitting, and self-assembled supramolecular materials for various applications.

Clean And Green Environment by Using Agricultural Waste with Better Cleaning Properties Than Synthetic Ones

Maria Taj Muhammad[1] and **Nasir Uddin Khan**[2]

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[2]Department of Chemistry, Jinnah University for women, Karachi 74600, Pakistan

The plant material was found to be rich with surfactant properties. The comparative study between synthetic and natural surfactant was carried out using spectrophotometry, and conductometric measurement. The natural surfactant plant gave CMC values 4.4×10-4M. It is the point where their monomer aggregates to form micelles, which are far below the CMC point of most of thesynthetic surfactants. The role of temperature was also monitored in comparison to the synthetic surfactants. The pH was used to find the nature of surfactants and number of replaceable protons in the system. The surfactant interaction properties were monitored against a variety of dyes cationic (CTAB), and anionic (methylene blue and neutral red). The interactions were monitored from pre- to post micellar concentrations of both natural and synthetic surfactants. The change in concentration of the surfactant led to the change in interaction behaviour. Wide range of temperatures were selected to monitor the behaviour and interactions of the natural and synthetic surfactants as these interactions are temperature dependent and found to be favourable at lower temperatures.

The self-degradation was observed at ambient temperature and in the darkboth in aerobic and anaerobic conditions. Based on its behavior and degradation properties, the proposednatural surfactant is a cheap and good alternative to the synthetic surfactants. These natural surfactants were found to have surfactant properties and even efficient from synthetic counterparts and biodegradable thus environmentally friendly.

Moreover, the natural surfactant helps to degrade many environmentally toxin dyes which are even non degradable in fenton presence.

Synthesis, Crystal Structure, and Computational (ELF, Hirshfeld Surface Analysis, And DFT) Studies of A New Strontium Polyphosphate Form α-Sr $(PO_3)_2$

El. Majdi, S. Zerraf and **Said Belaaouad**

Faculty of Sciences Ben M’sick, Hassan II University of Casablanca, Morocco

The strontium Sr(PO3)2 polyphosphate was synthesized and characterized by single crystal X-ray diffraction analysis, infrared and Raman spectroscopy, and Computational (ELF, Hirshfeld surface analysis and DFT) studies. This compound crystallizes in the centrosymmetric triclinic space group P-1 (Z = 4) with a = 5.7938(3) (Å), b = 7.2039(4) (Å), c = 8.0673(4) (Å), α = 97.800(2)°, β = 104.590 (2)°, γ =106.647(2)° and V = 304.25(3)Å3.The 3D-dimensional structure contains Sr(PO3)2 chains, which form wavy layers between which exist layers of ions (PO3)-. In addition, theoretical calculations were performed using the DFT/B3LYP/LanL2DZ basis set for crystal molecular structure, Infrared and Raman spectra, and HOMO-LUMO properties of the title compound. 3D-MEPs and the FMO (HOMO/LUMO) for Sr(PO3)2 were used to assess the total electron density and the reactive sites (local reactivity). Molecular orbital contributions are evaluated by DOS (density of states). A comparative study by the standard deviation (SD) is in the range DFT/XRD; 0.06 in % for bond lengths and 0.016 in % for angles. The Intermolecular Sr(PO3)2 interactions were quantified by Hirshfeld's analysis tools. The ELF (electron locator function) identifies (non-binding and binding) regions of space that can be associated with electron pairs for elaborated material. The infrared spectrum confirms the existence of the functional groups in the elaborated material. The complete vibrational assignments and analysis of the observed fundamental bands of the molecule were carried out.

Biography

Majdi Elmehdi, a 32-year-old luminary in Physical Chemistry of Materials and Spectroscopy, serves as a temporary professor at the Ben M'Sick Faculty of Sciences in Casablanca. Holding a Doctorate in his field, ElMehdi's expertise encompasses the intricate study of material properties through spectroscopic methods. His academic prowess is evidenced by 11 publications in esteemed international journals indexed in platforms like Elsevier and Taylor. ElMehdi's scholarly pursuits extend globally, with active participation in 53 international conferences. Through these engagements, he fosters collaboration, disseminates research findings, and stays abreast of the latest advancements in his field. ElMehdi's dedication to academia and scientific inquiry exemplifies his commitment to pushing the boundaries of knowledge in Physical Chemistry of Materials and Spectroscopy.

Acid-Base Pretreatment And Enzymatic Hydrolysis of Palm Oil Mill Effluent in a Single Reactor System for Production of Fermentable Sugars

Tawfikur Rahman

IUBAT, Bangladesh

Palm oil mill effluent (POME) is one of the main agro-industrial wastewaters in Malaysia. Highly polluting POME is a serious threat to the environment. In recent years, the methods used to treat POME are inefficient and complex in terms of cost or environmental preservation. The main object of this research is to propose a single reactor system (SRS) obtained from POME wastewater discharge as a promising low-cost treatment and high-energy method for harvesting the fermentable sugar by applying acid–base–enzyme pretreatment and hydrolysis of POME by locally produced cellulase enzymes to enhance biofuel production. Several experiments were conducted to produce fermentable sugars through the statistical methods, including the characterization of POME, acid-base pretreatment, and enzymatic hydrolysis process for reducing sugar production. The one factor-at-a-time (OFAT) results showed that the highest reducing sugar yield, 23.5 mg/mL of POME, was achieved by enzymatic hydrolysis in an SRS without having a separation and purification. Based on OFAT performance, optimization of two factors such as substrate concentration (total suspended solids, TSS %w/v) and enzyme loading (μmol/min/mL) was carried out by applying face-centered central composite design (FCCCD) under the response surface methodology (RSM) to develop a second-order regression model. The optimum reducing sugar production was 26.6 mg/mL (53.14%) with the conditions of 5% w/v, TSS, and 80 μmol/min/mL of the enzyme dose. In addition, the results of this research can be further considered in biofuel production using other wastewaters to enhance biofuel production as well as wastewater treating functions and minimize the negative environmental impacts.

Biography

Dr. Tawfikur Rahman is an Assistant Professor of the Department of Electrical and Electronic Engineering, IUBAT–International University of Business Agriculture and Technology, Uttara, Dhaka, Bangladesh. In 2004, he received his Diploma in Power engineering from Jessore Polytechnic Institute. He received his bachelor's degree in electrical and Electronic Engineering from IUBAT in April 2009. Then he received his Master of Science (MS) in Electronics Engineering (EE) in 2016 and a Doctor of Philosophy (Ph.D.) in Electronics Engineering (EE) in 2019. He has had the privilege to continue a 2- year Post-Doctoral Research in Renewable Energy Systems Biofuel Energy upgrading systems at the same University. His teaching and research interests include Biochemasty, Fuel cell, Electrochemical syetem, power quality, high power density, PSI inversion, green energy, power conversion and power electronic control of industrial systems. He can be contacted at tawfikr.eee@iubat.edu.

Kinetic And Isotherm Studies on Removal of Hexavalent Chromium by Nano-Bentonite

Ashok Kumar Jha

University Department of Chemistry, T.M. Bhagalpur University, India

In the present study, an adsorptive removal was developed using nano-bentonite of Rajmahal hills. Nano-bentonite was prepared by adopting ultrasonic process or chemical method and characterized by FTIR, SEM, XRD, TGA, and DTA. The BET surface area was known by adsorption of N_2 gas on bentonite at -95°C. Freundlich and Langmuir adsorption isotherm models were tried to see the best fit. The experimental data showed the best fit for Freundlich isotherm. The percentage removal was also recorded with a fixed amount of nano-bentonite up to different intervals of time. The optimum conditions such as pH, agitation time, and sorbent doses were determined for removal of Cr(VI) from aqueous medium. The kinetic studies were done based on first order, second order, and intra particle diffusion model. The regeneration of bentonite was also done for its reuse.

The optimum adsorption efficiency is 86% at a pH of 4.

The bentonite sample was found to contain traces of rare earth and radioactive elements along with major oxides of Si and Al. The analysis was done with Inductively Coupled Plasma Emission Spectroscopy (ICP-OES).

Biography

Dr. Ashok Kumar Jha, one of the most promising teaching faculty of the esteemed institute Tilka Manjhi Bhagalpur University, Bhagalpur, Bihar, India, has been doing great and innovative research work in the field of adsorption and catalytic properties of bentonite for the last two decades. He has published 50 papers in Journals of National and Inter national repute. He has ten books to his credit and completed two research projects.He is a well-known figure in the field of modern physical chemistry not only for his research works, but also for the activities like organizing National and International seminars and delivering invited talks in prestigious institutes like IIT Patna, IIT-ISM Dhanbad etc. He is the editor of a UGC-approved journal named 'Jalchintan'. Moreover, he is the Chairman of the Indian Chemical Society Bhagalpur Chapter and a Council Member of the Indian Chemical Society, Kolkata. He has teaching experience of 37 years till now.

Efficient Blocked Fractional Factorial Designs for Stated Choice Experiments of Size Two and Four

Emmanuel Amoah[1], **Jakperik Dioggban**[2] and **Adjabui Michael**[3] **Jackson**

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Stated choice experiments are increasing becoming popular due to their ability to optimize information gain with limited resources. Many designs have been developed for selection of various attributes and their levels to form choice sets. One of such designs is blocked fractional factorial design (BFFD). Stated choice experiments for symmetric attributes of 4 choice sets of size 2 and 4, 8 choice sets of sizes 2 and 4 were developed using BFFDs. Generators for stated choice set of size 2 and 4 with resolution three, four and five were developed. The alias structures and confounding effects for the designs were derived, as well as their clear effects if any for estimation. The A-efficiency was used to compute the efficiencies of the proposed designs, since it has better statistical properties. The computed efficiencies for the proposed designs reveal that 4 choice sets of size 4 designs are more efficient. Finally, a practical application of the proposed method was carried out for four choice sets of sizes 4 using 2_V^{5-1-2} design with attributes and levels of service quality in public transport.

Biography

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PHD APPLIED STATISTICS
University of Education, Winneba 2018- 2019
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University of Ghana, Legon-Accra
Mphil Statistics 2013- 2015
University for Development Studies, Tamale
B.Sc Mathematical Science (Statistics Option) 2007- 201
Navrongo Senior Secondary School
Senior Secondary School Certificate Examination (Agric Science) 2003- 2006

Ethnobotanical Study on Wild Edible Plants in Metema District, Amhara Regional State, Ethiopia

Getnet Chekole Walle, Getinet Masresha and **Yirgalem Melkamu**

Department of Biology, College of Natural and Computational Sciences, University of Gondar, Ethiopia

Wild edible plants are vital for the survival and sustainable livelihoods of rural people of Ethiopia. Thus, this study compiled wild edible plants, their use, threats and management practices in Metema District, northwestern Ethiopia. Eight sample Kebeles were selected purposively based on vegetation coverage and key informants availability. A total of 128 informants were selected using purposive and random sampling techniques. Data were collected using individual interviews, guided field walks, focus group discussion and market surveys through semi-structured questionnaires. Ethnobotanical data collected from the informants were summarized by descriptive statistics, and further verified by using informant consensus, preference and direct matrix ranking. Knowledge difference among age and sex groups was evaluated by independent sample t-test. A total of 44 wild edible plant species distributed in 34 genera and 25 families were documented. Most (88.64%) of these plant species were found in the wild habitat. Fabaceae and Moraceae accounted for higher proportion of edible plant species. Trees were the dominant habit (59.09%). From the total recorded wild edible plants, 33 (75%) species were used as supplementary foods and 11 (25%) species were used during famine. Fruits were the most edible plant parts (66%) and raw fresh forms were the main conditions of consumption (81.8%). Diospyros abyssinica was the most cited (60.94%) and first ranked. Some edible species such as Adansonia digitata and Balanites aegyptiaca were marketable. Ziziphus spina-christi was found the most multipurpose wild edible plant species. Most of the species (33, 75%) were used as animal fodder followed with traditional medicines (25, 56.82%) and firewood (20, 45.45%). Tamarindus indica, Moringa stenopetala, Balanites aegyptiaca, Grewia ferruginea, Corchorus olitorius and Cordia africana had nutraceutical values. Significant Knowledge differences ($P < 0.05$) were obtained among sexes and age groups of informants on the number of wild edible plant species they listed. As a result of their multiple roles, wild edible plants are threatened by various anthropogenic activities. Despite this, Metema District, still, supports good numbers of wild edible plants from which the poor inhabitants complement their basic needs by consuming and marketing them. For sustainable utilization, conservation, value addition and market linkage practices shall be strengthened to improve the livelihoods of local people and sustainable forest management.

Biography

Mr. Getnet Chekole(Presenter) is an lecturer in Biology Department(Botanical Science stream)at the University of Gondar, Ethiopia. In 2009, he received a B.Sc. in Applied Biology from the University of Gondar, Ethiopia, and in 2011, he graduated M.Sc. in Plant Biology and Biodiversity Management from Addis Ababa University, Ethiopia. Mr. Getnet started working at Woldia University as a lecturer in 2011. He started serving as a lecturer at the University of Gondar in 2016. He also coordinated community services, educational quality assurance & auditing, and research of the natural and computational science faculty at Woldia University from January to October 2016. Getnet has previous experience serving in a variety of voluntary tasks and joining a number of professional organisations. He has been supervising postgraduate and undergraduate students' research projects and thesis work in addition to teaching. He is currently coordinating the extension programs the University of Gondar at the Woreta Satellite Campus, Ethiopia. Additionally, he has reviewed journal articles, research projects, and student thesis papers. He has worked on a number of research projects and published his findings in peer-reviewed journals. Additionally, he has taken part in and presented his studies at national research conferences. His areas of interest in research include ethnobotany, Medicinal Plants, Ethnomedicine, Plant biodiversity, indigenous knowledge, range ecology, plant physiology, Plant Ecology, Pharmacognocy, Phytochemistry and Plant taxonomy. He is also interested in biological science.

Dual Solutions and Stability Analysis of Cu-H2O-Casson Nanofluid Convection past a Heated Stretching/Shrinking Slippery Sheet in a Porous Medium

K.A. Duguma[1], **O.D. Makinde**[2] and **L.G. Enyadene**[3]

[1,3]Adama Science and Technology University, Ethiopia
[2]Stellenbosch University, South Africa

This presentation deals with a fluid dynamics applications for energy efficiency, heat and mass flow control, which are focus area of chemical engineering, industrial chemistry, nanomaterials, and material science. The impact of $Cu/CoFe_2O_4/TiO_2$-H_2O nanoparticles on two-dimensional Casson nanofluid flows past permeable stretching/shrinking surfaces embedded in a Darcy-Forchheimer porous medium in the presence of slipperiness of surface, suction/injection, viscous dissipation, and convective heating were discussed. Using some realistic assumptions and appropriate similarity transformations, the governing nonlinear partial differential equations were formulated and transformed into a system of nonlinear ordinary differential equations and then numerically solved by using the shooting technique. Numerical results are displayed for dimensionless fluid velocity and temperature profiles, skin friction, and the local Nusselt number. The impacts of different governing physical parameters on these quantities are presented and discussed using graphs, tables, and a chart. For the specific range of shrinking sheet, the result shows that dual solutions exist, and temporal stability analysis is performed by introducing small disturbances to determine the stable solutions. It is detected that the upper branch solution is hydrodynamically stable and substantially realistic; however, the lower branch solution is unstable and physically unachievable. The fluid flow stability is obtained by enhancing the suction, surface slipperiness, and viscous dissipation parameters. However, augmenting the values of the Casson factor, $Cu/CoFe_2O_4/TiO_2$-H_2O nanoparticle volume fraction, porous medium, porous medium inertia, and convective heating parameters increases the blow-up stability of the fluid flow. The rate of heat transfer enhances with the increment in the Casson factor, porous medium, porous medium inertia, suction, velocity ratio, nanoparticle volume fraction, and convective heating parameters, whereas it reduces as the slipperiness of the surface and viscous dissipation parameters rise. Increment of $Cu/CoFe_2O_4/TiO_2$-H_2O nanoparticle volume fraction into the Casson fluid boosts the heat transfer enhancement rate higher for the shrinking sheet surface.

Biography

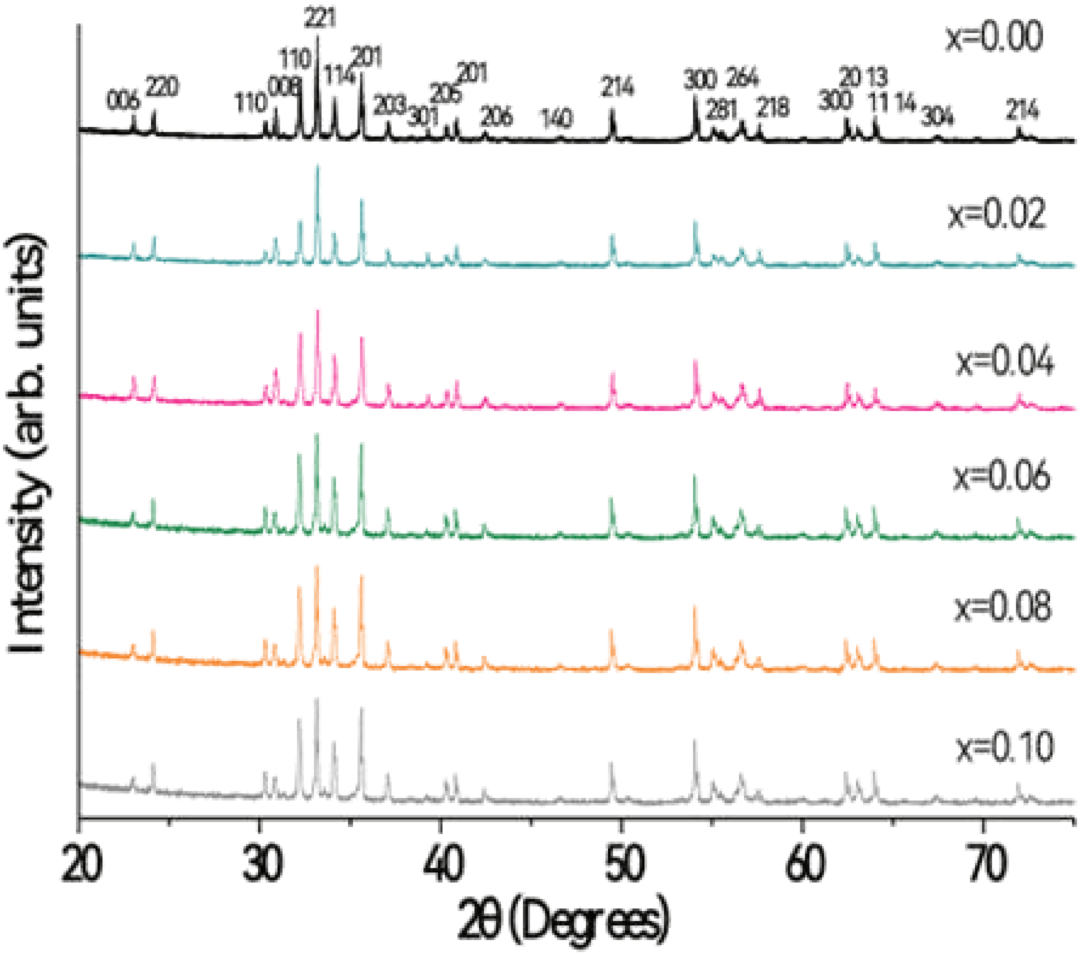
Kifle Adula Duguma is a doctor of philosophy candidate in Computational Fluid Dynamics at Adama Science and Technology University. Mr. Kifle is conducting a research on "Mathematical Investigations into Boundary Layer Flows of non-Newtonian Casson Nanofluids with Heat and Mass Transfer" for both single and two phase flow, that has significant applications in energy efficiency, heat and mass flow control. This research considers complex flow which involves various parameters that affects nanofluid flows. He has been studying for the last four years. At this stage, he has been published two articles and the third is under peer review. Moreover, he is almost completing the write up of his dissertation and will present it within the next two months. As he is a beginner researcher, attending this prestigious conference is a nobility for him.

Effect Of Divalent and Trivalent Cations on Structural, Electrical and Magnetic Properties of InMn Substituted M. Type Hexaferrites

Hasan M. Khan[1,2]

[1]Department of Physics, The Islamia University, Pakistan
[2]Centre of excellence in solid state physics, University of The Punjab, Pakistan

Effect of rare earth and Divalent (InMn) substitution on the structural electrical and dielectric properties of W-type hexaferrites prepared by sol–gel auto combustion is reported. The synthesized samples were characterized by Fourier transform infrared spectroscopy, X-ray diffraction, scanning electron microscopy electrical and dielectric properties (resistivity and conductivity). The X-ray diffraction analysis confirmed single phase M-type hexa-ferrite structure. The lattice parameters were found to increase as In Mn contents increases, which is attributed to the ionic sizes of the implicated cations. The InMn seems to be completely soluble in the lattice. The results of scanning electron microscopy shows that the grain size decreases with increase of In Mn substitution. The increased anisotropy and fine particle size are useful for many applications, such as improving signal noise ratio of recording devices.



Biography

Dr Hassan Mehmood Khan has completed his PhD at the age of 30 and is working as assistant professor at the Institute of Physics The Islamia University of Bahawalpur Pakistan The fields of interest include Condensed matter Physics. Magnetic Materials, Nanomaterials. (synthesis, characterization and their application studies), nanocrystalline soft ferrites, nanostructured hard ferrites. Microwave and other high frequency applications of Ferrites.

Dune Sand Stabilization Using Sustainable Pozzolanic Cement Supplementary Material

Manish V Shah and **Sandip Kori**

L D College of Engineering, Ahmedabad, India

Due to increasing trend of urbanization and industrialization, it is required to make transportation more feasible and accessible. But always it is not so easy due to presence of very problematic soils at the proposed pavement construction site. One of such problematic soils is dune sand which occupies major land portion in regions like Rajasthan and Kutch of Gujarat, India. Dune sand being collapsible and due to lose formation, is not suitable at all to use it as subgrade material. So, it is required to stabilize such soil to increase its strength and decrease collapsibility by binding all sand grains together. Still, production of several harmful gases in environment during production of cement sets a limit on its use. Also there is a disposal problem of the wastes generated in industries which not only occupy land but degrade the quality of environment and have pozzolanic property also. So, considering both problems, there is necessity to use these wastes in productive manner. The aim of this research study is to improve engineering properties of 'dune sand' using sustainable and pozzolanic cement supplementary wastes based on macro-molecules interaction with quartz silica of dune sand and interaction chemistry of waste material. This will also limits the use of cement by partially replacing it in stabilization of such soils. According to provision given by IRC, the most suitable stabilizer was found to be cement due to its pozzolanic reaction with water in presence of silica. This pozzolanic reaction takes place between $Ca(OH)_2$ and SiO_2 which ultimately results in formation of C-S-H (calcium silicate hydrate) gel which binds all soil grains and increases the strength and by replacing the cement with pozzolanic waste materials make more presence of silica and alumina which are primarily responsible for pozzolanic reaction. Additionally, such wastes in finely divided form are having more specific surface area available for pozzolanic reaction and also fill the pores present between sand grains. In this study, UCS and CBR samples are prepared at maximum dry density to determine strength that satisfies criteria given in IRC. Addition of optimum cement content is then replaced by varying percentages of pozzolanic wastes which are Wheat Straw Ash (WSA), Nano-Silica (NS) and Fluid Catalytic Cracking Catalyst Residue (FC3R). Thus, the parameters involved in subgrade design are analyzed. Also, the improvement in pore structure of stabilized soil and a pozzolanic reaction is analyzed using microscopy.

Atherogenic Dyslipidemia and Associated Risk Factors Among Hypertensive Patients of Five Health Facilities in Northeast Ethiopia

Ousman Mohammed, Ermiyas Alemayehu, Endris Ebrahim, Mesfin Fiseha, Alemu Gedefie, Abdurrahman Ali, Hussen Ebrahim and **Mihret Tilahun**

Department of Medical Laboratory Sciences, College of Medicine and Health Sciences, Wollo University, Ethiopia

Background: One of the major risk factors for cardiovascular disease is atherogenic dyslipidemia. There was, however, little information available in Ethiopia. Therefore, the purpose of this study was to estimate the prevalence of atherogenic dyslipidemia and related risk factors in Northeast Ethiopian hypertension patients.

Materials and methods: A systematic random sampling technique was used to perform a cross-sectional study at an institution with 384 chosen participants. A structured questionnaire was used to collect the socio-demographic, anthropometric, lifestyle, and clinical characteristics of the respondents. Student's t-test, Mann-Whitney test, and Pearson's Chi-square test were employed to compare groups based on the type of data. Furthermore, Bivariate and multivariable logistic regression analyses were performed to identify factors independently associated with dyslipidemia. Crude and adjusted odds ratios and their corresponding 95% Confidence Intervals (CI) were computed. In all cases, statistical significance was declared at $p < 0.05$

Results: The majority (93.2%; 95%CI: 90.6–95.6) of patients had at least one atherogenic dyslipidemia. The prevalence of elevated total cholesterol (TC), elevated triglyceride (TG), raised low-density lipoprotein cholesterol (LDL-c), and reduced high-density lipoprotein cholesterol (HDL-c) were 47.7%, 50.3%, 44.3%, and 59.6%, respectively. Being≥ 40 years were at higher risk for having elevated levels of TC (AOR: 3.22, 95% CI: 2.40–4.32), TG (AOR: 2.30, 95% CI: 1.61–3.79), and LDL-c (AOR: 4.68, 95% CI: 2.0–10.95) than those who were below 40years. Obese participants were more likely to have high concentrations of TC (AOR: 2.57, 95%CI: 2.10–3.22), LDL-c (AOR: 3.13, 95% CI: 1.97–5.10), HDL-c (AOR:2.71, 95% CI: 1.77–4.58), and TG (AOR: 2.23, 95%CI: 1.79–4.16).

Conclusion: This study revealed that a high prevalence of atherogenic dyslipidemia. Thus, to prevent atherogenic dyslipidemia, it is crucial to create routine blood lipid testing programs and carry out suitable intervention programs focused on risk factor reduction.

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Mixed Convection in A Double Lid-Driven Wavy Shaped Cavity Filled with Nanofluid Subject to Magnetic Field and Internal Heat Source

Kakali Chowdhury[1,2] and **Md. Abdul Alim[2]**

[1]*Department of Electrical and Computer Engineering, Presidency University, Bangladesh*
[2]*Department of Mathematics, Bangladesh University of Engineering and Technology, Bangladesh*

A numerical investigation is carried out to analyze the impacts of heat source, solid concentration of nanoparticles, magnetic field, and Richardson number on fluid flow, heat transfer and temperature field in an oppositely directed lid-driven wavy-shaped enclosure. The left and right vertical walls of the enclosure are cooled isothermally and moving with a constant velocity in the upward and downward directions respectively. The bottom wall is wavy shaped and isothermally cooled as the vertical walls while the top wall is kept adiabatic. A rectangular heat source is placed horizontally in the center of the enclosure. A uniform magnetic field is applied in the negative $\chi-$ axis direction normal to the vertical walls. The physical problems are characterized by 2D governing partial differential equations accompanying proper boundary conditions and are discretized using Galerkin's finite element formulation. The study is executed by analyzing different ranges of geometrical, physical and non-dimensional parameters namely, the ratio of heat source length and cavity length, $(0.2 \leq \frac{b}{L} \leq 0.6)$, solid concentration of nanoparticles ($0 \leq \varphi \leq 0.09$), Hartmann number ($0 \leq Ha \leq 70$), and Richardson number ($0.1 \leq Ri \leq 10$). The results indicate that, the ratio of $\frac{b}{L}$ and magnetic field have negative influences whereas the volume fraction of nanoparticle and Richardson number have positive influences on heat transfer. More specifically the result of this investigation show that, the lowest value of the ratio of $\frac{b}{L} = 0.2$ gives the maximum heat transfer rate in the natural convection regime. With the increasing value of *Ha* from 10 to 70, heat transfer rate is decreased by 23% in base fluid but 25% in nanofluid with 6% of copper nanoparticle. Average $N\underline{u}$ is upsurged by 8%, 16% and 24% for nanofluid with solid volume concentration 3%, 6% and 9% respectively in comparison with that of pure base fluid.

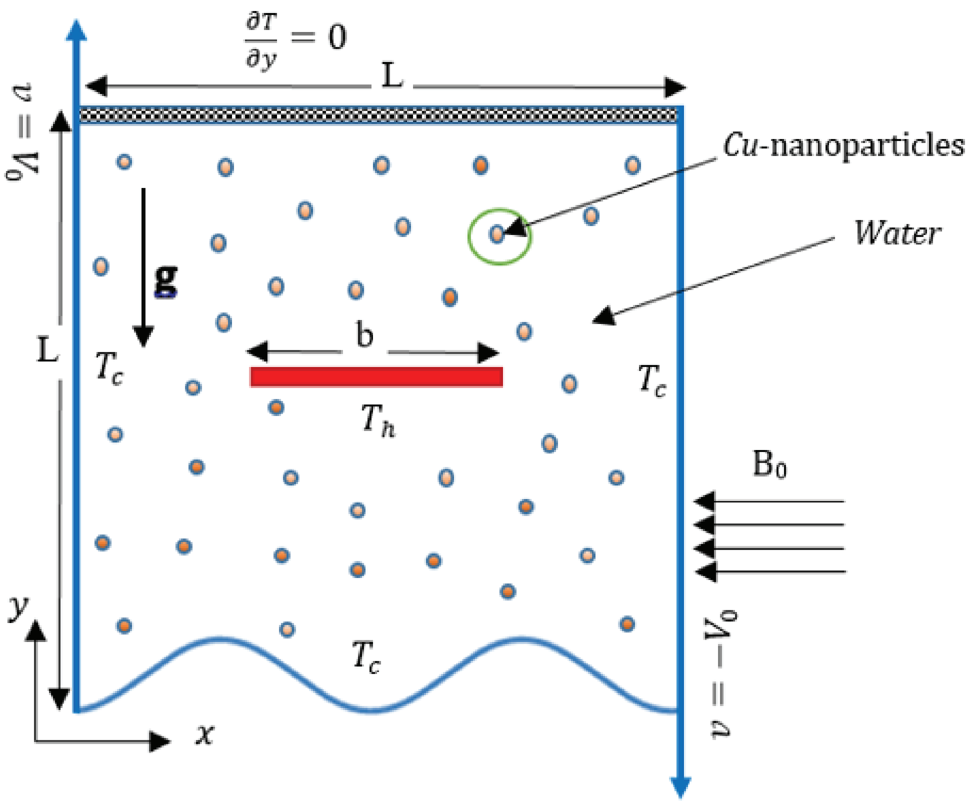

Figure : Schematic diagram with coordinate system

Biography

Kakali Chowdhury is working as a faculty member of Mathematics in the department of Electrical and Computer Engineering of Presidency University, Dhaka, Bangladesh. She obtained her B.Sc. and M.Sc. degree from Rajshahi University, Rajshahi, Bangladesh. She has obtained her M.Phil degree from Bangladesh University of Engineering & Technology (BUET), Dhaka and now she is continuing her Ph.D. degree in BUET, Dhaka also which will be completed very soon within August 2023. Besides teaching, for a long time she is engaged in the research work in the area of Computational Fluid Dynamics more specifically she has her expertise in the area of fluid flow and heat transfer. Recently she has extended her research work to Nanomaterial, Nanofluid and Nanotechnology.

Process Validation of Some Important Pharmaceutical Products in The Light Of cGMP and cGLP

Modhusudan Shome

General Manager & Head of Quality Assurance RANGS PHARMACEUTICALS LTD., Bangladesh

At present the world wide recognized regulatory bodies such as World Health Organization (WHO) and Food & Drug Administration (FDA) stipulate very strict criteria for quality assurance of healthcare products. From these increasing concerns about the quality of healthcare products evolved the concept of Pharmaceutical Validation, which is a modern tool for the assurance of quality of healthcare products. According to the WHO cGMP & cGLP guidelines, EU-GMP and FDA guidelines, Pharmaceutical Validation is a must to ensure the quality of the pharmaceutical products.

Validation is concerned with those aspects such as quality, safety, and efficacy of pharmaceutical products, which may be affected through manufacturing process carried out on any scale. It has become a major pharmaceutical issue throughout the world. Regulatory agencies now expect all pharmaceutical operations to be in a state of validation as a mean of ensuring that products and services are of consistently high-quality day to day, year to year, batch to batch and from one facility to another.

Although Pharmaceutical Validation has become an established norm in the pharmaceutical operations throughout the first world countries, but very few of the Bangladeshi pharmaceutical companies as well as third world countries have adopted this important and effective mechanism in their quality assurance program. And among the very few companies those are trying to follow validation process, almost none has been able to comply with all the elements of the Pharmaceutical Validation Process. Therefore, it is obvious that there is a very good scope to study how the pharmaceutical companies of Bangladesh and other third world countries and their users of healthcare products can be benefited from the adoption of Validation process in the operations of pharmaceutical companies. Therefore, this validation process will be strongly contributed to the overall quality, safety and economy of the healthcare products and consequently human health.

Material & Methods: Process Validation is to be completed mainly in three stages:

A. Stage-1: Process Design

I. Building & Capturing Process Knowledge & Capability

II. Establishing a strategy for Process Control

B. Stage-2: Process Qualification

I. Design of a Facility and Qualification of Utilities and Equipment

II. Process Performance Qualification

III. Process Performance Qualification-Protocol

IV. Process Performance Qualification-Execution & report

C. Stage-3: Continued Process Verification

As an advance study in the earlier-mentioned area would be a significant contribution to the pharmaceutical industries and consequently health sectors.

Biography

Modhusudan Shome has been working as a General Manager & Head of Quality Assurance in the Pharmaceutical Industry of Rangs Pharmaceuticals Ltd., Dhaka, Bangladesh. He obtained his B.Sc. (Honors) and M. Sc. degree from the Rajshahi University, Rajshahi, Bangladesh. He has also obtained his MBA. from (DIU) Daffodil International University, Dhaka, Bangladesh; LL.B. from (UITS) University of Information Technology and Sciences, and PGDPM from the IPM (Institute of Personnel Management), Dhaka, Bangladesh. He has over 30 years of working experience in the field of different manufacturing industry and out of these 30 years, over 27 years of working experience in the field of Quality Operations (Quality Assurance, Quality Control, Research & Development and Regulatory Compliance) of Pharmaceutical Industry. His specialization fields are in the Qualification & Validation and Regulatory Compliance of US-FDA, UK-MHRA, WHO-GMP, EU-GMP, PIC/S and ICH Guidelines.

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Mutagenic and Cancer Risk Assessment of Particulate-Bound Polycyclic Aromatic Hydrocarbons (Pahs) Emitted from Various Biomass Fuels

Anita Lakhani

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This study aimed to evaluate the potential mutagenic and cancer risks associated with particulate-bound Polycyclic Aromatic Hydrocarbons (PAHs) released during the combustion of different biomass fuels. PAHs are known to be hazardous, with the potential to cause cancer and mutations in human DNA.

Samples of smoke generated during the combustion of various biomass fuels were collected and analyzed to detect the presence of 16 priority PAHs. Among these PAHs, 11 were detected in the emissions of the fuels, while the other 5 (Chrysene (Chy), Benzo(b)Fluoranthene (BbF), Benzo(k)Fluoranthene (BkF), Indeno(1,2,3-c,d)Pyrene (IP), and Benzo(g,h,i)Perylene (BghiP)) were found to be below the detection limit. The emission factor for all PAHs was highest for coal (353.08 mg Kg-1), charcoal (27.28 mg Kg-1), and various types of wood.

Additionally, emission rates of total PAHs were measured for each type of fuel, ranging from 0.3 to 5.15 mg h-1. The highest emission rate was observed for bituminous coal, while the lowest was for Polyalthia longifolia.

To assess the potential health risks, a cancer risk assessment was conducted using the Incremental Lifetime Cancer Risk (ILCR) model for different age groups, including infants, children, and adults. The ILCR values derived from the model ranged from 10-11 to 10-6 for all emission samples. Notably, children and adults had higher cancer risk than infants.

Furthermore, the study found a direct correlation between the concentration of PAHs emitted from biomass combustion and their potential to induce mutagenesis in humans. Certain fuels, such as Dung, Bituminous coal, Charcoal, Dalbergia sissoo, Psidium guajava, Ziziphus mauritana, Polyalthia longifolia, and Ailanthus trithesa, exhibited a higher potential for frameshift mutations compared to base-pair mutations.

In conclusion, the findings emphasize the importance of monitoring and controlling PAH emissions from biomass fuel combustion due to their significant mutagenic and cancer risk to human health. Implementing effective measures to reduce exposure to these harmful pollutants can safeguard public health and minimise the adverse effects of biomass fuel emissions.

Optimizing Dye Removal with Anionic Polyacrylamide Hydrogels: A Comprehensive RSM Study on Equilibrium and Kinetics

Imane LEBKIRI, Brahim ABBOU, Abdelhay El AMRI and **Fatima Zahra ADDAR**

Laboratory of Advanced Materials and Process Engineering, Ibn Tofail University, Morocco

In this study, anionic polyacrylamide hydrogels (APAM) were used to remove three dyes, namely Crystal Violet (CV), Methylene Blue (MB), and Safranine (SF), from an aqueous solution. APAM hydrogels demonstrated excellent dye adsorption performance. The objective was to investigate and evaluate the efficiency of dye removal for the three dyes by examining the influence of different parameters: initial dye concentration (A), adsorbent dosage (B), and solution pH (C). As a first step, a customized design (CD) based on response surface methodology (RSM) was used to build predictive models and optimize the reduction of the three dyes. Twenty-six sets of experiments were conducted to assess dye removal performance based on these three parameters. The results revealed that the efficiency of dye removal for all three dyes exhibited similar trends in response to the three parameters. An increase in the initial dye concentration (A) led to a decrease in the removal efficiency, while higher adsorbent dosage (B) and elevated pH levels improved the removal efficiency for all three dyes. Analysis of variance was utilized to study the variables and their interactions. The predictive models showed a strong correlation between experimental and predicted values, with a coefficient of determination (R2) exceeding 0.86 for all three dyes. In addition, the optimal values of the three parameters were verified to maximize the removal efficiency of the three dyes, thereby enhancing the overall quality of the treatment process. In a second step we further investigated the adsorption kinetics and isotherms of CV, MB, and SF onto APAM. The results indicated that the Langmuir isotherm provided the best fit to the experimental data and both the first-order and second-order kinetic models provided a good fit.

Biography

Dr. Imane Lebkiri, hold a Ph.D. in Process Engineering and Environment from Ibn Tofail University. With a remarkable academic journey, she has made significant contributions to her field. Her accomplishments encompass a portfolio of 16 publications that highlight her expertise in various aspects of process engineering and environmental studies. Her research has brought valuable insights to the scientific community and has furthered our understanding of crucial topics in the intersection of engineering and the environment.

Strong Nuclear Interaction and Acquisition of the Mass

V.G. Plekhanov

Fonoriton Sci. Lab., Garon LtD, Estonia

The well-known coefficient - the binding energy of a proton with an electron (13.6 eV) is contained in any book on atomic physics. Being the second particle in the nucleus of an atom, the neutron, whose properties have not been studied as fully as that of the proton. The demonstration of what has been said is the lack of knowledge about the neutron-electron binding energy [1]. We add that the estimate of the radius of action of nuclear forces is obtained from the scattering of 10 MeV neutrons by protons.

This report is devoted to the results of non-accelerator study of strong nuclear long-range interaction in the mass isotope effect by the modern method of low-temperature optical spectrjscopy of condensed matter. This became possible after the discovery that the addition of one neutron causes global changes in the macroscopic characteristics of a solid. The observation of an isotopic shift (0.103 eV) of the zero-phonon line of free excitons in the luminescence spectra of LiH (without strong interaction in the hydrogen nucleus) and LiD (with strong interaction in the deuterium nucleus) crystals was the first and direct evidence of the long-range interaction of the Yukawa potential. Indeed, in both crystals, the lithium ions, the proton and the electron are the same and, therefore, the gravitational, electromagnetic and weak interactions are the same, and the addition of a neutron, according to Yukawa, a strong interaction appears, the influence of which manifests itself in the isotopic shift. These experimental results demonstrate the neutron-electron binding energy (0.105 eV) which is in excellent agreement with the theoretical Breit [2] estimate of 0.1067 eV. It was found that the maximum value of the strong long-range coupling constant in the deuterium nucleus is 2.4680.

Another вright effect of the new physics is associated with the isotopic creation of mass by massless fermions (leptons) in graphene [3]. This mass creation mechanism was predicted more than 15 years ago by B.L. Ioffe [4] for low-energy elementary excitations that do not require huge excitation energies of modern accelerators.

Biography

Professor V.G. Plekhanov has graduated from Tartu State University (Estonia). He obtained Ph. D. (physics and mathematics) 1972 as well as Doctor of Science (physics and mathematics) 1982 – both degrees from Tartu State University. The list of his publication contains more than 200 articles in peer – reviewed journals and more than 25 fundamental reviews in leading journals in English and Russian. He will add that he has written more than ten monographs in different field of physics and quantum informatics. Main interest field: the origin of the mass and natuure of the residual strong nuclear interaction as well as science of the new materials.

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Hydrogen Storage In Porous Ceramic Materials Of Aluminosilicate Composition

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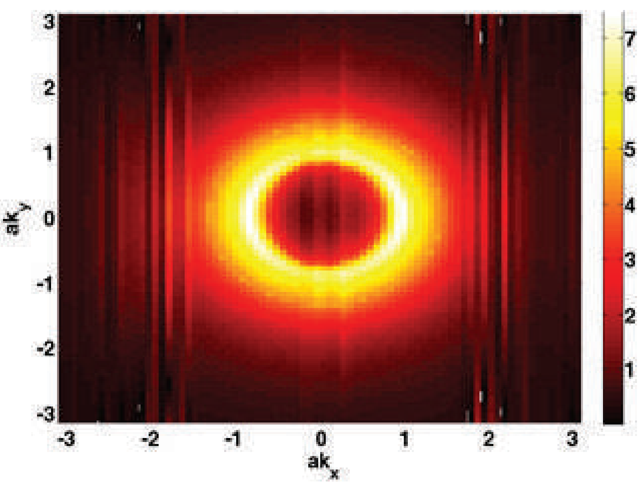
The problem of an adverse effect of human activity on the environment resolves into devising a strategy for development of the economy that relies on renewable sources. In this plan, the center stage is taken by so-called "green hydrogen" based on water electrolysis (splitting water into hydrogen and oxygen) using green electricity, that is, from renewable energy sources, such as, solar energy. Solar energy is considered the most promising source for the unconventional (alternative) energy industry in the conditions of climate change and trend for decarbonization of the global economy, including the transportation and energy industry. The growth rate of the development of the energy industry is hindered by unresolved challenges of hydrogen storage and delivery. Storage of gaseous hydrogen in cylinders of special materials withstanding high pressure (300–700 atm) poses a hazard, while hydrogen storage in a liquid state in special reservoirs (cryostats) under temperatures below $-253^{\circ}C$ is costly. Hydrogen can also be stored in chemically bound state in metals by means of hydrogenation. Of the sought solutions, hydrogen storage by adsorption (physisorption) on light-weight porous materials is the primary research focus. The problem with the majority of adsorbents is that energy of interaction between a solid and gas is too low to retain the desired amount of gas (at least 7 mass %) at ambient temperature. Importantly, if the energy interaction is too high, the efficiency will suffer likewise, since a large amount of hydrogen will be retained by an adsorbent at discharge (pressure charging). Due to their high density, zeolites seem unlikely candidates for on-board storage and delivery of hydrogen. A well-understood crystalline structure and simple ion exchange, however, make zeolites an ideal material for hydrogen adsorbers. These materials can also perform as catalysts, enhancing water splitting, when heated by a concentrated solar stream. Hydrogen storage systems are characterized by aspect ratio which is a ratio of masses of absorbed hydrogen to mass of absorber. When H2 is stored at pressures up to 30–40 MPa, α = 8–10 for cylinders; $\alpha \leq$ 2–3 for metal hydrides. At 10–15 MPa, α = 10–15 for super-cylinders of composite nanomaterials. The majority of the materials allow absorption of not more than 7 or 8 mass % of hydrogen. The use of porous ceramics as absorbers based on physical sorption of hydrogen in the pores by van der Waals forces appears to be one of the safest methods of hydrogen storage. For porous ceramics, the aspect ratio is defined by composition, porosity, as well as grain size of the ceramic material of the absorber. Thus, glass–ceramic materials ($CuMnO_2$) allow hydrogen absorption in the amount of 16g H_2/kg and approximately 50g H2/kg at 473 and 573K, respectively, under a pressure of 20atm.

Is Samarium Hexaboride a Strong Topological Insulator?

Partha Goswami

Deshbandhu College, University of Delhi, India

We show that the compound samarium hexaboride is a strong topological insulator using the eigenvalues of the space inversion operator in the low-energy limit of the periodic Anderson model. Additionally, we assume the presence of the ferromagnetic exchange interaction(M). A Dirac cone like feature in the surface state energy spectra is observed for M =0 in a certain parameter range. For M≠0 there is no Kramers degeneracy. By calculating Berry curvature and the Chern number we have been able to show that M≠0 corresponds to the quantum anomalous Hall state. In the figure below we have shown the Berry-curvature in the z-direction for M=0.08 as a function of the dimensionless wave vector components. We further show that the access to a novel state with broken time reversal symmetry (TRS) is possible due to the normal incidence of circularly polarized optical field on the surface of the compound despite M = 0. In this light-matter interaction case, we also show that the novel TRS-broken phase corresponds to the quantum spin Hall insulator state by calculating the spin Chern number.



Contour plot of the Berry-curvature in the z-direction for M=0.08 as a function of the dimension-less wave vector components ak_x and ak_y

Biography

Partha Goswami, M.Sc., M.Phil, and Ph.D. from University of Delhi, is an Associate Professor in Physics in Deshbandhu College, University of Delhi, India. He had completed his Ph.D. work at the age of thirty and masters at the age of 24. He had done his graduation, with first class first position, from St. Xavier's college, Ranchi. He has been teaching ADVANCED QUANTUM MECHANICS, MATHEMATICAL PHYSICS, and SOLID STATE PHYSICS to B.Sc. (Physics Hons.) students for the past thirty five years. His area of specialization is Condensed Matter Physics (Theory) and Material Science. Currently his area of interest are the conventional and higher order topological insulators. He has thirtyeight research papers to his credit, mostly under sole authorship, published in prestigious journals of Physics, such as Phys. Rev.B.

PEERS ALLEY MEDIA

Characterization And Optimization of Process Parameters of DLP Based Stereolithography

Baban K. Suryatal[1], **Suhas P. Deshmukh**[2] and **Sunil S. Sarawade**[3]

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[2]*National Council for Vocational Education and Training, India*
[3]*Mechanical Engineering Department, MES Wadia College of Engineering, India*

The low cost DLP based stereolithography system is developed to build 3D objects from the liquid photopolymer. The DLP projector is used as a UV light source and DMD chip already present in the projector is used as a dynamic pattern generator. The light beam from DLP projector passed through the focusing lens and then projected on a layer of liquid photopolymer which is settled on the platform. The liquid resin layer is solidified by photo-polymerization process and thus 3D objects are fabricated by layered manufacturing technique. The experimental results are validated by characterizing the process parameters. The process parameters are characterized by using the method of least square which is the inbuilt function in the MATLAB software, and a separate code is developed for the same. A good correlation is observed between the experimental values and numerical results. The maximum dimensional error difference between the experimental and numerical methods is 9.94%. The MATLAB code is also written for the optimization of the process parameters by using fminunc function and gradient descent algorithm. The best set of parameter values is found and it is observed that the optimized values are close to the experimental values. The maximum difference observed between the experimental and optimized values is 9.13%. The novelty of this work is that the medium-scale 3D components are successfully fabricated with good accuracy, build speed and resolution. The methodology developed for the characterization and optimization of process parameters can be applied to any newly designed SLA system.

Biography

Dr. Baban K. Suryatal is presently working as Associate Professor in Mechanical Engineering at Pune District Education Association's College of Engineering, Manjari Bk, Pune, Maharashtra, India. He has completed B. E. (Mechanical Engineering) from Government Engineering College, Dr. Babasaheb Ambedkar Marathawada University, Aurangabad, in 1995. Then, M. E.(Mechanical – Design Engineering) from VIT, Pune, in 2010. Then Ph. D. (Mechanical Engineering) from Savitribai Phule Pune University, Pune, in 2023. He has total 24 years teaching experience and 4 years industrial experience. His research area includes additive layered manufacturing, stereolithography, design engineering, fatigue analysis of non-linear materials etc. He has presented several papers in International Conferences. He has also published several research papers in peer reviewed journals like Elsevier, Springer publications. He has completed research projects funded by Savitribai Phule Pune University, Pune. He has awarded best paper prize at 22nd Rubber Conference, New Delhi, India, in 2014organized by IRMRA, Thane.

Inclusion Membranes for The Facilitated Extraction and Recovery of Co (II)And Ni (II) Ions Form Acid Medium

Zakaria Habibi[1], S. MAJID[1], Y. CHAOUQI[1,2], M. HLAIBI[1] and **K. TOUAJ[1]**

[1]Laboratory of Materials Engineering for Environment and Valorization (GeMEV), University Hassan II, Morocco
[2]Laboratory of Research on Textile Materials (REMTEX), ESITH Casablanca, Morocco

The growth of the lithium-ion battery industry requires a secure supply of raw materials and proper management of end-of-life batteries.

Functional recycling of lithium-ion batteries would meet both economic and environmental needs. It would ensure the continued availability of cobalt and nickel for industrial applications and allow waste reduction. The majority of heavy elements are toxic and harmful to living organisms, even at low concentrations.

For this work, we prepared two Polymer Inclusion Membranes (PIMs), based on the polymer support Polyvinylidene difluoride (PVDF) and two extractive agents: Trioctylphosphine oxide(TOPO) andTrioctyl amin(TOA).

These membranes were characterized and have adopted to achieve the oriented processes for the facilitated extraction and recovery of Co (II) ions. The obtained results were used to determine the values of different parameters: macroscopic permeability (P), initial flux (J0) and microscopic apparent diffusion coefficient (D*) and association constant (Kass) relating to the substrate movement through the membrane. The influence of several factors, initial substrate concentration, acidity and temperature (C0, pH, T) was studied. The results indicate that the various parameters (P, J, D* and Kass) vary greatly with the temperature of the medium and the performance of the used membrane increases with temperature factor. Similarly, these studies made it possible to determine the values of activation parameters, (Ea, $\Delta H^{\neq}$ and $\Delta S^{\neq}$), and to elucidate a mechanism by *successive jumps of Co (II) ions on fixed sites* of the immobilized extractive agent molecules in the membrane phase.

Finally, we treated the filtrate of a type of Li-ion battery because we relied on the same membrane which showed good results in the first experiments.

Technical And Economic Investigation of Stabilized Clayey Track with RRP235special

Hossein Ghorbani Dolama[1], **Jabbar Ali Zakeri**[2], **Morteza Esmaeili**[3] and **Parham Hayati**[4]

[1]*Department of civil engineering, Islamic Azad University, Iran*
[2]*School of railway engineering, Iran University of Science and Technology, Iran*
[3]*School of railway engineering, Iran University of Science and Technology, Iran*
[4]*Department of civil engineering, Islamic Azad University, Iran*

Construction of transportation facilities on the clayey soft soil has high investment costs. Significant maintenance cost and time-consuming operations have been encountered due to presence of clay. Using the Royal Road Product (RRP235 Special), as an innovative method for the first time, the layers underneath the sleeper have been replaced with the clayey subgrade stabilized with RRP 235 special. A series of static and dynamic lab experiments such as Maximum Compaction test, California Bearing Ratio, Unconfined Compressive Strength, Brazilian Indirect Tensile test, Direct Shear Strength, and Uniaxial Cyclic tests were carried out. Samples with different dosages of additive were made, and an optimal percentage was found. As a result, the sample with 0.15 lit/m3 RRP235 Special was determined as the suitable dosage in terms of mechanical and physical tests, while only in the Maximum Compaction test, by increasing the additive, the optimum water content decreased. The use of this method will reduce the need for raw materials and, as a result, decrease the environmental impacts. Also, due to the use of in situ materials, the costs of transportation will be significantly reduced. Evaluations illustrated 20 to 60 percent construction costs reduction.

Biography

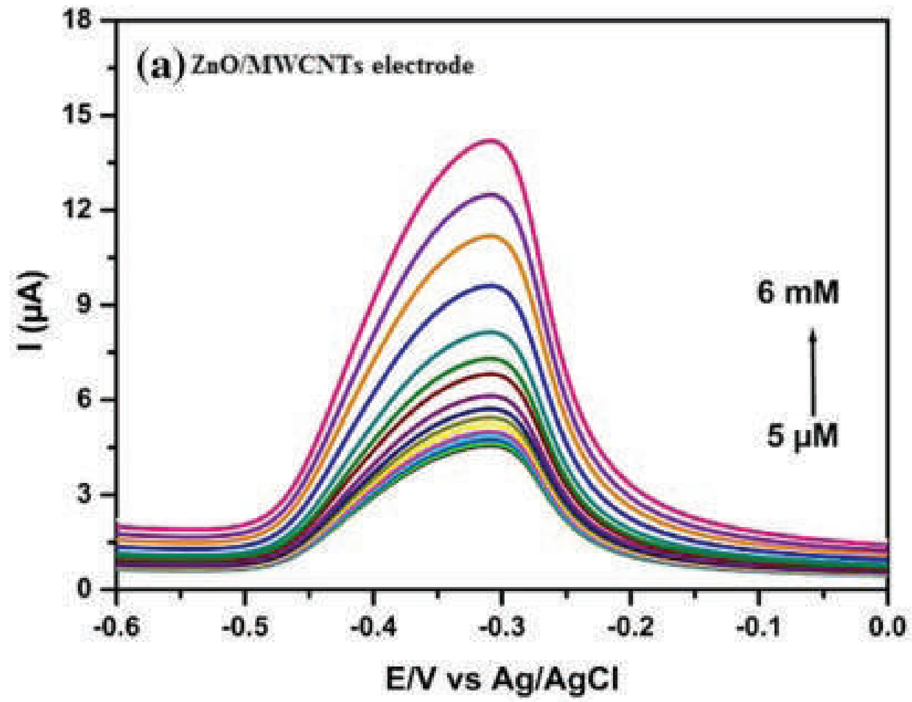
Hossein Ghorbani Dolama starts his education in civil engineering and graduated at the top of his class and pursued high education in transportation with expertise in Monorail in master course. This procedure continued by high speed railway investigation. A novel innovative track was introduced during PhD course for ballasted railway. Fortunately, these studies have occurred using chemical additive, RRP235special. He has tried to make cheaper and better infrastructure with less maintenance (cost and time), no environment impact. The gained experience in different professional positions in consulting engineers and civil projects, such as supervising engineer, project manager, lecturer in university and designer, has increased the richness of the research.

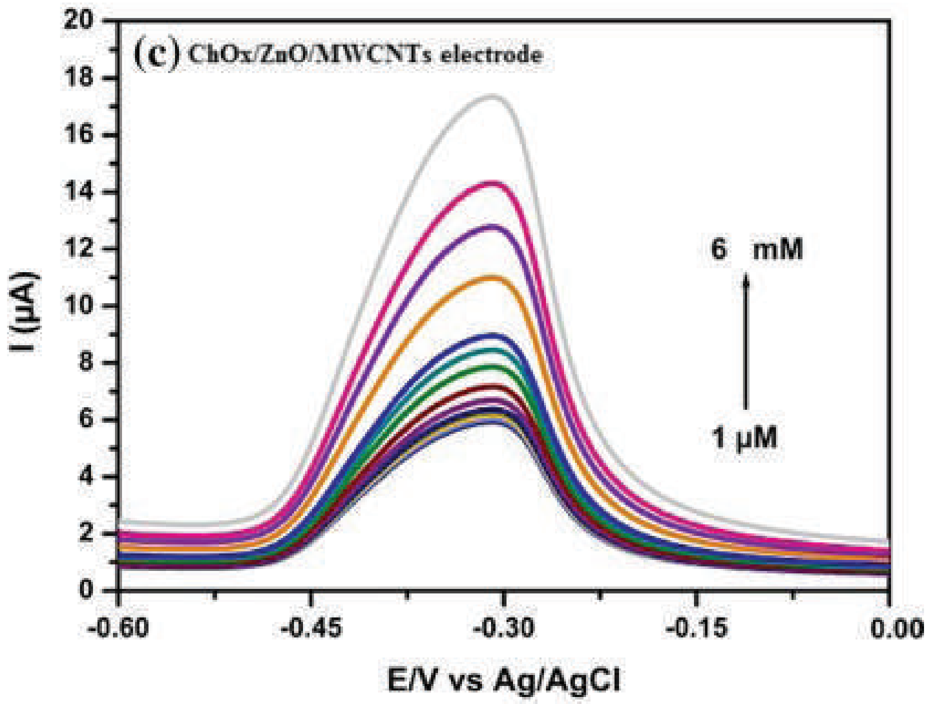
Loading Zinc Oxide Nanoparticles on Carbon Nanotubes for The Electrochemical Measurement of Blood Cholesterol

Davood Ghanei Agh Kariz, Elham Darabi and **Seyed Mohammad Elahi**

Department of Physics, Islamic Azad University, Iran

Cholesterol ($C_{27}H_{46}O$) is one of the most important biomolecules and is one of the essential components of body. Its major role is to provide strength and flexibility to the biological membrane of cells and is present in several nerve tissues, brain and also serves as a source for preparation of fatty acids. Despite the undeniable importance of cholesterol, the excessive amounts of it can be dangerous for human health. Biocompatible nanomaterials open a promising field toward the development of enzyme-based electrochemical biosensors. Sensors based on carbon nanotubes (CNTs) have shown excellent performance in determining biomolecules such as cholesterol, and many others. In this work, a new sensitive enzyme-based electrode for electrochemical cholesterol biosensor was fabricated based on a nanocomposite of Au nanoparticles, ZnO nanoparticles and multi-wall carbon nanotubes (ZnO/MWCNTs). The nanocomposite was prepared by sol–gel method and deposited on FTO substrate by dip coating, followed by cholesterol oxidase (ChOx) enzyme immobilized (ChOx/ZnO/MWCNTs). Structural properties and morphology of the nanocomposite have been studied using X-ray diffraction (XRD) and Field emission scanning electron microscopy (FESEM). The sample was subjected to Fourier transform infrared spectroscopy (FTIR) to determine functional groups. Electrochemical behavior of the electrode was studied by cyclic voltammetry (CV) and differential pulse voltammetry (DPV) techniques as a function of cholesterol concentration. Electrochemical impedance spectroscopy (EIS) was also considered to study of surface modified electrodes. The ChOx/ZnO/MWCNTs electrode has been found to have enhanced electron transfer and display excellent analytical linear performances. The fabricated electrode exhibited low detection limit (1 μM), high sensitivity (12.49 μA/μM) evaluated from DPV data in the detection range of 0.1–100 μM and high selectivity in the determination of cholesterol over glucose and uric acid. The application of the ChOx/ZnO/MWCNTs electrode in detection of cholesterol in human serum was also confirmed.


(a) ZnO/MWCNTs electrode
6 mM
5 μM
I (μA)
E/V vs Ag/AgCl
18
15
12
9
6
3
0
-0.6
-0.5
-0.4
-0.3
-0.2
-0.1
0.0


(c) ChOx/ZnO/MWCNTs electrode
6 mM
1 μM
I (μA)
E/V vs Ag/AgCl
20
18
16
14
12
10
8
6
4
2
0
-0.60
-0.45
-0.30
-0.15
0.00

Applications Of FTIR And Chemometrics Methods In Authenticity Analysis Of Walnut Oil

MOULOUDA El Mouftari[1], **I. Essafi**[1], **A. Khalidi**[2], **F. Kzaiber**[1], **Gomaa A. M. Ali**[3], **F. Z. Mahjoubi**[1] and **A. Oussama**[1]

[1]*Université sultan Moulay Slimane, Laboratoire d'ingénierie et de Technologies Appliquées (LITA), Morocco*
[2]*University Hassan II, Laboratoire de Chimie Physique et de Chimie Bioorganique, Morocco*
[3]*Chemistry Département, Al-Azhar Université, Egypt*

This study focuses on detecting and evaluating the adulteration in nut oil, which can cause health and food dangers. The two adulterants used during this study are cheaper vegetable oils and present a similar property with walnut oil, sunflower oil with a falsification percentage of 5.80–31.95%, and rapeseed oil with 4.33–29.37%. This adulteration was studied using Fourier transform infrared spectroscopy (FTIR) coupled with chemometrics, a new and specific approach. The spectra of the studied samples were determined by FTIR and were analyzed by PLSR and PCR with two sorts of pretreatment, normalization, and first derivation. The results showed different functional groups of the nut oil. The most appropriate pretreatment that provides reliable calibration values (RMSE) and prediction (RMSEP) is the normalization preprocessing in the range of 3050 to 700 cm^{-1}. The chemometrics results give the best model selected in the PLSR with an $R2$ of 0.998 for sunflower oil and 0.999 for rapeseed oil. According to this study, we have solved nut oil falsification by developing a chemometrics model that can detect and evaluate this adulteration.

Electronic, Magnetic and Elastic Properties of Hexagonal Ymno3 Oxide at High Temperature: Insights from Ab Initio Study

A. Chadli[1], **I. Chadli**[2] and **B. Lagoun**[3]

[1]Larhyss Laboratory, University of Biskra, Algeria
[2]Material Sciences Department, University of Biskra, Algeria
[3]Physico-Chemistry of Materials Laboratory, University of Laghouat, Algeria

The h-$YMnO_3$ compound at high temperature in the paraelectric phase, which has hexagonal centro-symmetric structure and conform to the P63/mmc space group, has been investigated using generalized gradient approximation (GGA), the density functional theory (DFT) and the full-potential linearized augmented plane wave method (FP-LAPW) implemented in the Wien2k code in the ferromagnetic ordering (FM). The mechanical stability, the electronic, magnetic, elastic and anisotropic properties have been investigated after the well-optimized structure. The agreement of our calculations including internal atomic relaxations, with the experimental data is very good. The spin-polarized electronic band structure exhibit metallic behavior using GGA approximation with band gap equal to zero, while a semi-conductor band structure is observed including the modified Beck-Jonson approach (TB-mBJ) with a low band gap equal to 0.4 eV. Exclusively, the total magnetic moment of h-$YMnO_3$ is carrying by the Mn atoms. Its value is equal to 3.634 μB and 3.632 μB per formula using the both approximations GGA and GGA+TB-mBJ, respectively. Moreover, the calculated elastic constants verify that our material is stable mechanically satisfying the Born stability criteria. The estimated anisotropy factors show that h-YMnO3 has a strong anisotropic character. Other relevant quantities namely bulk and shear moduli, compressibility (β), Young's modulus (Y), Poisson's ratio (v) and Lamé coefficients (μ, λ), are performed.

Biography

Abdelhakim CHADLI, Professor of Chemistry at the University of Mohamed Khider of Biskra, Algeria since December 2010 and member of the LARHYSS research laboratory since 2016. He obtained his baccalaureate at the Lycée Mohamed Belounar in Biskra in 2001, and his magister in theoretical chemistry at the University of Biskra in 2008 in collaboration with Professor Jean-Yves Saillard from the University of Rennes1 in France ; then the doctorate in physical chemistry at the University of Laghouat, Algeria in 2019. His thesis work was the ab initio study of the properties of some mixed oxides with RMnO3 formulas.

Controlled In-Line Cooling Setup for Heat Treatment of Pearlitic Rail Steels

M. Kalyan Phani

Department of Metallurgical Engineering, OP Jindal University, India

Recent trends in railway transportation have been focused on enhancing axle load capacity and increasing operational speed. As a result, rail steel is being subjected to more rigorous operating conditions. An essential goal in the advancement of new rail materials is the enhancement of their wear resistance. By employing head-hardened rails and implementing a suitable maintenance strategy, a notable reduction in overall life-cycle expenses can be achieved. Aligned with the Government's "Make in India" initiative, JSPL has successfully implemented a Head Hardened Rails system. As the exclusive manufacturer of Head Hardened Rails in the nation, JSPL is positioned to play a pivotal role in the expansion of India's rail infrastructure. The pioneering installation of the first-ever rail head hardening technology in India was initiated at Jindal Steel and Power Ltd, Raigarh.

To facilitate the optimization of the unit installed at JSPL's rail rolling mill, a "Rail Head Hardening prototype" system was devised. A similar controlled cooling process was executed on the rail cooling rig, involving extensive research, numerous trials, and the application of various customized cooling protocols. These efforts aimed to attain the desired microstructure and hardness distribution across the rail head with exceptional precision and operational adaptability. This article outlines the fundamental concepts behind Rail Cooling Rig Design and empirically investigates the impacts and interplay of the primary factors governing the cooling process.

Beyond The Environmental Kuznets Curve: Do Combined Impacts of Air Transport and Rail Transport Matter for Environmental Sustainability Amidst Energy Use in E7 Economies?

Benjamin Ampomah Asiedu and **Bright Akwasi Ghyamfi**

Cyprus international university, Cyprus

Beyond the environmental Kuznets curve: Do combined impacts of air transport and rail transport matter for environmental sustainability amidst energy use in E7 economies?

This study is motivated by the United Nations Sustainable Development Goals (UN-SDG-7,8,11,12 and 13) on the need for clean and responsible energy consumption in view of anticipated actions for environmental sustainability. The world has been plagued with various consequences of environmental degradation including the attendant risks of climate change which has been exacerbated by rising greenhouse gas (GHGs) emissions over the years. To this end, we explore the combined effect of rail, air transportation, and urbanization in an EKC framework for the case of the E7 economies between 1995 and 2016. This study distinguishes itself from the extant ones by extending the EKC framework to explore the nexus between air transport, rail transport, urbanization, and the environment. The empirical evidence obtained from the study is based on second-generation panel econometric methods that are robust to heterogeneity and cross-sectional issues. Firstly, the findings lend support to the EKC phenomenon for E7 economies, thereby, implying that emphasis is placed on higher-income status in the bloc relative to environmental sustainability. Secondly, conventional energy from fossil fuel and air transport significantly dampen environmental quality among the E7 economies. Thirdly, rail transport and urban population, on the contrary, strongly aid the improvement of environmental quality among the E7 countries thus underscoring the significance of green urban mass (rail) transportation to the environmental sustainability agenda. Hence, in view of the economic growth trajectory among the E7 economies, useful policy blueprints were highlighted in the concluding section of the study.

Biography

Master Benjamin Ampomah Asiedu, student Cyprus international University, North Cyprus and graduated as MBA in 2018. He then joined the research group of Prof. Murald Bein at the institute of administration and economics. Benjamin is currently a PhD student. After two years of his studies, he has published many articles and a chapter.

Effect Of Tib2 Particles on The Morphological, Mechanical and Corrosion Behaviour of Al7075 Metal Matrix Composite Produced Using Stir Casting Process

J. Suresh Kumar[1] and **K. Kalaichelvan**[2]

[1]*College of Engineering, Anna University, India*
[2]*Alagappa College of Technology, Anna University, India*

Aluminium metal matrix composites are lightweight high-performance materials mostly applicable in aerospace, automobile and marine applications. In this study, the morphological, mechanical and corrosion behaviour of Al7075 metal matrix composites were investigated to find the effect of reinforcement of TiB_2 particles for various weight percentage. Al7075-TiB2 composites were developed by reinforcing the 3–5 μm size TiB_2 ceramic particles using stir casting process. The particles with different weight percentage of 2, 4, 6 and 8 were uniformly reinforced with the help of the mechanical stirrer. The energy dispersive X-ray diffraction (EDAX) pattern confirms the presence of TiB_2 particles in the composites. SEM and optical microstructures clearly revealed the uniform distribution of TiB_2 particles in the aluminium matrix. The additions of TiB_2 particles enhance the tensile strength and micro hardness due to the strong interface and load sharing between the matrix and the reinforcement particles. Dry sliding wear test was conducted by varying the applied load and sliding distance. SEM microstructure of worn surfaces shows that addition of TiB_2 particles decreases the wear rate due to the presence of stiffer and stronger reinforcement particles. The electrochemical potentiodynamic polarization and salt spray test were also conducted to study the corrosion behaviour of the Al-TiB_2 composites. SEM microstructures confirm the occurrence of pitting corrosion and shows that addition of TiB_2 particles improves the corrosion resistance.

Biography

Suresh Kumar is currently working as a Faculty Member in the Department of Mechanical Engineering, College of Engineering, Guindy, Anna University Chennai. He has teaching and research experience of more than 15 years in the field of Nano materials, Additive manufacturing, Advanced Machining and composite structures. He published more than 20 publications in various international journals and conferences. He completed his doctorate in the area of Aluminium honeycomb core sandwich structure and masters in Manufacturing Engineering.

Ionic Conductivity of B_2O_3-Nasicon Type Glass-Ceramics

Nedjemeddine. BOUNAR and **Abdelali. BENZAID**

University of Jijel, Algeria

The glass-ceramics belonging to the Li_2O-SnO_2-P_2O_5 system were prepared by adding different amounts of B_2O_3. The starting glasses were obtained by the melt-quenching technique and the glass-ceramic samples were then, prepared by a one-step heat treatment. The glass-forming ability of the glass starting materials, the crystallisation tendency and the ionic conductivity of the corresponding glass-ceramics were also examined. The glass-ceramic samples were then examined by X-ray diffractometry, differential thermal analysis, and electrochemical impedance spectroscopy and scanning electron microscopy. According to the results, the addition of 2.0 mol % B_2O_3 to the glass composition resulted in a large increase in ionic conductivity at room temperature. Thus, the overall conductivity of the ''heat-treated at 900 °C for 6 h'' sample was measured to be 1.67×10^{-3} S.cm^{-1} , which is 8 times higher than that of the base glass-ceramic without additive. The increase of B_2O_3 amount reduced the conductivity and crystallinity of the glass ceramic.

Biography

Nedjemeddine BOUNAR was born in 1969 in Jijel, Algeria. He is a research teacher at the University of Jijel and currently a full Professor. He is Vice-Rector for External Relations, Cooperation, Communication and Scientific Events.

Nedjemeddine BOUNAR has authored and co-authored several national and international publications and working as a reviewer for reputed professional journals.

Nedjemeddine BOUNAR is working on the development of materials and systems for electrochemical energy storage. His research focuses on the basic understanding and development of materials for high-energy batteries and full cells. The goal is to create sustainable energy storage systems from environmentally friendly and available materials and processes.

5th Edition of
Advanced Chemistry World Congress
March 25-26, 2024

Removal of Remazol Black B, Cationic Brill Red-X and Acid Erionyl Yellow Dyes from Aqueous Solutions Using Chitosan Grafted Copolymres

Fariborz Azizinezhad

Department of Chemistry and Chemical Engineering, Islamic Azad University, Iran

Chitosan(CTS) graft copolymers were synthesized using a mixture of monomers, itaconic acid (IA) - methacrylamide (MAm) and a mixture of itaconic acid (IA) - methacrylamide (MAm) - bentonate in the presence of primer 4, 4 Azobis 4-cyanovalric acid (ACV) and ethylene glycol dimethacrylate (EGDMA).

Characterization of both copolymers was accomplished by XRD, FTIR and SEM methods.

The copolymers were used for adsorbtion of acid erionyl yellow (AEY), cationic brill red-x (CBR) and remazol black b (RBB). For all dyes, the important adsorption parameters including pH, adsorption time, adsorbent concentration and adsorbent amount were optimized. The results showed that the tendency to absorb CBR and RBB dyes is more than AEY dye. The best adsorption conditions were recorded for CBR (pH = 2.0, time = 60 min , [CBR] = 300 mg/L, adsorbent = 0.03 g , q_{max} = 538 mg/g).

The important and well-known Langmuir isotherm models and the pseudo-second-order model were well consistent in the CBR adsorption study.

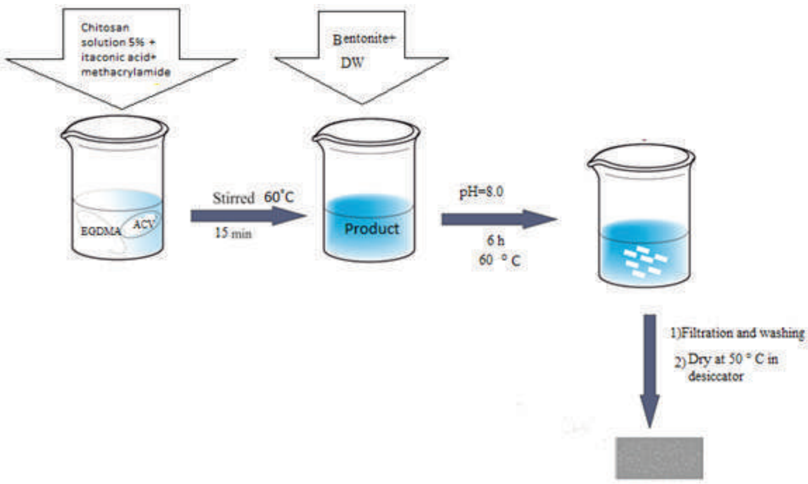


***Fig1.**Schematic diagram of graft copolymerization of chitosan with itaconic acid, methacrylate and bentonite*

Biography

Fariborz Azizinezhad is graduated in applied chemistry in 1992 and in 1997 he graduated in master degree in polymer and worked on PET fiber grafting and completed his PhD in 2 fields of fiber grafting and surface chemistry. He participated in various international congresses such as PPS-21, 22, 26, 27 and. He has published more than 63 articles and he has guided many students in master's and doctorate degrees. His activities are related to the synthesis and characterization of new polymers and MIPs, surface chemistry and surface adsorption, kinetics and mechanisms of polymer reactions, and he worked as a member of the scientific faculty of chemistry and chemical engineering.

An Intensity-Modulated Optical Fiber Sensor with Sol Gel Coating for Measurement of Refractive Index

Jayprabha Vishal Terdale

A.C. Patil College of Engineering, India

The refractive index (RI), which represents the substance's optical characteristics, is a vital optical measurement. The principle of operation is based on intensity modulation, evanescent field and scattering of light. The intensity modulation sensors are popular for their accuracy and ruggedness. They require inexpensive non-coherent source such as Light Emitting Diode (LED). The modulation of optical light intensity in the sensor happens as a collective effect of combination of agarose and chitosan sol gel coating on the cladless sensing region, sensing length, and analyte's (sucrose solution) RI profile surrounded to the coating. A unique aspect of the developed sensor is the analysis of sensor performance is done by immersing the coated sensing region of the sensor in the prepared sucrose concentration. The samples of different concentrations of sucrose in distilled water were prepared for different refractive indices and measured by Abbe's refractometer (DR-194). Due to the absorbance, scattering and pore size of agarose and chitosan coating, sensitivity of the sensor is enhanced with the coating on the claddless core with polishing depth of 250 μm. The experiments were carried out for the clad removed fiber with and without sol gel coating. Sensor with combination of 20% of agarose and 80% of chitosan coating and 2 cm sensing region at higher wavelength (RED LED) has shown better sensitivity as compared to all other fabricated sensors. The sensor has shown good reproducibility. The coating is formed with the sol-gel technique. The microcontroller-based optical bench is designed to ensure that the intensity of light source remains stable. The Electrical to Optical convertor is vital for maintaining the light source's stability. It boots the fidelity in the sensor output. The optical test bench helps in eliminating the effect of dark current and stray radiations. This sensor is biocompatible, tiny and inexpensive.

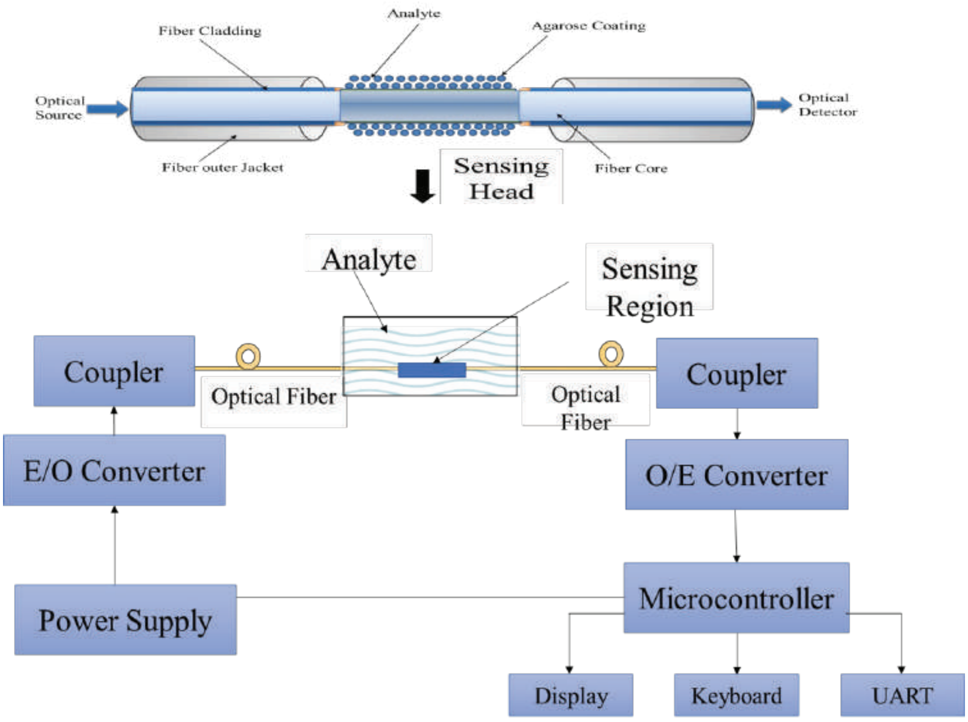


***Fig. 1** Experimental Set up of RI Sensor structure showing clad removed core coated with combination of Agarose and Chitosan coating surrounded by sucrose solution.*

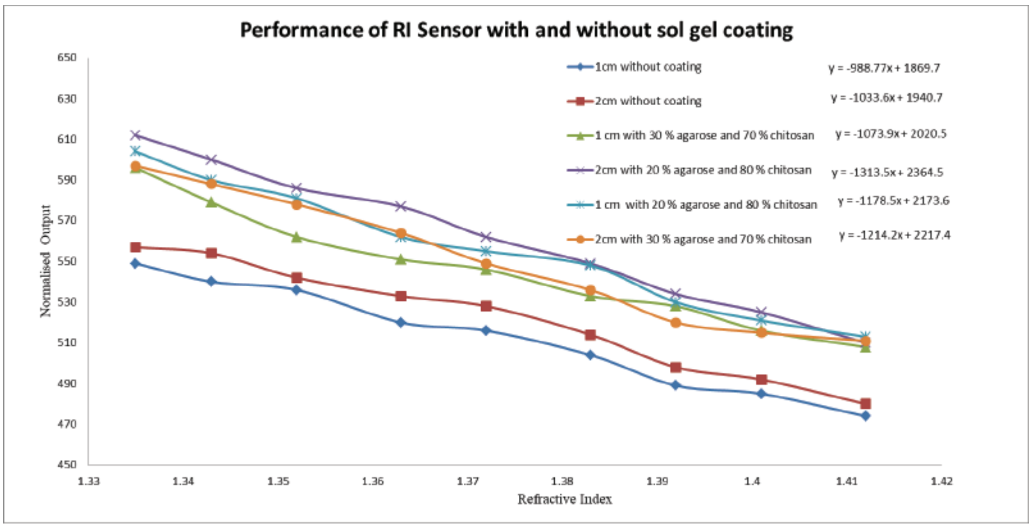


***Fig 2.** Performance of RI Sensor for RED LED (Higher wavelength) with and without Sol gel coating*

Biography

Dr. Jayprabha Vishal Terdale is an academician and researcher in the field of Electronics and Telecommunication Engineering, currently serving as a prominent faculty member at the A. C. Patil College of Engineering. With an illustrious career spanning over 18 years, Dr. Terdale has done significant contributions to both teaching and research. Dr. Terdale's expertise lies at the intersection of various cutting-edge technologies, including Fiber Optics Sensors, Internet of Things (IoT), Image Processing, and Machine Learning. She has actively participated in numerous Scopus indexed IEEE International Conferences, showcasing her commitment to staying updated with the latest developments in her field. Additionally, her scholarly impact extends to more than 10 credited papers presented at international conferences and published in esteemed ESCI and Scopus indexed journals. She is also reviewer in many IEEE conferences and international journals.

Photocatalytic Degradation of Rhb Dye Using Hybrid Nanocomposite Biocl@Kaol Under Sunlight Irradiation

Hamza Ighnih[1], **Hassan Ouachtak**[1], **Amane Jada**[2,3] and **Abdelaziz Ait Addi**[1]

[1]*Laboratory of Organic and Physical Chemistry, Ibn Zohr University, Morocco*
[2]*Institute of Materials Science of Mulhouse (IS2M), Haute Alsace University, France*
[3]*Strasbourg University, France*

The development of advanced photocatalytic materials for environmental purposes is among the high research topics. In the present work, a nanocomposite BiOCl@Kaol, made of kaolinite supported Bismuth Oxychloride "BiOCl" photocatalyst, was designed for Rhodamine B dye photodegradation in aqueous solution. The obtained BiOCl@Kaol nanocomposite exhibited high photocatalytic activity in the removal of Rhodamine B dye (RhB) from water, with a degradation efficiency reaching 100 % within 35 min. Furthermore, it was observed that the nanocomposite photocatalyst, BiOCl@0.4Kaol, at optimal Clay/BiOCl ratio of 0.4, exhibited 4.37 times better photocatalytic performance, compared to bare BiOCl. Finally, to elucidate the photodegradation mechanisms, we determined various interactions occurring between BiOCl and kaolinite particles, as well as between RhB molecules and BiOCl@Kaol nanocomposites, using Monte Carlo calculations. It was concluded from Monte Carlo calculations that hydrogen bonds were established between oxygen atoms of BiOCl and H of kaolinite (001) hydroxyl groups upon the adsorption of BiOCl (003) particles on the kaolinite (001) surface, owing to its high negative interaction energy. Meanwhile, van der Waals attraction was also established between the RhB mole- cules and the BiOCl@Kaol (001) surface.

Biography

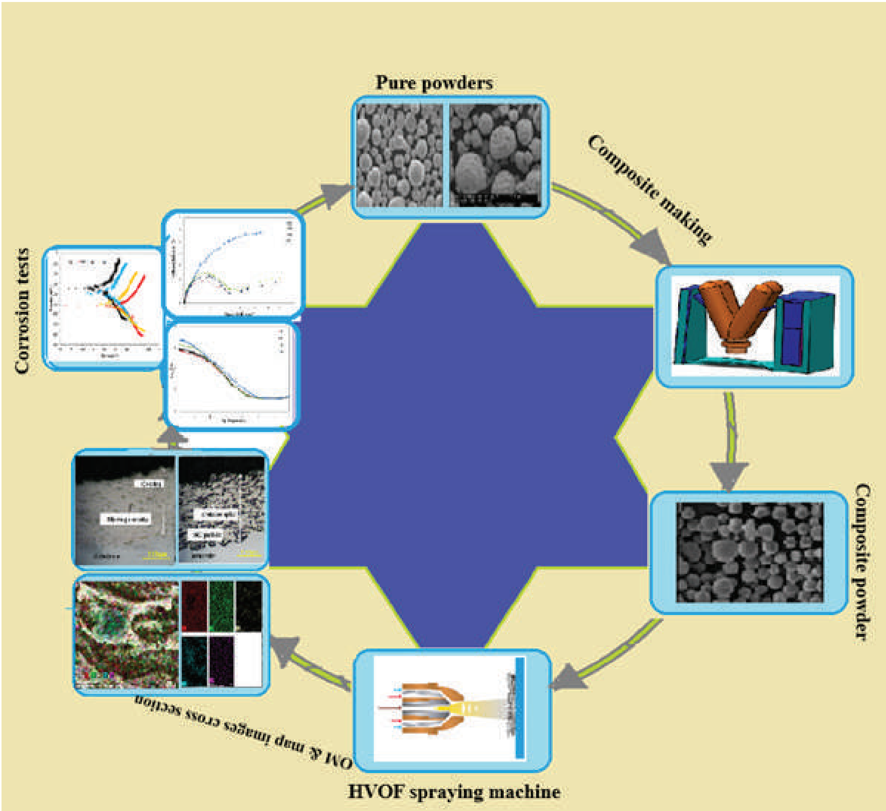
Dr. Hamza Ighnih is from the Faculty of Sciences, Ibn Zohr University, Agadir and is in the third year of his doctoral studies. Dr.Hamza Ighnih is expert in the Materials Chemistry and has published 9 articles in the international journals about the related fields. Dr.Hamza Ighnih actively participated in many international conferences, shared his views and played an active role in the conferences, including a conference just concluded----National days for doctoral students and young researchers CNRST-Rabat, Morocco, 21, 22 July 2023. He also participated in several project researches in related fields and accomplished the project tasks excellently..

An Investigation on Microstructural and Electrochemical Characteristics of NiCrBSi/WCCoCr Composite Coatings in 3.5% NaCl Solution

Freshteh Sadaat Keshvari Tabatabaei[1], **Behrooz Ghasemia, Omid Mirzaeea, Mahboobeh Azadi**[1] and **Seyed Saeed Keshvari Tabatabaei**[2]

[1]*Faculty of Materials and Metallurgical Engineering, Semnan University, Iran*
[2]*Department of Mechanical Engineering, Arak University, Iran*

In this paper, the electrochemical behavior of NiCrBSi coatings reinforced by WCCoCr particles in 3.5% NaCl solution is investigated. These coatings were made by the High-velocity oxygen fuel spraying (HVOF) process. The content of reinforcement particles was a variable that affected the characteristics of composites coatings. The microstructural evaluations were done by utilizing the field emission scanning electron microscopy (FESEM) and optical microscopy (OM) techniques. The electrochemical tests were used to study the corrosion behavior of these composite coatings. The FESEM images showed that WC particles were distributed homogeneously in the matrix that contained the different sizes of stretched splats. Based on Tafel polarization results, NiCrBSi coatings reinforced by 15% wt WCCoCr particles showed lower corrosion rates with respect to other coatings. When the content of reinforcement particles increased in the matrix the corrosion current densities increased. This event was due to the increase in the porosity of coatings. The electrochemical impedance spectroscopy (EIS) test result showed that the increase in the corrosion resistance of composite coatings was about 23.4-75.2%. This behavior was due to the increase in the chromium and cobalt phase in the matrix which formed the oxide layers and acted as a passive layer in the corrosive solution.



Biography

She is a master's student in materials engineering from Semnan National University. Since 2011, I have 3 years of experience in various scientific fields, including nanotechnology. She had the honor of being the vice president of supervision and planning, as well as being a member of the board of directors of the Central Province Nanotechnology Research Institute, and in 2014, she won the 6th national rank in the 5th National Nanotechnology Competition. She also a member of the Club of Young Researchers and Elites. In line with the aforementioned research activities, her master's thesis is an idea to solve the problem of wear and corrosion of parts of various industries, such as oil, gas, petrochemical and refinery. Since 1995, the project has been defined in the petrochemical industry, and finally, after passing all the experimental tests and obtaining positive results, the plan was implemented in the same industry, and after 7 years, positive feedback has been obtained. In this regard, in 1998, the mentioned project was selected as one of the selected projects of the vice president's technology department, and with the support of this respectable institution, it reached the commercialization stage. A private company under the name of Iranian Coating Industry Company was registered with registration number 16582 in 1400 and chairman of the board of this company, and currently the company is in the process of registering knowledge base

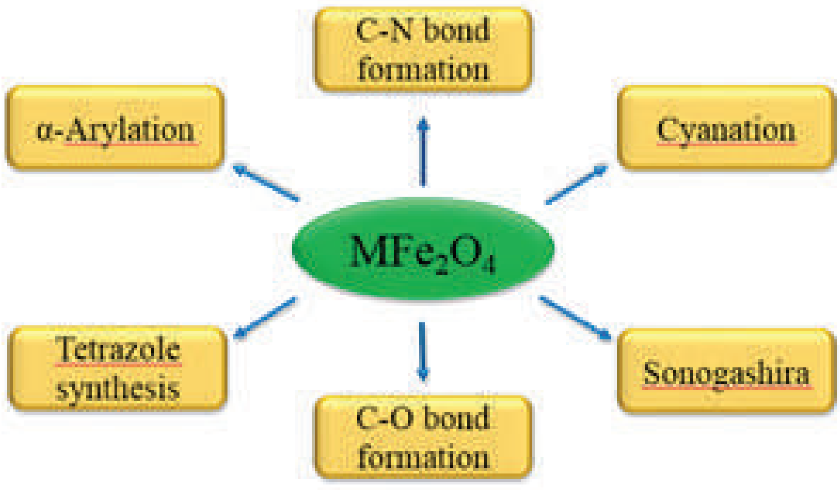
Synthesis And Catalytic Application of Magnetic Metal Ferrite Nanoparticles in Organic Reactions

Firouz Matloubi Moghaddam

Laboratory of Organic Synthesis and Natural Products, Department of Chemistry, Sharif University of Technology, Iran

Bimetallic nanoparticles are a class of nanomaterials with new physical and chemical properties resulting from synergistic effects between the two metals. MFe_2O_4, where M is a divalent transition metal, is the formula of one important family of these bimetallic compounds called metal ferrites. These structures crystallize in the spinel form showing superparamagnetic properties originating from the moment of antiparallel spines between ferric ions at tetrahedral sites and M^{2+} ions at octahedral sites. The unusual structural, electronic, magnetic and catalytic properties of these nanodimensional transition metal spinel oxides provide potential application in various fields, such as preparation of high density recording devices, gas sensors, and high efficient catalysts.

Ferrites used in catalytic applications are generally synthesized by low temperature co-precipitation methods which overcome the drawbacks such as low surface area, varying morphology, inhomogenity at an atomistic level and large particle with grain boundary, generally associated with high temperature preparation. Further, co-precipitation methods generate Bronsted acid sites in different cationic environment in addition to Lewis sites, which makes the catalyst active and effective for many organic transformations such as aromatic alkylation, acylation, etc. It has been proved that these nanoparticles show very good catalytic activity in C-C and C-heteroatom bond formation. During the last couple of years, application of different types of these magnetic catalysts has shown in various organic transformations by our group [1-5]. They have employed in C-N, C-O and C-C coupling reactions successfully; still, there are a lot more transformations that can be done using the catalytic properties of these compounds.



Biography

Firouz Matloubi Moghaddam was born in Maragheh, Iran. He obtained his B.Sc. in Chemistry and M.Sc in Organic Chemistry from Tabriz University. Thereafter, he joined the group of Prof. G. Solladie in the University of Louis Pasteur Strasbourg France and obtained a 'Doctorat d'Etat' (Habilitation) in 1982. He also obtained a M.SC in Medicinal Chemistry from the same University. After three years of postdoctoral appointments at University of Zurich (Prof.C.H.Eugster) and (Prof.A.Vasella), he began his own career at the Sharif University of Technology. Currently, he is distinguished professor of Organic Chemistry and his scientific interests include total synthesis of bioactive compounds, isolation, structure elucidation and synthesis of bioactive natural products, heterocyclic chemistry and catalysis.

Spectrally Selective Single Layered Ag@CuO nanocermet Coatings for Photothermal Application: Green Synthesis Method

G.G. Welegergs[1,2,3], **H.G. Gebretinsae**[1,2,4], **M.G. Tsegay**[1,2,4], **A. Bhardwaj**[5], **S. Mathur**[5], **T.G. Kebede**[6], **Z.Y. Nuru**[1,2,4], **S. Dube**[6] and **M. Maaza**[1,2]

[1]UNESCO-UNISA Africa Chair in Nanosciences-Nanotechnology, University of South Africa, South Africa
[2]Nanosciences African Network (NANOAFNET), iThemba LABS-National Research Foundation, South Africa
[3]Debre Berhan University, Department of Chemistry, Ethiopia
[4]Adigrat University, Department of Physics, Ethiopia
[5]Institute of Inorganic Chemistry, University of Cologne, Germany
[6]Department of Chemistry, University of South Africa, South Africa

Herein, green synthesized single-layered Ag@CuO nanocermet coatings deposited using spin coating on stainless steel (SS) substrates at 700, 800, 900 and 1000 rpm as solar selective absorbers is reported. The solar absorbing coatings consist of plasmonic silver (Ag) nanoparticles (NPs) embedded in a semiconductor matrix of CuO. The morphological, structural, compositional, and thickness of the coatings were characterized using Scanning electronic microscopy (SEM), X-ray diffraction (XRD), Energy dispersive X-ray spectroscopy (EDX), and Rutherford backscattering spectrometry (RBS). The SEM images of Ag@CuO nanocermet confirms the presence of better dispersibility of Ag NPs in the nanorod-like morphology of CuO. XRD patterns revealed well-crystalline nature of monoclinic CuO, and face centered cubic of Ag metal, and EDX spectra confirms the compositions of the coatings. RBS determined thicknesses of the coatings, and are found to be 1416 × 1015 atoms/cm2 (298.2 nm), 1296 × 1015 atoms/cm2 (272.8 nm), 1153 × 1015 atoms/cm2 (242.7 nm), and 998 × 1015 atoms/cm2 (210.2 nm) at 700, 800, 900, and 1000 rpm, respectively. The optical properties of the obtained coatings were analyzed using UV–Vis–NIR, and FTIR spectrophotometers in the wavelength range of 0.3–2.5 μm, and 2.5–20 μm, respectively. The Ag@CuO nanocerment coatings exhibit a solar absorptance (α = 0.93), and emissivity (ε = 0.23) at RS of 700 rpm. The embedded Ag NPs are responsible for enhancing the intrinsic absorption properties of CuO, due to the concentrated free electrons whose particle sizes are comparable to or smaller than the wavelength of incident light.

Development Of Oil-Formulations and Biodegradable PVA/Starch/Bentonite Polymeric Films for Diammonium Phosphate (DAP) Encapsulation

Abhijit Sarkar

ICAR-Indian Institute of Soil Science, India

Di-ammonium phosphate (DAP) is one of the mostly used, water soluble fertilizer that simultaneously supply nitrogen (N) and phosphorus (P). N is highly mobile and P is highly immobile in soil system. Hence, uncontrolled dissolution of N and P fails to synchronize with crop nutrient demand, resulted low recovery efficiency and environmental pollution. Controlled dissolution of DAP through surface encapsulation could be an important aspect to be explored. Oil-formulations (Linum usitatissimum and Brassica juncea oils) and biodegradable PVA/starch/bentonite polymeric films (CPSBs) for DAP encapsulation was developed using proportional mixing and graft polymerization technique, respectively. The binary threshold images indicated Oil-1 had lowest surface wrinkle, weight change during curing and smooth surface morphology. However, SEM images detected several micropores in CPSB surface. With increasing bentonite content (0 to 20 wt%) relative crystallinity index, density of CPSBs were increased; whereas, porosity, water absorption was decreased. In uninoculated soil half-life (t0.5) of CPSBs was ranging from 27 days (CPSB-0) to 74 days (CPSB-20). Aspergillus awamori and Trichoderma viride inoculation hasten the CPSB degradation and Aspergillus awamori inoculation recorded fastest (21 to 51 days) biodegradation of CPSBs. In water medium, N and P release data was well fitted to Korsmeyer-Peppas model over first-order kinetic model; Korsmeyer-Peppas nutrient release exponent indicated Non-Fickian diffusion from Oil-1-, CPSBs- encapsulated-DAP; whereas, uncoated-DAP followed Quasi-Fickian diffusion. In soil medium, N release from encapsulated-DAPs is more temperature sensitive than P. At higher levels of encapsulation (~8 wt%) both N and P release from DAP was prolonged. Overall, bentonite content at 10 wt% stabilizes the CPSB structure and Oil-1 had minimum surface deformation. Therefore, CPSB-10 and Oil-1 formulation- encapsulation could be an alternative option to produce controlled release DAP fertilizers with minimal cost intervention.

Biography

Dr. Abhijit Sarkar is graduated in Agriculture (Hons.) from BCKV, West Bengal and completed M.Sc. and Ph.D. from ICAR-IARI, New Delhi in the discipline of Soil Science and Agricultural Chemistry with the special emphasize on development of technology like controlled release phosphate fertilizers, nitrogen-phosphate fertilizers using low-grade minerals and commercial grade fertilizers with polymer chemistry, assessment of controlled release properties and evaluation of crop performances. His work especially emphasized on combined nutrient application system and improved use efficiency of fertilizers to curb the fertilizer requirement and associated cost involvement in the farming community. At present he is serving as Scientist at ICAR-Indian Institute of Soil Science, Bhopal and doing research related to modification and utilization of fly ash and municipal sludge for better water-nutrient productivity. The works done by Dr. Sarkar is evidenced by a good number of quality publications in highly-rated journals of international and national repute.

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The I- And -S Type Granites from The Shissa Pluton, Central African Fold Belt in Cameroon: Petrogenesis and Geodynamic Implication

Benjamin Ntieche[1], **Pauline Wokwenmendam Nguet**[2], **Dieudonne Charles Isidore Ilouga**[1], **Amidou Moundi**[3], **Mekala Ram Mohan**[4], **Mahomed Aziz Mounjouohou**[5], **Zakari Nchouwet**[3] and **Pierre Wandji**[1]

[1]*Geology Laboratory, Higher Teacher Training College University of Yaounde 1, Cameroon*
[2]*Research Center for Geophysics and Volcanology, Institute of Geological and Mining Research, Cameroon*
[3]*Department of Earth Sciences, University of Yaounde 1, Cameroon*
[4]*CSIR-National Geophysical Research Institute, India*
[5]*Department of Earth Sciences, University of Maroua, Cameroon*

Situated at the central part of the Central African Fold Belt in Cameroon, the Shissa pluton consists of two-mica granites and biotite granites. All the granites are shoshonitic in nature and present high K_2O / Na_2O ratios (1.50 - 2.42). The biotite granites are subaluminous and present I-type character (A/CNK ranges 1.0-1.1). The two-mica granites are typically two-mica alkali granites with S-type signature (A/CNK ranges 1.1-1.21) and Al_2O_3- rich (Al_2O_3 = 12.86-13.40 wt.%) than the biotite granites (Al_2O_3 11.24-13.26 wt.%). The Shissa granites multi-element patterns show enrichment in LILE such as Rb, Th, U, and Pb and are depleted in HFSE such as Ti, Ba and P, suggesting the crustal source with an inherited arc signature. All the granites present the Nb / Th ratio (0.2 - 1.2) significantly lower than that of the mantle (> 15), indicating the crustal source for the granites. The chemistry of the biotites suggests that the biotite granites are generated from the partial melting of already differenciated metabasite to metatonalitic source under high oxidazing conditions at the temperature between 908 and 1009 °C, while the two-mica granites were formed under moderated oxidazing conditions between 836 and 917 °C from the assimilation of felsic crustal component by the biotite granite magma during its ascent. The Shissa granites formed at a relatively hydrous environment (4 wt.% of the water content). The upwelling of the asthenosphere through slab break-off may have favoured the partial melting of the meta-igneous lower crust by supplying the thermal anomaly as it is the case in the Central African Fold Belt in Cameroon. The whole-rock geochemistry and the biotite mineral chemistry suggest the collisonal tectonic setting for the Shissa granite as several granitoid plutons in the CAFBC.

Biography

Date and place of birth:	10/01/1982 in Magba in Cameroon.
2017:	PhD Thesis in earth Sciences (Petrology and Structural Geology) University of Yaounde I.
2006-2009:	Master's degree with thesis in Earth Sciences (Petrology and Volcanology), University of Yaounde I.
2005-2006:	Master's degree in Earth Sciences (Petrology and Volcanology), University of Yaounde I.
2004-2005:	Bachelor Degree in Earth Science, University of Yaounde I

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Hydrogeochemical Characterization of Ground and Surface Water in The Eastern Part of The Adamawa-Yade Domain, Bertoua-Cameroon

Menti Agbor Nelson[1], Engome Regina Wotany[1], Christopher Agyingi[1] and **Mengnjo Jude Wirmvem[2]**

[1]Department of Geology, University of Buea, Cameroon
[2]Institute of Geological and Mining Research, Cameroon

Groundwater and surface water are the major sources of water supply to the inhabitants of Bertoua. A hydrogeochemical study was conducted in the study area to identify the processes that control the chemistry of groundwater sources and to examine the quality of water sources for domestic and agricultural purposes. The presence of metals in water can have detrimental effects on aquatic organisms, leading to decreased biodiversity and impaired ecosystem function. Additionally, the ingestion of contaminated water poses risks to human health, including the development of chronic illnesses. Fifty water samples were collected from boreholes, open wells, springs, and rivers within the study area in January 2022 (the dry season). The physicochemical characteristics of the samples included pH, electrical conductivity (EC), total dissolved solids (TDS), and major ions. The water samples were acidic, with 94% having pH values less than 6.5. The EC varied from to 21-776 µS/cm and the TDS (8.5-388 mg/l). Low EC and TDS values indicate low mineralization and freshwater. The relative abundance of major ions (meg/l) was $Ca^{2+} > Mg^{2+} > K^{+} > Na^{+}$ for cations and $HCO_3^{-} > Cl^{-} > NO_3^{-} > SO_4^{2-}$ for anions. These major ion concentrations were low and within the WHO Health Organization guideline values for drinking water. Three water facies were observed in the Piper diagram: Ca-SO_4, Ca-HCO_3, and mixed Ca-Mg-Cl. Rock-water interaction, ion exchange, silicate weathering, and anthropogenic activities were the processes responsible for groundwater chemistry, with some minor evaporative effects (Figure1). Based on the Sodium Adsorption Ratio and Residual Sodium Bicarbonate, all samples fell into the excellent category for agriculture. In the study area, the results for the WQI had values ranging from 7.94-366.40 having a mean value of 49.61 (Table 1). Thirty percent of samples were excellent, 36% good, 14% fair, 4% poor and 6% unfit for drinking.

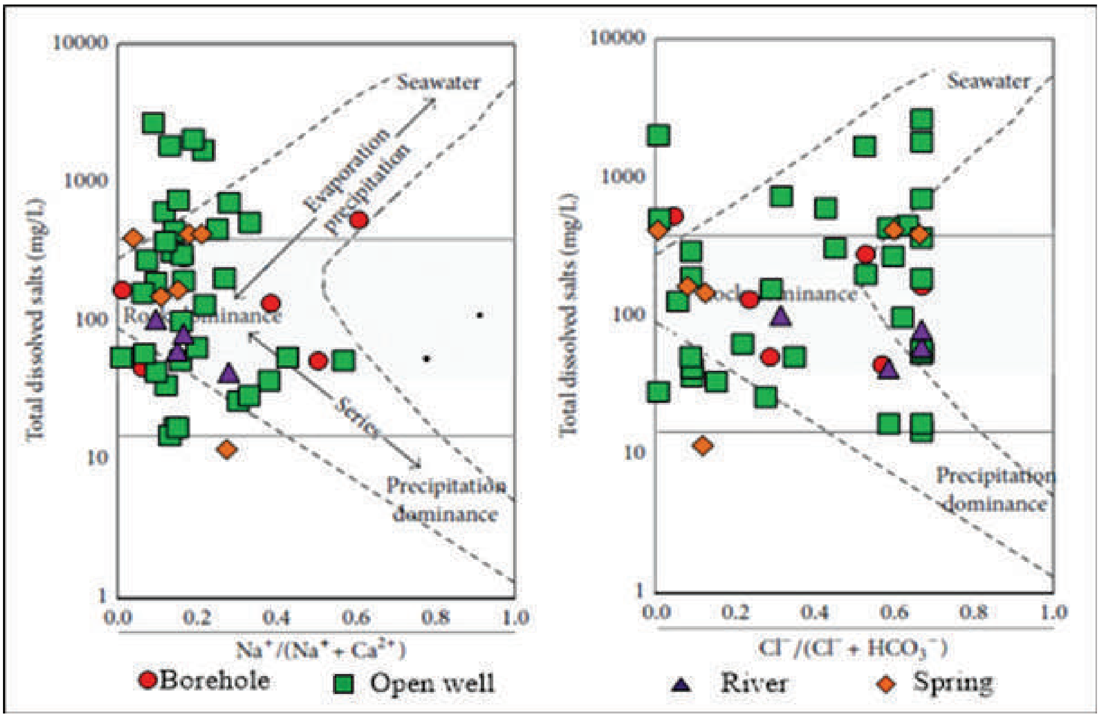

Figure 1: Gibbs plot for the groundwater showing dominant process.

Table 1: Water Quality Index in the study area.

Range	Category	Samples	Rank	Sample No.	Percentage
0-25	Excellent	7,10,12,13,17,18,22,23,27,29,33,36,42,43,47	I	15	30
26-50	Good	1,9,11,16,19,21,24,25,26,28,30,31,32,34,38,39,40,41	II	18	36
51-75	Fair	2,5,6,14,15,20,37	III	7	14
76-100	Poor	3,4	IV	3	4
101-150	Very Poor		V	0	0
>150	Unfit for drinking	8,48,35	VI	3	6

Biography

EDUCATION:

2019……: PhD Candidate (Hydro geochemistry)

2016-2019: Master Degree in Applied Geology

2013-2016: Bachelor Degree in Geology.

2011-2013: G.C.E Advanced Level in Science. 2006-2011:G.C.E Ordinary Level

1995-2005: First School Leaving Certificate (F.S.L.C)

PROFESSIONAL EXPERIENCE.

- Presently serving as an Environmental consultant with Pan African Institute for Development West Africa (PAID-WA)
- Graduate Teaching Assistance University of Buea 2020/2021 Academic year
- Lecturer, Fomic Polytechnic University, HND, B-Tech 2020/2021 Academic year
- Intern as hydraulic Engineer with CDC-Tiko Cameroon 2022
- Hydrogeologist/Geochemist consultant
- Served as union farms of Africa trainer on the field in Jakiri northwest region for two weeks. This program was aim at sensitizing the rural population of Jakiri and it environ about modern agro technological methods, advantages of using hybrid seedlings, and finally how to become agripreneurs.
- 2017/2018 academic year served as geology, chemistry and biology teacher and laboratory assistannce in summerset bilingual college molyko-Buea

Isolation, Characterisation, Antifungal Activity and Validated UPLC/MS/MS Method For Quantification of Novel Compounds from Artemisia Tournefortiana Reichb

Wajaht Amin Shah and **Mahpara Qadir**

Department of Chemistry, University of Kashmir, India

The scope of being less explored, this plant can prove most beneficial if given attention towards pharmacology, isolation and biological evaluation.The chloroform extract of Artemisia tournefortiana resulted in isolation of one novel compound named tournefortin A and two known Artemetin and tournefortin B bioactive compounds. Tournefortin B is first time obtained from natural source. The structures of all the isolated compounds were elucidated by detailed 1D and 2D NMR including HSQC, HMBC, 1H-1HOSY and NOESY spectroscopic techniques. To our good luck both extracts as well as compounds showed promising antifungal activity. All the isolated compounds were quantified through UPLC/MS/MS and the developed method will serve as a first fingerprint method for the rapid determination of these phytomolecules in various plant extracts. The higher antifungal effect of the isolated compounds suggests that this plant could act as potential source of antimicrobial agents.

Biography

Prof. syed wajaht Amin Shah has written more than 50 research articles in reputed journals like RSC, Science direct, Elsiever, Taylor Francis.etc, four projects has been sanctioned to his credit in last three years in natural product and synthetic field.

The Role of Environmental Degradation in Macroeconomic Instability: Panel Evidence from Emerging Economies

Shreya Pal[1], **Mantu Kumar Mahalik**[2], **Anjan Kumar Sahu**[2] and **Gupteswar Patel**[1]

[1]*Christ Deemed to be University, India*
[2]*Indian Institute of Technology Kharagpur, India*

This study examines the role of environmental degradation in macroeconomic instability for a balanced panel sample of 22 emerging market economies from 1996 to 2019. Governance is included in the macroeconomic instability function as a moderating factor. Besides, bank credit and government spending are also included in the estimated function as control variables. The long-run results from using the PMG-ARDL method show that environmental degradation and bank credit induce macroeconomic instability, whereas governance and government spending reduce it. Interestingly, environmental degradation creates greater macroeconomic instability than bank credit. We also find that governance being a moderating factor weakens the adverse impact of environmental degradation on macroeconomic instability. These findings are robust to the FGLS technique, suggesting that governments in emerging economies should prioritize environmental degradation and governance in mitigating climate change and ensuring macroeconomic stability in the long run.

Biography

Shreya Pal is an accomplished Assistant Professor at Christ Deemed to be University in Bangalore, India. Prior to her current position, she served as a Senior Research Fellow at the esteemed Department of Humanities and Social Sciences at the Indian Institute of Technology (IIT) Kharagpur. Her academic journey and expertise encompass a wide array of fields within economics.

Shreya's primary research areas include macroeconomics, international trade and finance, and energy economics. Her dedication to these fields is evident through her prolific publications in prestigious international journals. Some of her notable contributions can be found in publications such as "Economic Analysis and Policy," "Emerging Finance and Trade," "Journal of International Trade and Economic Development," and "Economic Research," among others.

Her work reflects a deep commitment to advancing our understanding of complex economic issues, contributing valuable insights to the global academic community. Her research achievements are a testament to her dedication and expertise in the field of economics.

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PEERS ALLEY MEDIA

Fabrication And Characterization of Highly Visible-Light Responsive Tio_2/Fe_2 Tio_5 Ceramic

Atefe JafarAbadi, Manoochehr Sobhani and **Hasan koohetani**

Semnan University, Iran

In my recent paper, TiO_2/Fe_2TiO_5 ceramic has been prepared through the reaction between iron (III) hydroxide and dispersed suspension of TiO_2 particles. The experiments were done using addition of the ammonia solution into a suspension including dispersed titania particles in $FeCl_3$ solution. Suspensions at different values of pH (2, 3, 5, and 7) were prepared. Consequent calcination of the washed product leads to crystallization of the Fe_2TiO_5 phase on the surface of titania particles. X-ray diffraction (XRD) results approve the formation of pseudobrookite Fe_2TiO_5 at 1000°C. The rising of the suspension pH value from 5 to 7 cause to formation of Fe_2O_3 due to increasing the hydrated iron. Transmission electron microscopy (TEM) results approve the existence of pseudobrookite structure Fe_2TiO_5 beside the TiO_2 with the rutile structure. According to the UV–Vis diffuse reflectance spectra (UV-DRS) and Kubelka-Munk method, the synthesized sample at pH = 5 and consequent calcination at 1000 °C has two direct band gap energies of 2.28 and 2.93 eV that are related to the Fe_2TiO_5 coating and TiO_2 support, respectively. Pseudobrookite structure of Fe_2TiO_5 ceramic layer was synthesized on TiO_2 particles by reaction of the iron (III) hydroxide and TiO_2 after calcination at 1000°C. Calcination at lower temperature leads to formation of Fe_2O_3. Increasing of the pH from 2 to 7 during the synthesis process, accompanied by increasing of the Fe_2TiO_5 and formation of the Fe_2O_3. The maximum value of Fe_2TiO_5 phase can obtained at pH = 5 without formation of the Fe_2O_3 impurity.

Biography

Atefe Jafarabadi was born in 1994, she lives in Iran. She was graduated in master degree in material science engineering. She works in a paint and pigment company in Iran for 7 years. Now she will so glad to corporate with everyone.

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Modelling And Tracing Green House Gases Rupturing Stratopause Rate of The Earth Using Radionuclides Curium Rutherfordium Inter Atomic Nuclear Chain Reaction in Space with Helium Nuclide

Niranjan Kumar[1,2]

[1]*Indian Institutes of Technology Bombay, India*
[2]*Indian Institutes of Management, India*

Nuclear noble research was carried out to know and estimates the generation and contribution of ghgs CH_4; CO_2 & CFC in two different type of settlement a city with agriculture land in surrounding and a forest area by curium rutherfordium interatomic nuclear chain reaction. For this the generation of O18 in water were measured using gas chromatograph and its nuclear association with 248Cm were modelled in the soil and further by its half-life 18.1 yrs the di-decadal input was estimated; while the maximum input in both ecosystems were CO_2 and CFC. The contribution of CFC gases is found higher in city agriculture land 766 while the total average input was in order of 1x109 million tons of ghgs. The modelled metal concentration were in the range of 0.88 to 4.76 ppm 248Cm and rutherfordium and gas O18 values were 64 & 410 ppm in forest and city agriculture land water respectively.The concept behind modelling is that the water heavy nuclides of oxygen is the result of spark nuclear reaction of nitrogen and the same heavy water pour down from the tropopause layer of atmosphere reaches earth surfaces and the 248Cm.Persent in the soil combines to generate 261Rf and the portion of curium get dissolved with surface and ground water as lechate and the water laden O18 combines with ghgs and from the equivalence law in chemistry and nuclear decay chemistry the decadal input of the ghgs especially carbon methane and CFC were modelled and the captured carbon in two different ecosystem is finally modelled and the productivity estimation by classical methods for estimation is checked by sampling herbaceous layer grasses(stored carbon) for both type of ecosystem and result suggests that the Cfc contribution is higher in city land but overall forest area contributes much in emission of CO_2 and it's capturing. and di-decadal estimated input is ,1.3 and 6.5 million tons of ghgs carbon in Meghalaya and Kiul khagour respectively. Añd total ghgs rate of input is almost 5 times higher in Kiul Khagour. in comparisons with Meghalya and for validation of the modelled data for both the ecosystem the productivity (P) was estimated and found 2.5 & 2.1 respectively. Which validate the Modelling approaches and sustained ghgs=k×(1/P) and ghgs=kxP and Ccrop =kx(1/P)

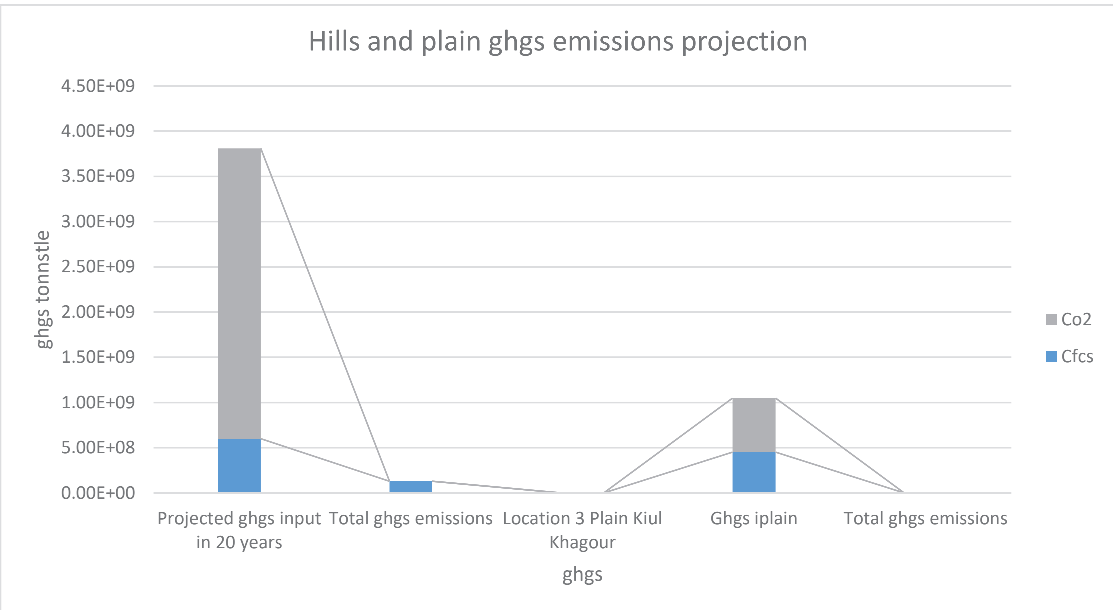
7N+4He=18O. 1

248Cm + 18O=261Rf+5n.............eqn2

***Table:** Modelled Metal concentration of two different type of ecosystem Forest and plain*

Location Hill Meghalaya	Ghgs concentration input rate in stratopause	Location 3 Plain Kiul Khagour	Ghgs concentration input rate in stratopause
*		CH_4	180.4
CH_4 Atmosphere	0.28 gram		
	0.16gram		
Cfcs		Cfcs	766.7
Co_2	0.021 gram	Co_2	136..6
BM ratio productivity	2.5	BM Ratio	2.1
Terresterial Sink carbon OM		Terresterial Carbon Sink OM	
Moisture content		Runoff	NA
Runoff soil carbon	19×10E+6 tone/yr	Moisture content Herbaceous	0.60

***Figure:** projected 20 years concentration of ghgs past and future trends of two different area plain and Forest.*



Biography

Dr.Niranjan Kumar is a free lance researcher in Science and Technology and travelled several nations for study and research purposes authored Several books and scientific research manuscripts in international journal and credited several international patent in his name ;chaired as distinguished speakers in international conferences and Editorial board member of American journal Earth Science. His area of interest is technological development and environment science and computing software; and nuclear; chemical ;hydrological and environmental engineering radiation and radioecology. He pioneered many scientific works credited for establishing research Department of Advance study in studying radiation and radioecology in foremost scientific disciplines in Asian region and he owned a consultant company named Kumar International R&D Consultant Pvt.Ltd.He is the recipient of several international prestigious award. He works for Ministry of Defence India.

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Physicochemical And Microbiological Characteristics of Stem Bark Exudate Gum of Tree in Conventional Release Tablets

Samuel Lugrie Kipo, Kwabena Ofori-Kwakye, Noble Kuntworbe, Raphael Johnson, Mariam El, Boakye-Gyasi, Yaa Asantewaa Osei and **Fredrick Owusu Akuffo**

Development of a raw material such as plant based polysaccharide gum into an acceptable pharmaceutical excipient involves the study of the physicochemical and formulation properties of the potential raw material. Results from this evaluations may serve as a guide to subsequent use or rejection of the substance. Natural gums can be used to manipulate existing active pharmaceutical ingredients to fulfil specific functions in conventional or novel drug delivery systems. Gums are generally characterized by several physicochemical properties most of which are advantageous to their use as pharmaceutical excipients. Due to the numerous possible advantages of their pharmaceutical use, a number of plants base gums are being investigated for their potential use as pharmaceutical excipients. The objective of this current study was to evaluate the physicochemical and microbiological properties of the stem bark gum of a tree in conventional release paracetamol tablets. With the physicochemical properties, the gum was slightly acid and soluble in all the aqueous based solvents tested, except 0.1N HCl solution, in which it was sparingly soluble. All the absorptive properties of the gum indicated its potential as a tablet disintegrating agent. The total ash of the gum was higher than that of international standard gum Arabic. Micromeritic properties of the gum indicated the need for a flow aid to improve its flowability. There were no harmful microorganisms detected in the gum. Aerobic organisms and moulds and yeast were detected within BP 2018 permissible limits. Tablets formulated using six different concentrations of the gum dispersions as a binder were generally soft and failed the USP T80 standard of dissolution, indicating poor binding and drug releasing properties. Quality control properties of three different batches of tablets containing varying concentrations of the dry gum powder as a disintegrating agent were comparable to tablets containing equal concentrations of corn starch. The *in vitro* drug releases were similar at all-time points of drug evaluation. The gum can therefore be considered as a good disintegrant in the formulation of conventional release tablets.

Fabrication Of Strawboard by A Sustainable Approach Using Agricultural Waste Biomass

Chhaya Sharma

Indian Institute of Technology Roorkee, India

This work was focused on the manufacturing of strawboard from agricultural waste like wheat straw (WS) and rice straw (RS) as natural resources of fiber by a sustainable and eco-friendly approach. Pineapple crown waste (PCW) fiber was used to replace the binder chemicals that are being used in the strawboard manufacturing industries to improve their quality in terms of mechanical strength properties. The strawboard with admirable properties like 4.74 mN·m2/g tear index, 14.96 N·m/g tensile indexes, 1526 m breaking length, 8.87 burst factor, and 20.3 stiffness factor was developed by adding 40% of PCW with 60% of WS pulp which was prepared by hydrothermal treatment of the material at 165 °C followed by the refiner mechanical pulping of the material. In addition to that, blending 60% RS with the same quantity of PCW pulp could develop strawboard with similar properties as that of wheat straw, which met the grade A and grade B strawboard required specifications as per Indian Standard: 2647–1967. The step towards utilizing agricultural waste to develop chemical-free strawboard not only minimizes the dumping of waste into the open field but also reduced the chemical utilization by the strawboard manufacturing industries, with PCW fiber that has been measured about 43% and 48% longer than WS and RS fiber, these could be the main reasons for developing such kind of strawboard with high mechanical properties. The fiber quality (morphology, crystallinity, and functional groups) of the different materials used was verified by different characterization techniques, such as FE-SEM, XRD, and FTIR-ATR analysis.

Biography

Dr. Chhaya Sharma is working as a Professor in the Department of Paper Technology, IIT Roorkee, Saharanpur Campus. She has completed her Ph.D. from the Paper Technology Department of IIT Roorkee and post-doctoral from PTS, München, Germany. Her research interests lie in the domain of (a) Laboratory-scale studies on wastewater treatment (b) Monitoring of pollutants/contaminants in wastewater, paper products, soil, and groundwater and their impact on health and metallic structures (c) Material synthesis and its applications, (d) Value-added products from natural lignocellulose waste etc.

Dr. Chhaya has published about 134 research papers in reputed international journals and National as well as international conferences. She has been awarded the prestigious Khosla research award, best presentation award in many international conferences, and best women of the year award by the Indian Women welfare Society. She has successfully guided 10 students of Ph.D. and 8 students are currently pursuing their Ph. D. under her supervision. She has also supervised more than 25 MTech. students' dissertations, some of them worked in Germany under the Indo- DAAD sandwich program.

To Evaluate the Efficacy of TMNPS Modified with Ionic Liquids in Removing Textile Industry Pigments

Santosh Bhukal

Guru Jambheswar University of Science & Technology, India

The low biodegradability of organic dyes, which frequently have carcinogenic behaviors, exacerbates the concerns connected with water contamination. Toxins are present in several dyes, and the byproducts of their breakdown can be far more dangerous than the original pigments. Various procedures have been used to address this issue, including ion exchange, flocculation, reverse osmosis, co-precipitation, and solvent extraction. Adsorption is particularly effective due to its low sludge output and affordable cost. Transition-metal nanoparticles (TMNPs) are attractive due to their size-dependent photonic and electrical properties but are only kinetically stable due to their large surface areas. Most TMNPs are electrostatically or sterically stabilized with specific stabilizing agents, which must be eliminated to prevent contamination and damage to their properties. Furthermore, these extra processes make the preliminary procedures more difficult. Room-temperature ionic liquids (RTILs), which are composed of just cations and anions, have spurred interest in the synthesis of TMNPs because they appear to be a promising medium for stabilizing TMNPs without the need for additional organic compounds. In this work, TMNPs were synthesized and modified with a hydrophobic ionic liquid. A range of characterization techniques, including XRD, FT-IR, and FESEM, were used to examine the properties of the synthesised nanoparticles. Greener IL-based adsorbents have increased CV dye adsorption capabilities.

Biography

Dr. Santosh Bhukal is working as an Assistant Professor in the Department of Environmental Science and Engineering at Guru Jambheshwar University of Science and Technology, Hisar. Dr. Santosh Bhukal completed her Ph.D. in the year 2015 from Panjab University, Chandigarh. She was awarded a Post-doctorate fellowship for women/Post Doctoral Fellowship for SC/ST by UGC, New Delhi (India) in 2018. Prior to that, she worked as an Assistant professor at Sri Guru Granth Sahib World University, Fatehgarh Sahib Panjab from July 2015-2017. Dr. Bhukal has significantly contributed to the field of Nanotechnology and Waste Water Treatment. She holds experience of 08 years in teaching and research in Environmental sciences and has attended 48+ International and National seminars and conferences. Dr. Bhukal received two best papers at conferences during her research work. She has authored 25 research articles in reputed national and international journals. She has 13 h-index. She has completed one project sanctioned by the university. Currently, she has also received UGC Start-Up grant from UGC NEW Delhi. Dr. Santosh Bhukal awarded with Junior Scientist of The Year in 2021 in "Promoting Environmental Technologies for Waste Management and Sustainable Development (WMSD-2021) held on 12-13 December, 2021" BY National Science Environment Science Academy. She also awarded by Best Scientists in International Conference held on 6-8 May, 2022 organised by National Environment Science Academy. One student completes his Ph.D in her supervision. Currently, eight students are registered for Ph.D. under her supervision. She is acting as Programme Coordinator for M.Tech. Geo-Informatics and Diploma in Solid and Hazardous waste management. She is also acting as a Village Programme Officer under the "Swachh Bharat Swasth Bharat" scheme since 2018.

An Economic Approach to Analyzing Rare-Earth Elements Using an Enhanced X-Ray Fluorescence Spectrometer

P.J. Adeti[1], **G. Amoako**[1], **J.B. Tandoh**[2], **O. Gyampo**[2], **H. Ahiamadjie**[2], **A.S.K. Amable**[3] and **S.A Bamford**[4]

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Rare-earth elements (REEs) are pivotal in various industries due to their unique magnetic, luminescent, and catalytic properties. These elements find applications in sectors such as clean energy, automotive, consumer electronics, semiconductors, and nuclear defence.

While REEs are invaluable for geological dating techniques like Sm-Nd isotope geochronology, the conventional analysis method via inductively coupled mass spectrometer (ICP-MS) is expensive, complex, and not readily available, especially in developing regions.

Addressing this challenge, our study harnesses the power of the conventional Tube-based X-ray fluorescence spectrometer, enhancing its capabilities for a cost-effective analysis of REEs. Integrating an Am-241 excitation system into the Ag-anode-X-ray tube spectrometer (EXP-1) at the National Nuclear Research Institute of the Ghana Atomic Energy Commission improved the detection range and sensitivity. The enhanced system successfully quantified various REEs using their K-X-rays. This method, which was anchored on the "Elemental Sensitivities Method" from the Quantitative X-ray Analysis (QXAS) software, was further cross-validated with Instrumental Neutron Activation Analysis and ICP-MS. Notably, the modified spectrometer showcased an accuracy rate of about 80% when analyzing the REEs in the IAEA-Soil 7 reference material, signaling its potential as a viable, economical alternative for REE analysis.

Biography

Dr. Prince James Adeti is a Physicist with a research interest in environmental and health issues. He has over a decade of experience in research into the areas of rare earth elements, heavy metals, and air monitoring. He had his M.Phil. from the University of Ghana and Ph.D. from the University of Cape Coast, Ghana. He served as the Vice president of the Graduate Students' Association of Ghana-Legon and served as a member of the Graduate School Board of the University of Ghana. A member of the Ghana Science Association. He is currently a Chief Technologist at Ghana Atomic Energy Commission (GAEC)

Significance Of Natural Colorant Extracted from Leaves of Murraya Exotica and Assessment of Dyeability on Cellulosic Fiber Via Statistical Modeling

Umme Habibah Siddiqua[1] and **Shaukat Ali**[2]

[1]*University of Jhang, Pakistan*
[2]*University of agriculture faisalabad, Pakistan*

In recent years, increasing awareness of public regarding eco-safety and health matters biodegradable and non-toxic bio-resource products are flourishing in different domains of our lives. This study focussed on the natural colorant extraction from Murraya exotica leaves using Soxhlet extraction apparatus under optimized extraction conditions. The dyeing potential of the colorants obtained from the leaves was evaluated by dyeing cotton fabric at different optimized conditions using response surface methodology (RSM). The maximum dye extraction was observed in 90 min using 1:10 M: L ratio under alkaline conditions using 0.45 M NaOH solution. Data outcomes showed that at optimum dyeing conditions of temperature (62.61ºC), time (75.5 min) and salt (67.89 g/L); highest color buildup of dyed samples was obtained representing 2.21 % K/S values. Different metal salts were applied as mordant to fix the dye on the cotton fabric and excellent color buildup was obtained when copper II sulphate was used as co-mordant. Colorimetric data and color strength of the dyed cellulosic fabric was evaluated by spectra flash spectrophotometer. Furthermore, quality assurance tests such as light fastness, rubbing fastness, washing fastness etc. were conducted which suggested the Marwa plant leaves as a good natural colorant.

Biography

Dr. Umme Habibah Siddiqua, a native of Pakistan, proudly hails from the vibrant landscapes of the country. In 2017, she accomplished her doctoral studies at the esteemed University of Agriculture in Faisalabad, Pakistan, marking a significant milestone in her academic journey.

Presently, Dr. Siddiqua holds the esteemed position of Assistant Professor and Head of the Department of Chemistry at the University of Jhang, contributing her expertise to the academic community. Her professional pursuits revolve around diverse areas within the realm of chemistry, showcasing a profound understanding of organic synthesis, wastewater treatment, dye and textile chemistry, and enzyme biotechnology.

Dr. Siddiqua is a prolific researcher with an impressive track record, boasting 22 publications in various international journals. Her scholarly contributions have garnered recognition, evidenced by a cumulative impact factor exceeding 60. In her dedicated pursuit of knowledge and advancement, Dr. Umme Habibah Siddiqua continues to make substantial contributions to the fields of chemistry and environmental science.

Structural characterization and antileishmanial activity of newly synthesized organo bismuth(V) carboxylates: experimental and molecular docking studies

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National University of Technology, Pakistan

In a quest to discover new formulations for the treatment of various parasitic diseases, a series of heteroleptic triorganobismuth(V) biscarboxylates of type $[BiR_3(O_2CR')_2]$, where $R=C_6H_5$ for 1–4 and $p\text{-}CH_3C_6H_4$ for 5–8, were synthesized, characterized and evaluated for their biological potential against L. tropica. All the synthesized complexes were fully characterized by elemental analysis, FT-IR, multinuclear (1 H and 13C) NMR spectroscopy and X-ray crystallography. The crystal structures for $[BiPh_3(O_2CC_6H_4(o\text{-}Br))_2]$ (1), $[BiPh_3(O_2CC_2H_2C_6H_4)_2]$ (2), $[BiPh_3(O_2CC_6H_4(m\text{-}NO_2))2]$ (3) and $[BiPh_3(O_2CC_6H_4(2\text{-}OH,3\text{-}CH_3))_2]$ (4) were determined and found to have a distorted pentagonal bipyramidal molecular geometry with seven coordinated bismuth center for 1–3 and for 4 distorted octahedral geometry, respectively. All the synthesized complexes demonstrated a moderate to signifcant activity against leishmania parasites. A broad analytical approach was followed to testify the stability for (1–8) in solid state as well as in solution and in leishmanial culture M199, ensuring them to be stable enough to exert a signifcant antileishmanial efect with promising results. Cytotoxicity profle suggests that tris(tolyl) derivatives show lower toxicity against isolated lymphocytes with higher antileishmanial potential. Molecular docking studies were carried out to reveal the binding modes for (1–8) targeting the active site of trypanothione reductase (TR) (PDB ID: 4APN) and Trypanothione Synthetase-Amidase structure (PDB ID 2vob).

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Enhanced Docking of the Aiibβ3 Glycoprotein Integrin with The Tripeptide Arg-Gly-Asp Acid (RGD) Ligand Due to Conjugation of RGD With Sio2 Nanoparticles and The Role of Temperature: A Molecular Dynamic Simulation and Free Binding Energy Study

Hossein Arzani[1] and **Fatemeh Ramezani**[2]

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[2]Physiology Research Center, Iran University of Medical Sciences, Iran

The phenomenon of blood coagulation and bleeding disorders, such as Von Willebrand Disease (VWD), form active research areas in hematology. An effective structure involved in the blood coagulation process is the αIIbβ3 glycoprotein integrin that naturally binds to the tripeptide Arg-Gly-Asp acid (RGD) ligand motif and manages the blood clotting. We have investigated, via molecular dynamic (MD) simulation, the enhancement of the docking interaction strength of the integrin with the ligand when the latter was conjugated with the silica nanoparticles(SNP) of different sizes, and also examined the role of temperature in this interaction. Our results show that the conjugation of the ligand with nanoparticles, together with the integrin-ligand docking orientation, and the applied temperature, all lead to the enhancement of the integrin-ligand interaction strength.

Biography

Dr. Hossein Arzani, born in 1987, obtained a Mastrs in Medical Nanotechnology from the Tehran University of Medical Sciences, IRI in 2015. He was awarded a ministry of health doctoral exam from Shahid Beheshti University of Medical Sciences and stayed on for a Ph.D. in Medical Nanotechnology, which he completed in 2021. Finally, a doctoral thesis entitled" Nanoscopic modeling and experimental study of the effect of RGD-conjugated-Silica nanoparticle on type 1 von Willebrand disease" was performed, While becoming a professional in Molecular Dynamics simulation under Professor Hashem Raffi-Tabar. His main research has been in the field of nanomaterials and their application in medical sciences as well as, MD simulation of biological systems. He has authored or co-authored more than 10 publications since 2015. His most important research interests include MD simulation of biological systems, nanocancer, and nanostructure biocompatibility.

Assessing The Efficacy of Magnetic Biochar Derived from Novel Waste Wood of Acacia Auriculiformis for Aqueous Arsenic Removal

Sandip Mondal[1] and **Sneha Das**[2]

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Current study is based on a new method to prepare magnetic biochar from waste wood derived from Acacia Auriculiformis. The conversion of waste wood into biochar was achieved through slow pyrolysis method which in turn proved to be more efficient than other procedures. Nanoparticles which were successfully deposited onto the surface of biochar were derived from iron powder transformed into iron-oxide. The prepared adsorbent contains a high specific surface area of 266.564 m2g-1. SEM images demonstrate the formation of triangular pyramid-shaped nanoparticles in the adsorbent's inner and outer wall pores. According to XRD peaks, the adsorbent's surface was coated with crystalline, carbonaceous, and Fe3O4. FTIR analysis indicates that multiple aliphatic and aromatic stretching bonds of carbon and hydroxyl bond act as functional groups in the impregnation and arsenic adsorption process. Establishment of best fit model which is Freundlich indicated towards the multi-layer heterogeneous adsorption process. 95% removal efficiency is achieved with batch study whereas kinetic pseudo 2nd order model represents the adsorption process. Surface mechanism involved electrostatic attraction followed by Bangham equation and Weber Morris intra-particle diffusion and complexation helping in adsorption of the arsenic ions. The maximum capacity of the manufactured biochar is estimated to be 294.1176 mgg^{-1}.

Biography

The author is working as an Assistant Professor in the Department of Earth and Environmental Studies at NIT Durgapur. The Author have more than 13 years of teaching and research experiences. He has 14 publications in SCI journal, 4 nos. of Book Chapter more than 25 nos. publications in conference proceedings. Three research scholars were awarded with PhD Degree under his guidance. Another research scholar already submitted his PhD thesis. Recently one research scholar, i.e. Sneha Das has developed biorchar impregnated nanoparticles for the separation of contaminants from aqueous media. More than 20 nos. of post graduate students completed their project work under his guidance. The Author is presently working in the field of removal of different emerging pollutants from water & wastewater, degree of contamination and fate transport of several contaminants in groundwater, recovery of critical elements, development of nanoparticles to use in filtration technology.

Enhancing Styrene Monomer Recovery from Polystyrene Pyrolysis: Insights from Density Functional Theory

Baggya Karunarathna[1], **Jayamal Damsith Wanniarachchi**[2], **M. A. B. Prashantha**[2] and **K.K. Govender**[3]

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[3]Department of Chemical Sciences, University of Johannesburg, South Africa

The continuous demand for plastics in consumerist society causes the accumulation of plastic wastes that leads to significant environmental impact due to their slow degrading nature. In the past few decades, plastic waste pyrolysis has taken a huge interest in minimizing plastic accumulation. However, monomer recovery from the pyrolysis of plastic waste gains more demand as its significant influence on environmental plastic accumulation. In the present study, the detailed thermal decomposition mechanism of the tetramer model compound of polystyrene was investigated by employing the density functional theory (DFT) method at the B3LYP/6-31G (d) level of theory. The calculated bond dissociation energies indicate that the cleavage of non-terminal carbon-carbon backbone bonds is energetically favourable, and it may result in high molecular weight primary and secondary benzylic radicals at the initiation of pyrolysis. In this study, four plausible pyrolysis pathways were proposed, and the thermodynamic and kinetic parameters were calculated using the DFT method. In all four reactions, the reaction steps of bond cleavage, β-scission, hydrogen transfer, hydrogen absorption, and dehydration are mainly involved. The calculated kinetic and thermodynamic results indicate styrene, α-methylstyrene, isopropylbenzene, methylbenzene, ethylbenzene, and methane gas as the major constituents of pyrolysis product. Based on the results of this study, a high yield of styrene recovery can be obtained by controlling the temperature profile of the reactor by driving the pyrolysis process toward a more kinetically feasible direction. The results of this study may facilitate the enhancement of styrene monomer recovery from heat control pyrolysis of waste polystyrene.

Biography

Dr. Baggya Karunarathna, a passionate young researcher, presently holds the position of Senior Lecturer in Chemistry at the Department of Chemistry, Eastern University Sri Lanka. Specializing in computational material chemistry, her focus centers on addressing the critical challenge of plastic degradation. Driven by a commitment to sustainability, her academic journey has provided a robust foundation for substantial contributions in this field. At the forefront of her research is the unraveling of intricate molecular mechanisms governing plastic decomposition. Dr. Karunarathna is dedicated to pioneering innovative solutions for this pressing global concern, showcasing her determination to advance understanding and offer practical remedies in the pursuit of a more sustainable future.

Investigation On Molecular Interactions of Memantine Hydrochloride in Aqueous Solution by Thermophysical Methods and Molecular Dynamics Simulations at Different Temperatures

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[5]Department of Chemistry, PB Siddhartha College of Arts & Sciences, India
[6]Department of Chemistry, Acharya Nagarjuna University, India

He density (ρ), speed of sound (u), and refractive index (nD) of aqueous solutions of Memantine hydrochloride with molalities ranging from 0.0 to 0.05 at atmospheric pressure and temperatures between 305.15 and 320.15 K were investigated. The experimental results have been used to compute apparent molar volume (), limiting values of apparent molar volume (), the limiting apparent molar expansibility (), Hepler's constant (), apparent molar adiabatic compressibility (), limiting values of apparent adiabatic compressibility (), specific refraction (), molar refraction () and hydration number (). These data indicated the existence of substantial solute-solvent interactions in the liquid system, as well as hydrogen bond, dipole-dipole, dipole-induced-dipole interactions and solute structure-making capacity. Good correlations with the experimental studies were observed from molecular dynamics (MD) simulation studies.

Evaluation of Biological Measures and Multipurpose Adaptive Grass on Soil Bund in Lasta District, Ethiopia

Haymanot Lamesgn Zena and **Yalelet Abie**

Wollo University, Ethiopia

The adverse effect of soil erosion is a major problem in Ethiopia, and soil and water conservation efforts must do to reduce the impact. Use of biological measures (grasses) combined with soil bund have numerous impact for reducing soil nutrient loss and increase soil moisture conservation, secure animal fodder for farm owners in low grass potential areas, enhance productivity of land and green biomass, but its adoption has been limited in the study area. This study explored the effect of grasses combined with soil bund on The experiment want to see the effect of stabilizer grasses on soil bund have seven treatments with randomized complete block design. Moisture content and bulk density data were collected and analyzed, taken undisturbed soil sample by gravimetric method, survival rate available plant per total planted times 100, tiller total number, plant height via meter and biomass using hanging balance data's were collected. The data analysis was done using R-Software and for mean separation, LSD at 5% significance level was used for moisture, bulk density, survival rate, biological parameters. Grass have positive impact on moisture content and bulk density to increase ease of use of water for grass and to stabilize the bund results in 2020 was 22.2%, 17.56%, and 12.3% of difference vetiver, Sudan grass, elephant and panicum in 2021 13% (1.36) in Sudan grass with comparison of the control treatment (1.57), respectively. Sudan grass and panicum have (100%) and (80%) performance on survival rate to rehabilitate and support the bund and protect direct runoff. Panicum has scored 77.2 average tillers in 0.15m2 area on number of tiller that can affect biomass and direct runoff. Sudan grass 98.7 cm, elephant 85.4 cm and panicum 81cm was resulted in 2021 and in 2020 Sudan grass 136.4 cm, elephant 91cm and panicum 78.3 cm record on plant height. The green biomass that have great contribution for forage and other multipurpose use was Sudan grass, elephant and panicum yielded 20.8 t/ha in 2020 12.7 t/ha and 10.6 t/ha in 2021 respectively. Overall, in the experiment Sudan grass, Panicum Coloratum and Elephant grass have better adaptability and survival, increase farm land productivity contributing additional grass proceeds and have multipurpose use of fodder production.

Table 1. *First year (2020) and second year (2021) mean square value on survival rate of trial site.*

Treatment	Survival rate (2020)	Survival rate (2021)
Desho with soil bud	9.66 [a]	3 [c]
Elephant with soil bud	8.33 [a]	7.33 [b]
Vetiver with soil bud	9 [a]	7.66 [b]
Sudan grass with soil bud	10 [a]	10 [a]
Rhodes with soil bud	9.33 [a]	7.66 [b]
Panicum with soil bud	9 [a]	8 [b]
L.S.D	Ns	2.24**
CV	10	10.54

Figure 1. *Field Performance of different multipurpose grass, where; A is panicum Grass, B is Sudan Grass, C is Elephant Grass, D is all treatment on soil bund.*

Biography

Haymanot Lamesgn Zena is a dedicated professional holding a Bachelor of Science degree in Soil and Water Resource Management from Wollo University, Ethiopia. Currently employed at the Amhara Regional Agricultural Research Institute, they possess a robust academic background, offering a comprehensive understanding of sustainable agriculture complexities. Haymanot's advanced research and analytical skills enable them to conduct thorough investigations in agricultural science.

Proficient in GIS and EnVEST software, Haymanot demonstrates technical prowess enhancing precision in research. Their strong communication skills excel in proposing ideas, presenting findings, analyzing data, and finalizing papers with clarity. Committed to addressing challenges in soil and water resource management, Haymanot contributes valuable insights to the agricultural community. Their dedication reflects a broader commitment to advancing sustainable agricultural practices in Ethiopia and beyond. With a passion for research and practical applications, Haymanot Lamesgn Zena is poised to make meaningful contributions to the field within their role at the institute.

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Mercury Waste from Artisanal and Small-Scale Gold Mining Facilities: A Risk to Farm Ecosystems — A Case Study of Obuasi, Ghana

Sylvester Addai-Arhin[1,4], **HuiHo Jeong**[1], **Nana Hirota**[2], **Yasuhiro Ishibashi**[2], **Hideki Shiratsuchi**[2] and **Koji Arizono**[2,3]

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[3]Graduate School of Pharmaceutical Sciences, Kumamoto University, Japan
[4]Pharmaceutical Sciences Department, Kumasi Technical University, Ghana

Frequent discharge of mercury waste from artisanal and small-scale gold mining (ASGM) facilities into nearby farms may contaminate foodstuffs and the entire farms. High contamination levels may result in ecological risks to the soil, plants, animals, humans, and the entire farm ecosystem. In this study, the contamination levels and the associated ecological risks of farmland soils, plantains, and cassavas from farms sited near ASGM facilities in four communities around Obuasi, Ghana, were evaluated using the Hakanson (1980) model. Results showed that all samples except for the edible parts of plantains from Tweapease, Nyamebekyere, and Ahansonyewodea and plantain peels from Nyamebekyere and Ahansonyewodea were contaminated and may pose moderate to very high ecological risks. All farms were also contaminated and may pose considerable to very high ecological risks. The farms at Odumase were the highest contaminated with degree of contamination (Cdeg) above 20, while those at Ahansonyewodea were the least contaminated with Cdeg= 8.1. This meant that farms at Odumase may pose the highest potential ecological risk (Per) to plants, animals, humans, and the entire farm ecosystem since Per > 600, while the farms at Ahansonyewodea may pose the least ecological risks with Per = 324. There is, therefore, the need for strict control of ASGM activities in these study areas to preserve the integrity of the ecosystem.

Biography

Dr. Sylvester Addai-Arhin is a young researcher and faculty member of the Faculty of Health Sciences, Kumasi Technical University, Kumasi, Ghana. He has been in Academia for sixteen (16) years i.e., ten (10) years as a technical staff and six (6) years as a lecturer and researcher. He holds a Doctor of Philosophy (PhD) in Environmental Science from the Prefectural University of Kumamoto, Kumamoto, Japan. His research area involves environmental and pharmaceutical contaminants, particularly heavy metals with special interest in mercury risks and toxicity. His specific research interest, therefore, focuses on risk assessment of chemical pollutants, ecotoxicology, analytical method development and validation, and pharmaceutical analysis. His current research works have centered on ecological and human health risks of mercury, particularly mercury from Artisanal and Small-scale Gold Mining (ASGM) facilities.

Iot Enabled Microfluidics-Based Biochemistry Analyzer Based on Colorimetric Detection Techniques

Sangeeta Palekar[1], **Jayu Kalambe**[1] and **Rajendra M. Patrikar**[2]

[1]*Shri RamdeobabaCollege of Engineering and Management, India*
[2]*Visvesvaraya National Institute of Technology, India*

Microfluidics is an ideal technique to simplify whole blood processing including classical biochemical analysis. In this work, a microfluidics-based biochemistry analyzer has been developed. It is based on the colorimetric imaging acquisition and analyzing system, utilizing a machine-learning algorithm to estimate the concentration of targeted biochemistry blood parameters. A microfluidics-based device was fabricated using Polydimethylsiloxane to hold the sample at the time of analysis using the soft lithography technique. The integration of microfluidics and machine learning algorithms helped in minimizing the incubation time by around 80%, which leads to reducing the per-test reaction time and speedup the complete analysis process. The Internet of things has been incorporated so that the test result can be accessed online in real-time for remote counseling. The developed platform is tested to estimate the concentration of Triglyceride, Calcium, and Glucose in the blood serum has been estimated with a limit of detection of 0.79, 0.24, 1.71 mg/dL and linear detection range 1–1000, 1–400 and 2–20 mg/dL respectively. The developed platform offers the advantages of portability, lower cost per test, less reagent and sample consumption, shorter time-to-result, reduced hardware complexity due to programming flexibility, and less analytical footprint.

Biography

Sangeeta D Palekar received a B.E. degree in Electronics Engineering from PESCOE, Aurangabad, Maharashtra, India in 2012 and an M. Tech degree in VLSI Design in 2016 from RCOEM, Nagpur, India. Currently, she is pursuing a Ph.D. degree under the supervision of Dr. Jayu Kalambe, Department of Electronics Engineering, RCOEM, Nagpur, Maharashtra, India. Herein, she is developing a Portable microfluidics-based platform for Biomedical Applications. She has published 10 international/national research articles and published two an Indian Patent. Her research interests are MEMS and Microfluidics for point-of-care applications.

Realization Of Optical Solitons from Nonlinear Schrödinger Equation Using Modified Sardar Sub-Equation Technique

Salisu Ibrahim

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This study presents a novel modification of the Sardar sub-equation method (MSSEM) for solving the nonlinear Schr¨odinger equation (NLSE) with second order spatiotemporal dispersion and group velocity dispersion, which is used to describe and model the propagation of optical solitons in non linear media. The modification is based on introducing a new function that is used to approximate the solution of the equation. By applying this modified method, we are able to obtain exact analytical solutions for the NLSE with several classes of optical soliton solutions. The method is tested on a variety of nonlinear optical systems and is shown to be highly effective in producing accurate solutions. The results of this study demonstrate the potential of this novel approach for solving the NLSE in the context of optical solitons. These soliton solutions are of great importance in the field of science, physics, mathematics, and engineering.

Biography

Dr. Salisu Ibrahim, a distinguished Applied Mathematician with a doctorate, serves as a full-time Assistant Professor at Tishk International University, dedicating eight years to academic excellence. Specializing in applied mathematics, computational mathematics, system control theory, and mathematical physics, he showcases a robust commitment to teaching, research, and community service.

In addition to his academic role, Dr. Ibrahim has taken on significant administrative responsibilities, including positions such as faculty examination officer and department examination officer. He has chaired and contributed to International and National Workshops, and played a crucial role in various conferences' organizing committees. Proficient in mathematical computation and simulation tools like Python, MatLab, Mathematica, and Maple, his expertise extends to the modeling of diverse science and engineering problems.

Dr. Ibrahim's academic journey spans countries like Iraq, Jordan, Turkey, and Nigeria, fostering cultural adaptability and a flexible mindset. Known for his humility, gentleness, and disciplined work ethic, he expresses gratitude for the teaching opportunities and impactful research experiences at Tishk International University. His unwavering dedication has not only contributed to academic achievements but has also supported the university in reaching its goals and potential.

The Problem of Reduce Description in Chemical Kinetics

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A comprehensive comprehension of the concept of the gradual unchanging manifold (GUM) gives rise to numerous techniques for reducing models (TRM) in dissipative systems of chemical kinetics for mechanical engineering problems. This research calculates and contrasts the unchanging solutions for multi-route systems. The TRM, such as the Intrinsic Low Dimensional (ILDM), Quasi Equilibrium Manifold (QEM), and Spectral Quasi Equilibrium Manifold (SQEM), are utilized to construct the gradual unchanging manifolds, which function as primary approximations to GUM. By employing the Method of Invariant Grid (MIG), the enhancements of QEM solutions are computed imposing the effect of activation energy. Our discoveries suggest that we could assess each route independently rather than taking into account the entire mechanism. Local sensitivity analysis is conducted using the SimBiology toolbox of MATLAB. To compare TRM, the calculation period is presented in tabular form.

Heterogeneous Catalyst for Triglyceride Transformation into Biodiesel and Related Products

Amjad Ali, Avneet Kaur and **KM Abida Khan**

Virginia Tech-TIET Center of Excellent in Emerging Materials, Thapar Institute of Engineering & Technology, India

Issues related to ever-increasing global warming due to rising carbon emissions and the continuous depletion of fossil fuel reserves have encouraged research on renewable energies. In this context, biodiesel (BD) fuel, derived from vegetable oil, has emerged as a renewable and eco-friendly alternative to fossil-based diesel fuel. Chemically, BD is a mixture of fatty acid methyl esters (FAMEs) produced via the transesterification of triglycerides (vegetable oils or animal fat). To avoid the food versus fuel situation, the Indian BD policy encourages using waste cooking oil, non-edible oils and tallows for commercial BD production. Using such feedstock reduces overall biodiesel manufacturing costs and helps manage waste cooking oil disposal.

The flourishing BD industry has recently resulted in a surplus of glycerol, which has choked the global market. This glycerol could also be employed as a substrate to develop non-food and fuel additives, including glycerol carbonate and (mono-, di- and tri-) acetins. These molecules have emerged as promising candidates to offer services in the food, polymer, electrolytic, fuel additive and pharmaceutical industries. In literature, homogeneous catalysts have been extensively used to form BD and glycerol derivatives. However, homogeneous catalysts are gradually ceased due to the issues related to the formation of catalyst-contaminated products and effluent generation during the catalyst removal step. To address the problems associated with homogeneous catalysts, alkali and alkaline mixed metal oxide, hydrotalcite, and metal-organic framework-based heterogeneous catalysts were developed and employed for triglyceride and glycerol transformation into value-added products. The present work is aimed to give an overview of the heterogeneous catalysts developed in our lab for BD, glycerol carbonate, and acetin synthesis.

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Biography

Amjad Ali was born in Roorkee, India, in 1978 and received his M.Sc. degree in Chemistry from IIT Roorkee in 2000 and Ph.D. degree from IIT Bombay in Bio-inorganic chemistry in 2005 under the supervision of Prof. C. P. Rao. His Ph.D. thesis was based on developing calix[4]arene based sensors and biomimetic models. Presently, he is working as a full Professor in the School of Chemistry and Biochemistry at Thapar Institute of Engineering and Technology, Patiala. He teaches coordination, bioinorganic and general inorganic chemistry courses to postgraduate and undergraduate students. His research expertise is the development of heterogeneous chemical and bio-catalysts for biomass valorization and organic transformation to synthesize biodiesel and glycerol derivatives. He has 75 SCI publications and two Indian patents to his credit. His research work is funded by various government funding agencies, viz., CSIR, DRDO, and SERB-DST.

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Archean Crustal Generation and Neoproterozoic Partial Melting in The Ivindo Basement, NW Congo Craton, Republic of Congo: Petrology, Geochemistry and Zircon U-Pb Geochronology Constraints

Alan P. Rodeck Loemba[1], **Alanielson Ferreira**[2] and **Legran J. E. Plavy Ntsiele**[2]

[1]*Faculty of Science and Technology, Congo*
[2]*Department of Earth Sciences, South Africa*

We present systematic petrographic descriptions, geochemical and geochronological data from Souanké, Bomalinga, Elogo and Zoula areas in the Ivindo basement to understand the evolution of NW Congo Craton, Republic of Congo. Hornblende tonalite, biotite granodiorite, usually with hornblende-bearing enclaves, and granitic leucosome veins are ubiquitous in all areas. Specifically, coarse-grained muscovite-garnet-bearing pegmatite cross-cutting ancient mafic tonalite and felsic granodiorite in the Souanké area. Overall, three well-defined chemical patterns are described: (1) low SiO_2 (57-63 wt.%), high MgO+FeO (9-19 wt.%) and metaluminous composition with intermediate LREE/HREE ratios and slightly positive Eu anomaly for tonalite, (2) middle SiO_2 (67-73 wt.%), MgO+FeO (7-1.5 wt.%) and peraluminous composition with intermediate LREE/HREE ratios for granodiorite and (3) high SiO_2 (72-75 wt.%), low MgO+FeO (~<1 wt.%) and peraluminous character with low LREE/HREE ratios (flat patterns) and negative Eu anomaly in granitic veins and pegmatites.

Regardless of the study area, the hornblende tonalites present similar ages (2884 ± 2.7, 2875 ± 5.6 and 2888 ± 3.2 Ma) that are near coeval with the ages presented by biotite granodiorites (2896 ± 8.9, 2880 ± 5.9 and 2875 ± 6.4 Ma), while granitic leucosomes have slightly younger ages (2850 ± 7.3, 2870 ± 8.2 and 2858 ± 7.2 Ma). Lastly, garnet-bearing pegmatite presents a Neoproterozoic/Cambrian transition age of 540 ± 1.6 Ma. Different enrichment LREE/HREE ratios combined with negative Nb-Ta and Ti anomalies may suggest a subduction-like setting for the generation of near coeval Mesoarchean tonalite-granodioritic crust. Whereas field relationships and flat REE patterns in the muscovite-garnet-bearing pegmatite indicate a younger ~ 540 Ma crustal melting in the NW Congo Craton likely related to West Gondwana assembly. Further, these results confirm that the ~ 2.9 Ga represents a significant period of continental reworking within a magmatic arc setting.

Biography

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Chemo-enzymatic Approach to Synthesis of Modified Nucleosides

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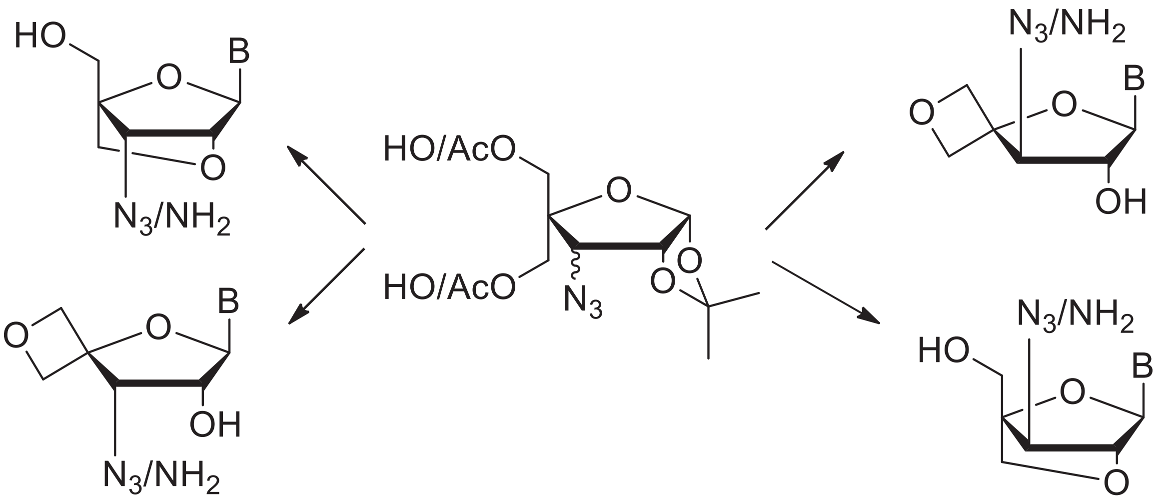
Over two decades, a large number of nucleosides have been synthesized, which demonstrated potent antiviral and antitumour activities and have become cornerstones of treatment for patients with cancer or viral infections. Oligonucleotide-based antisense strategies represent a unique paradigm for the treatment of a wide variety of human diseases. In order to discover new class of nucleoside derivatives with enhanced biological activities, the modifications in the sugar moietiy have been attempted, which provide a remarkable level of control over nucleoside sugar puckering and its biological activity.

Herein, we report; (a) the selective biocatalytic acetylation studies on modified 3′-azido-4′-C-hydroxymethylated sugar derivatives with an aim to develop an efficient and easy method for the synthesis of ribo-azido/amino LNA monomers and xylo-azido/amino spiro-oxetano nucleosides and (b) the selective biocatalytic deacetylation studies on modified 3′-azido-4′-C-acetoxymethylated sugar derivatives with an aim to develop an efficient and easy method for the synthesis of ribo-azido/amino spiro-oxetano nucleosides and xylo-azido/amino LNA monomers.



B = Nucleo Bases (T, U, C & A)

Biography

Dr. Rajesh Kumar received his Master of Science degree in organic chemistry from University of Delhi in 2010. He joined the same department for a PhD and completed his Ph.D in 2017 and during Ph.D, Dr. Kumar visited University of Southern Denmark as a Research Assistant for nine months. After completion of Ph.D, he joined as Assistant Professor in chemistry at B.R.A. Bihar University, India. He has published 25 research papers in reputed national and international journals such as The Journal of Organic Chemistry, Theranostics, Carbohydrate Research, RSC Advances etc. His research interest lies in Nucleic acid chemistry, Biotransformations, Catalysis, Green Chemistry, and heterocyclic chemistry.

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Towards Clinical Use of Varian Clinac Ix Linear Accelerator in A Low Resource Radiotherapy Facility: Evaluation of Commissioning Data

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[2]Oncology Directorate, Komfo Anokye Teaching Hospital, Ghana
[3]School of Nuclear and Allied Sciences, University of Ghana, Ghana
[4]Radiological and Medical Sciences Research Institute, Ghana Atomic Energy Commission, Ghana

Purpose: The evaluation of the commissioning beam data of a Varian Clinac iX linear accelerator installed and commissioned at a low-resourced radiotherapy facility has been performed.

Method: The commissioning data acquisition was predominantly dependent on the use of the DoseView 3D water phantom and the software provided by the manufacturer. The evaluation of the commissioning data was achieved by employing criteria specified in the American Association of Physicists in Medicine (AAPM) Task Group protocol 106 (TG-106) and the manufacturer guidelines and specifications.

Results: Beam performance measurements were performed, and the measured values were 1.60 cm for photon depth of ionization at a maximum depth (dmax), and 66.6 cm at a depth of 10 cm with their specification values from the manufacturer being 1.60 cm and 67.2 cm respectively. The beam symmetry and flatness were 1% and 2%, respectively, while the manufacturer recommended 2% and 3%. In addition, the percentage depth dose for the 10 × 10 cm2 field size is 76.2% at 10 cm depth and 100 cm source-to-surface distance (SSD), and the manufacturer recommended 77.0 ± 0.5%.

Conclusion: In a low-resource radiotherapy facility in Ghana, the Varian Clinac iX linear accelerator was commissioned for the dual photon and four-electron energy beams. The study demonstrated that the newly installed dual photon beam energy (6 MV and 16 MV) and electron beam energy (6 MeV, 9 MeV, 12 MeV, and 16 MeV) Linac meets all the manufacturer's specifications. The measured percentage depth dose data, beam profiles, output factors, and other parameters were analyzed and integrated into the Eclipse treatment planning system (TPS). All the commissioning beam measurements and tests performed on the Linac under study agreed with the AAPM TG-106 protocol and other relevant publications. The beam data obtained is beneficial for the quality assurance (QA) program at the low-resource radiotherapy facility where the Linac is installed and for inter-comparison between different radiotherapy

institutions. Moreover, a quality assurance software has been designed out of the acquired data to detect the machine's downtime, failure modes, and rates to assist in obtaining detailed statistical data to determine the actual impact of the environment and its challenges on the effectiveness and efficiency of the machine. As a result of the statistical data generated by this quality assurance software, manufacturers can establish an equipment hub in Sub-Saharan Africa to avert the long waiting time for the equipment parts to be transported from Europe and America to avoid delays in delivering treatment to cancer patients. Overall, the work demonstrated that the newly installed dual photon energy (6 MV and 16 MV) and electron energy (6 MeV, 9 MeV, 12 MeV, and 16 MeV) LINAC is in total compliance with the specification standards of the manufacturer and AAPM TG 106 protocol.

Biography

Joseph Adom is a clinical medical physicist at the Oncology Directorate of the Komfo Anokye Teaching Hospital, Kumasi-Ghana, with over thirteen years of experience in undertaking 2D and 3D treatment planning for cancer patients, as well as performing and reporting on quality control of the radiotherapy machines at the center. Having trained by experts from Mayo Clinic in USA, UCL, UK and Varian at Switzerland, Joseph has developed so much interest and experience in the treatment planning of cancer patients. Joseph uses that experience to equip himself with how to do 3D CRT and IMRT treatment planning of various cancer patients undergoing radiotherapy with cases such as Carcinoma of the cervix and vaginal walls, Differentiated Adenocarcinoma cells, Aggressive Fibromatosis of the arm, Carcinoma of the breast and so on. Joseph recently joined the Department of Physics at the Kwame Nkrumah University of Science and Technology to be able to impact on students with his expertise knowledge acquired.

The professional goal of Joseph is to be able to integrate the knowledge gained in his PhD and Masters degrees as well the experience he has in treatment planning and quality assurance on the radiotherapy machines to be able to extend his scope of research to be able to come out with exciting solutions as far as administering of radiotherapy treatment and good performance of radiotherapy machines is concerned.

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Application of CSM-CANEGRO Model for Climate Change Impact Assessment and Adaptation for Sugarcane in Semi-arid Environment of Southern Punjab, Pakistan

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[2]*Pir Mehr Ali Shah, Arid Agriculture University, Pakistan*
[3]*National Research Center of Intercropping, The Islamia University of Bahawalpur, Pakistan*

Climate warming poses a serious danger to the production of the sugarcane crop. Crop growth simulation models offer the capacity to assess the impact of climate change and management practises on sugarcane crop growth and production. Crop growth simulation models generate simulations based on the relationship of genotype, management, and environment. The study was carried out with the goals of (1) calibrating, evaluating, and using the CSM-CANEGRO-Sugarcane model and (2) assessing climate change and developing adaptation strategies for industrial (spring and autumn crops) and non-industrial (summer crop) sugarcane. Two field experiments regarding industrial sugarcane were carried out at Multan in Pakistan during 2013–2014 and 2014–2015 and two field trials regarding ponda chewing sugarcane (non-industrial, thick, soft and juicier sugarcane) at Vehari in Pakistan during 2017 and 2018. Calibration and evaluation of CSM-CANEGRO-Sugarcane model showed that all model statistical parameters were attained under satisfactory range. Results indicated that average temperature is raised almost 0.9 °C during baseline weather data (1980–2018), whereas according to diverse climate projections by GCMs, average temperature 3-5 °C can be increase during mid-century. Therefore, if adaptation strategies are not adopted then as a result, sugarcane yield will be lessened ranging from 15 to 23% under various GCMs during mid-century. Adaptation strategies such as 18 to 25 days advance planting, increasing 15% N application dose and increasing frequency of irrigation and growing heat tolerant and more thermal time demanding cultivars can reduce the harmful influence of climate warming during upcoming decades.

Investigation of Thin Film Nanocomposite (TFN) Membrane with NH2-CuBTC for CO2/N2 Separation

Mahdi Fakoori[1], **Mousa Fakoori**[2], **Amin Azdarpour**[3] and **Bizhan Honarvar**[3,4]

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[3]*Department of Chemical Engineering, Islamic Azad University, Iran*
[4]*Department of Civil Engineering, University of Texas at Arlington, USA*

Wordwide heating is a general alarming subject agented *via* maximum CO_2 transmission to atmospher. therefore, CO_2 removing applying thin film nanocomposite membranes (TFNs) is a competent method to increment the CO_2 gas separation yeild. TFNs including two layers, support layer *via* polysulfone and thin layer for selectivity and permeability *via* pebax1657 filling by NH_2-Cu BTC was produced to separate gases. The achieved expriments from thermal gravity analysis (TGA) and field emission scanning electron microscope (FESEM) make known that the qualified samples declared a superior affinity among fillers and Pebax. The permeation analysis of total samples were investigated over different feed gas pressure was done range of 2 – 10 bar. Mixed gas feed was used for permeability and ideal selectivities improved by filling MOFs into the Pebax. At 15 wt.% filling of MOFs for total samples analysis. The permeability of gases (N_2, CO_2 and CH4) reached to 4.65, 202.7 and 6.82 Barrer, respectively, for neat sample were incremented as the used feed gas pressure incremented of 2 bar. Furthermore, the selectivities (CO_2/N_2 and CO_2/CH_4) was incremented to 43.59 and 29.72; respectively. Achieved tests revealed that the membranes performance was incremented at higher used feed gas pressure. The Sample of membrane including 15wt% NH_2-CuBTC hint a CO_2 permeability of 238.8 Barrer at 10 bar pressure.

Biography

Dr.Mahdi Fakoori was born in Borazjan city of Boushehr province.

2007-02-24 to present (Department of Process, South Pars Gas Complex (SPGC), Assalouyeh,Iran.) Employment.

Specialized fields: Oil and Gas | Membrane separation process , Nanotechnology, Process modeling and simulation, Catalysts, Hydrates, Gas processing (GTU), LPG Treatment and storage, Sulphur recovery unit.

PhD (Chemical Engineering-Transfer Phenomena and Separation Processes).

M.SC (Petroleum Engineering-Reservoir Engineering).

B.SC (Chemical Engineering- Gas Industry).

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Prediction of Influencing Atmospheric Conditions for Explosion Avoidance in Fireworks Manufacturing Industry- A Neural Network Approach

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Artificial neural networks (ANNs) are used to create occupational accident prediction models for Sivakasi firework industries. Atmospheric parameters of temperature, pressure and humidity are the reason for an explosion during chemical mixing, drying, and pellet making. In this study, ANN approaches are used to predict the accident owing to the atmospheric conditions. This prediction takes values from historical accident data due to the atmospheric conditions of Sivakasi (2009-2021). In the ANN model development, the feed- forward back propagation (FFBP) with Levenberg-Marquardt function has been employed with hidden layers of 5 and 10 to train the network. To create a constructive model, the network is trained with 70% of the data and tested with 30% of the data. The performance accuracy of both the hidden layers are evaluated and predicted the accidents happened due to the atmospheric condition is 82.7% and 67.8% respectively. In that predicted the duration of accident accuracy is 72% and 54%, specificity is 77.7% and 60.1%, sensitivity is 69% and 52.92% respectively. The hidden layer 5 is predicted to be of high accuracy than the hidden layer 10. This study is useful to the firework industry management and workers for improving the safety precautions and avoid the explosions, when the usage of hazardous chemicals reacts with the atmospheric conditions.

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Properties of Fired Clay Bricks with Incorporated Waste: Case of Coconut Shell Powder

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Laboratory of Physical Chemistry, Hassan II University of Casablanca, Morocco

The development of lightweight materials with reduced thermal conductivity and acceptable physical and mechanical properties has intensified in order to reduce the weight of buildings and energy consumption. Ceramics are one of the most widely used building materials in the world due to their simple manufacturing process and interesting physical-mechanical properties, although they have limited thermal conductivity values. Thus, the use of agricultural and industrial wastes as pore-forming agents in ceramic production has been growing worldwide. The incorporation of wastes into ceramics reduces both the environmental impact of waste materials and the current depletion of non-renewable natural resources. This study examines the experimental substitution of clay with 0, 10, 20, and 30 wt% of coconut shell waste powder. Chemical composition, phase identification and thermal behavior of the raw materials were analyzed by XRF, XRD, and TGA, respectively. The brick mixtures containing coconut waste powder in different proportions were formed and fired at 1100°C. Properties such as firing shrinkages, bulk density, porosity, water absorption, compressive strength, thermal conductivity, and microstructure of the fired brick samples were determined. It was found that the highly porous brick has an excellent insulating behavior (0.37 W.m-1.K-1), while maintaining adequate compressive strength (9.87 MPa). This study showed that the coconut waste could be used as a pore-forming agent in the production of bricks at certain ratios.

Biography

Zineb MOUJOUD is a PhD student in Faculty of Sciences Ben M'Sik, Hassan II University of Casablanca, Morocco. She is preparing her thesis in the Laboratory of Physical Chemistry, Materials and Catalysis (LCPMC) on the elaboration and characterization of new eco-friendly thermal insulation materials.

Rapid Quantitative Detection of Medetomidine Using an Electrochemical Sensor Based on Cnos Boosted with Metal Sulphide and Polymeric-Based Nanocomposite

Masoumeh Ghalkhani

Department of Chemistry, Shahid Rajaee Teacher Training University, Iran

Medetomidine, 4-[1-(2,3-dimethylphenyl) ethyl]-1himidazole hydrochloride, is a synthetic drug that is prescribed as a surgical anesthetic and sedative. This drug has analgesic effects too. In this work, a screen-printed carbon electrode (SPCE) was modified by a composite of N and P-doped carbon nano-onions (N, P CNO), MoS2, and poly (melamine) (PME) (SPCE/N, P CNO/MoS2/PME). First, synthesized nanomaterials and fabricated electrodes were evaluated and analyzed by FT-IR, FE-SEM, and XRD techniques. Then, the voltammetric response of medetomidine was evaluated using SPCE/N, P CNO/MoS2/PME. The effect of N, P CNO, MoS2, and melamine, deposited electrochemically on the surface of SPCE, was evaluated for medetomidine measurement. Results proved that mentioned nanomaterials enhanced the SPCE surface area and facilitated the electron transfer rate. A cathodic peak appeared in a buffered solution with pH = 7.0 containing medetomidine. A diffusion-controlled process resulted in the medetomidine electroreduction at SPCE/N, P CNO/MoS2/PME. The synergetic effect of N, P CNO and MoS2, providing wide active surface area, and PME as an electron conduction booster enhanced the modified electrode response toward medetomidine. The calculated limit of detection for medetomidine in the concentrations range of 0.04 to 700 μM was 10 nM. The SPCE/N, P CNO/MoS2/PME was able to accurately determine the medetomidine concentration in mouse blood samples with 90-98.2% recovery. The consecutive analysis of a medetomidine solution led to outstanding repeatability with RSD = 4.10%. The calculated RSD = 3.54% for the reproducibility test of SPCE/N, P CNO/MoS2/PME preparation introduced it as a proper sensor. The long-term stability is another outstanding feature of the SPCE/N, P CNO/MoS2/PME, for which a 23% decrement of the peak current was resulted after 6 months of storage.

Biography

Dr. Masoumeh Ghalkhani began her career at the top university in Iran- Sharif University of Technology (SUT) where she obtained her M.Sc. (2005) and received her PhD in Electrochemistry (2010). In Sep. 2012, she was appointed Assistant professor in Chemistry at Shahid Rajaee Teacher Training University, SRTTU, Iran. At present, she is Associate Professor of chemistry at SRTTU. Her current research interests include chemistry education, synthesis of nanomaterials and their application for electro-analytical chemistry, electro-chemical catalysis, fuel cells, supercapacitors, and sensors, mainly focused on fabrication and application of modified electrodes and biosensors. She has published over 100 manuscripts related to electrochemical systems, catalysis, and inorganic chemistry that have garnered over 2028 citations.

Elucidating the Molecular Mechanisms of Cholesterol Lowering Drugs Simvastatin and Lovastatin for their Antibiofilm Activity Against Bacillus Subtilis

Janmejay Pandey[1], **Nidhi Verma**[1,2], **Usha Kantiwal**[1] and **Mamta Bajia**[1]

[1]*Department of Biotechnology, Central University of Rajasthan, India*
[2]*Department of Microbiology, JECRC University, India*

Microbial biofilms are a cause of major concern as they enhance microbial resistance to conventional antimicrobials. Therefore, there is a pressing need for discovery and development of novel anti-biofilm therapeutics for mitigation of chronic diseases caused by biofilm-forming microbial pathogens. In recent past, several studies have reported cholesterol lowering drugs viz., statins for various pleiotropic effects, including inhibition of bacterial biofilms. Consequently, statins are projected as potential antibiofilm therapeutics. Unfortunately, none of the statins has yet been approved for 'anti-biofilm' applications. The same may be attributed to the lack of comprehension about the possible biological targets and the underlying mode of action for the anti-biofilm activities of the statins.

We have reported two statins (viz., Simvastatin and Lovastatin) for interaction with TasA(28-261), the major protein component of the Bacillus subtilis biofilm matrix. Also, these statins inhibited biofilm formation by B. subtilis. However, the mechanism for their antibiofilm activity remained obscure. Intending to decipher their antibiofilm mechanism of Simvastatin and Lovastatin, here we have investigated how their binding affects the physiological activity of TasA(28-261). TasA(28-261) has been reported to interact with TapA(33-253), form a heteromolecular complex, and aggregate into amyloid fibrils. We assessed the aggregation and amyloid formation by purified recombinant TasA(28-261) and recombinant TapA(33-253) in the presence of test statins. Results indicated that both statins interfered with aggregation and amyloid formation by TasA(28-261)-TapA(33-253) complex. Also, treatment with Simvastatin and Lovastatin did not significantly alter the expressions of major regulatory genes (spoA, sinR, sinI) and effector genes (bslA, tasA, tapA) related to biofilm formation in B.subtilis. These results highlight that Simvastatin and Lovastatin inhibit biofilm formation in B. subtilis by interfering with the essential process of aggregation and amyloid formation by TasA(28-261) –TapA(33-253) complex. These results present valuable insight for future studies for development of statins as drug repurposed anti-biofilm therapeutics.

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Biography

Dr. Janmejay Pandey is an active researcher in the field of Microbial Biotechnology. He received M.Sc. in Biotechnology from Kurukshetra University, Kurukshetra, 2002 and completed PhD. in Microbial Biotechnology from Institute of Microbial Technology – (IMTECH CSIR), Chandigarh, India in 2009. During doctoral studies, he worked as visiting scholar at Ecole Polytechnique Federal de Lausanne (EPFL), Lausanne, Switzerland and Commonwealth Scientific and Industrial Research Organization (CSIRO), Canberra, Australia. After obtaining the Ph.D. degree, he joined Gordon Centre for Integrative Sciences, University of Chicago, Chicago- IL, USA as a Postdoctoral Scholar in 2009 and later moved to School of Medicine, Georgia Health Sciences University, Augusta- GA, United States of America.

He returned to India in June 2012 and joined Central University of Rajasthan, Ajmer- Rajasthan as an Assistant Professor in Department of Microbiology. Subsequently, he joined Department of Biotechnology at Central University of Rajasthan in March, 2013.

To date, He has authored 30 research articles, 3 review articles in journals of high impact factors and international reputes. He has also contributed 9 book chapters. His work has been cited in ~ 1400 citations. He is a reviewer for several international journals and also serves as an Editorial Board Member for 'Open Access Biotechnology' journal published from London, UK. His current research interests include studies on (i) diversity of extremophilic actinobacteria towards isolation, characterization of novel bio-actives and therapeutics; (ii) genomics and bioinformatics guided discovery of microbial pathogen specific small molecule inhibitors.

Dr. Pandey has more than 10 years' experience in 'Good Laboratory Practices and Biological Safety Regulations'.

He is the founder Member Secretary of the Institution BioSafety Committee (IBSC) of the C. U. Rajasthan. He has been serving on this position since November 2013.

Impact of Spatial Metabolomics in Clinical Cancer Research

Swarnendu Bag

Academy of Scientific and Innovative Research (AcSIR), India

Metabolic reprograming of tumor cells support cell-proliferation, growth and progression of cancer. Understanding of metabolite expression in spatial context in the heterogeneous tumor microenvironment would be very crucial to find potential metabolic threat which might be an important prognostic marker or therapeutic target. Mass-spec imaging plays a vital role in the study of spatially resolved metabolomics. We found very interesting result regarding the impact of spatial (Tumor-Centre and Invasive-margin) metabolomics in immune contexture on oral cancer prognosis..

Biography

Dr. Bag presently is working as an Assistant Professor at CSIR-Institute of Genomics & Integrative Biology (IGIB) & Academy of Scientific and Innovative Research (AcSIR), New Delhi. He is an expert in the field Multimodal Spectroscopy and Analysis for the Proteomics study & Metabolomics study. His research expertise includes detection of biomolecules for early diagnosis, prognosis and predictive marker discovery of different types of metabolic disorders including cancer. He has diverse experiences in academic and research domain as faculty & scientist in different reputed institutions like National Institute of Technology Sikkim, India, Tata Medical Center, Kolkata, India & AIIMS, New Delhi, India.

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Phytoplankton Communities and Environmental Variables as Indicators of Ecosystem Productivity in A Shallow Tropical Lake

Yirga Enawgaw

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The water quality and ecosystem productivity of a tropical lake in Ethiopia (Lake Arkiet) was evaluated using phytoplankton and environmental factors. This was to ascertaining the lake's potential for various applications. Phytoplankton communities and some selected environmental variables were collected from two predefined sampling sites (open water and littoral) using a seasonal campaign between March to May (dry season) and June to August (wet season) in 2022. The analysis of the physicochemical characteristics of this study showed that the lake's water was well-oxygenated (6.8–16.7 mg/L), warm (25.8–29.8 °C), turbid (154–317 NTU), had poor water transparency (4.3–16.1 cm), and was alkaline (pH = 7.29–11.31). The concentrations of inorganic nutrients (phosphate and nitrate) were notably high, ranging from 2.12–5.26 and 2.19–10.64 mg/L, respectively. A total of 34 phytoplankton taxa from four divisions were identified in Lake Arekit. Bacillariophyceae (18 taxa) and Chlorophyceae (10 taxa) were the major groups of phytoplankton which together represented the largest (82%) phytoplankton taxa. The total biovolume of phytoplankton in the lake was to be 384.15 mm3/L. Cyanobacteria contributed the largest (41%) phytoplankton biovolume followed by Bacillariophyta (32%). The highest biovolume (about 75%) was constituted in the Microcystis aeruginosa, Cylindrospermopsis raphidiopsis, Anabaena spiroides, Pediastrum duplex, Aulacoseira granulate, Navicula schroeteri, and Nitzschia palea. The distribution of environmental factors and phytoplankton communities showed greater seasonality. High phytoplankton biovolume was observed in the dry season at both sampling sites concurrently with high water transparency and low water temperature. Findings from this study revealed that Lake Arkeit was a moderately polluted but productive lacustrine ecosystem that can still support aquatic life, fish production, irrigation, and aquaculture. The primary source of the pollution is the entry of inorganic and organic wastes from a brewery and other water bottling industries nearby and around the lake, as well as possible excessive nutrient levels due to the lake's geological background. It is advised that commercial factories stop producing or releasing waste in open spaces that are heavily washed and enter the lake via flooding and tributary rivers and streams. Additionally, the local government should work with the nearby communities to set up a buffer zone where people are prohibited from engaging in agricultural activities to protect and reduce pollution, which will help to preserve the lake's water and ecosystem.

Activation of Tuberculosis in Recovered COVID-19 Patients: A Case Report

Azzam H. Alhussein Alhajji, Abdullah Khouri, Mohamad F. Kashkash and **Rawaa S. Al-kayali**

University of Aleppo, Syria

This abstract discusses the potential link between COVID-19 and tuberculosis (TB) as two major causes of respiratory infections. The activation of latent tuberculosis infection after COVID-19 infection is a concern, particularly in TB-endemic areas. Patients with post-COVID-19 chronic respiratory symptoms should be screened for TB using the Gene-Xpert test, even if the Ziehl-Neelsen stain was negative. Several factors, such as HIV infection, tumor necrosis factor-α inhibitors, glucocorticoids, malnutrition, chemotherapy, or exposure to environmental factors like silica dust or cigarette smoke, may increase the likelihood of activating TB. It is important to consider these factors in order to ensure human health and safety.

Biography

Azzam Alhussein Alhajji is a dedicated radiology resident with a passion for medical research and volunteering. He has made significant contributions to the field of medicine, including publishing a case report that will be presented at this conference. Azzam is also a peer reviewer for BMC case reports journal. In addition to his academic pursuits, Azzam is a committed volunteer, having served for three years as a volunteer for medical journalism and medical team. He is deeply committed to improving the lives of others through his work and is always eager to share his knowledge and expertise with others. Working hard and commitment always were the secret of success, that is Azzam's favorite quote.

Two-Dimensional Structured Electrode of Nickel Oxide for Enhanced Capacitive Behaviour

Peeyush Phogat, Shreya, Ranjana Jha and **Sukhvir Singh**

Department of Physics, Netaji Subhas University of Technology, India

Two-dimensional (2D) nickel oxide (NiO) was synthesized using carbon as templates in a single step hydrothermal route. X-ray diffraction studies revealed the formation of a single phase NiO. Crystallite size and strain in the as synthesized material were calculated using the Williamson-Hall method and Size-Strain plot. UV-Vis spectroscopy investigations provided insight into the absorption region and optical band gap of NiO, including refractive index analysis. The optical absorption indicated that the material absorbs in both UV and part of visible region, with a reduced band gap of 1.9 eV. Microstructural analysis of NiO was carried out by using high resolution transmission electron microscope (HRTEM) which confirmed the presence of nanosheets. The selected area electron diffraction pattern (SAEDP) of the corresponding area revealed the polycrystalline nature of the as synthesized NiO, with fine crystallites oriented along (111) and (220) planes. Morphological analysis was performed using field emission scanning electron microscopy (FESEM), revealing the presence of 2D nano-sheets. Elemental compositional analysis was carried by using energy-dispersive X-ray spectroscopy (EDS) as an attachment of FESEM and TEM, which showed the presence of nickel and oxygen only. Nyquist plot and cyclic voltammetry depicts the capacitive behaviour, suggesting the material's suitability for capacitor/supercapacitor applications.

Biography

Mr. Peeyush Phogat is currently pursuing his Ph.D. in the Department of Physics at Netaji Subhas University of Technology. His current area of research is synthesis and characterization of materials, focusing particularly on applications in solar energy and capacitors. Holding a master's degree with specialization in condensed matter physics, He is driven by the pursuit of uncovering novel materials and their distinct properties, meticulously tailored for effective solar energy capture and the design of efficient capacitors. His scholarly endeavors have resulted in significant contributions towards the development of new and advanced materials for solar applications, which are evidenced by his 5 publications in esteemed SCI/SCIE journals and authorship of 2 book chapters within the renowned Springer book series. His expertise extends comprehensively into the domain of capacitors, where his research showcases a remarkable ability to engineer materials that optimize energy storage and discharge capabilities.

Effect of Heterojunction Dynamics on Charge Transfer Mechanism in Type-II Zns/Mos2 Nanocomposite

Shreya, Peeyush Phogat, Ranjana Jha and **Sukhvir Singh**

Department of Physics, Netaji Subhas University of Technology, India

The development of novel nanocomposites holds immense potential for various applications in optoelectronics, catalysis, energy storage systems and photovoltaic applications. In this manuscript, the synthesis and comprehensive characterization of type-II ZnS/MoS2 nanocomposite synthesized by hydrothermal roue are reported. The synthesized nanocomposite was characterized by numerous analytical techniques to investigate its structural, morphological, optical, and electrochemical properties. XRD analysis confirmed the presence of both ZnS and MoS2 phases in the nanocomposite, validating its successful formation. UV-visible spectroscopy (UV) was utilized to study its optical properties which revealed a band gap of of 3.2 eV. Scanning electron microscopy (SEM) and transmission electron microscopy (TEM) imaging demonstrated the presence of large sheets of ZnS with smaller nanoparticles of MoS2 dispersed over the surface, indicating the hierarchical structure os the composites. Cyclic voltammetry (CV) and electrochemical impedance spectroscopy (EIS) were performed to evaluate the electrochemical performance and charge transfer kinetics of the nanocomposite. These techniques facilitated the investigation of their suitability for solar cells. CV analysis displayed prominent reduction peaks, indicating the presence of active electrochemical sites in the nanocomposites. Furthermore, it revealed diffusion-controlled behaviour which indicates the potential of the nanocomposite for efficient solar cells. EIS analysis revealed the presence of Warburg diffusion in the Nyquist plot which indicates the possibility of efficient charge transport and ion diffusion within the nanocomposites. This shows the suitability of nanocomposite material for solar cell applications.

Biography

Ms. Shreya is currently pursuing her Ph.D. in Physics at Netaji Subhas University of Technology, where she is making significant contributions to the field of photovoltaic devices based on nanomaterials. Her profound interest revolves around exploring the exceptional properties of nanomaterials and propelling renewable energy technologies through their unparalleled potential. She is particularly focused on the properties and applications of two-dimensional materials like transition metal dichalcogenides. She has authored six SCI/SCIE/Scopus journal publications and four book chapters in highly esteemed Springer book series of conference proceedings.

Single and Combined Effect of Cd and Zn on Growth, Metal Accumulation and Mineral Nutrition in Tobacco Plants (Nicotiana tabacum L.)

Ramin Cham[1], **Tahereh Moghtaderi**[2], **Andrés Rodríguez Seijo**[3,4] and **Razieh Alamdar**[5]

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[2]*Department of Earth and Environmental Sciences, Rutgers University New Jersey state, United States*
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[4]*Instituto de Agroecoloxía e Alimentación (IAA), Universidade de Vigo – Campus Auga, Spain*
[5]*Department of Earth Science, Islamic Azad University, Iran*

Contamination by heavy metals (HM) is a global concern due to their impact on terrestrial and aquatic environments. This question has great relevance in agricultural areas due to excessive chemical fertilization. In this sense, Cd is a toxic element that can reach agricultural soils through chemical fertilization or sewage sludges. Tobacco plants (Nicotiana tabacum L.) can uptake and accumulate Cd in their tissues, and therefore, an increased risk for human health due to tobacco consumption.

This study was performed to evaluate the response of tobacco plants to a single and combined amendment of Cd and Zn on agricultural soil with a pot experiment. A factorial experiment was performed with four Cd levels (0, 25, 50 and 100 mg kg-1) and three Zn levels (0, 15 and 25 mg kg-1). Growth, Cd and Zn bioaccumulation and nutrient uptake parameters were assessed. The results revealed that during the tobacco growth, Cd was bioaccumulated on roots (translocation factor <1), while Zn was bioaccumulated on the aerial part (TF>1). Besides, the Zn amendment significantly decreased the Cd uptake and accumulation, especially under intermediate doses (15 mg kg-1 Zn). Zinc amendments could be helpful as a mitigation measure for Cd uptake in tobacco plants and, therefore, for health risk reduction.

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Conversion of Cud and Paper Waste to Biochar Using Slow Pyrolysis Process and Effects of Parameters

TayachewNega[1], Kirubeil Awok[1], Ashenafi Tesfaye Bicks[1], Endale Getu Mengstie[1], Getahun Tassew Melese[2], Ashager Shimelash Admasu[3] and **Aboytu Sisay[4]**

[1]*Mechanical Engineering, University of Gondar, Ethiopia*
[2]*College of Agriculture and Environmental Sciences, University of Gondar, Ethiopia*
[3]*Chemical Engineering, University of Gondar, Ethiopia*
[4]*Natural Resource Management, University of Gondar, Ethiopia*

A series of laboratory studies were undertaken in Gondar to explore the effects of temperature, air mass flow rate, heating rate, and residence duration on cud and waste paper char yields in slow pyrolysis. Cud and waste paper were burned at a low pyrolysis temperature (1670C) in a barrel reactor to generate biochar. The rate of decomposition depends on the feedstock and the process conditions. The biochar yield is mostly governed by the applied regulated temperature and airflow rate, according to the data. During the experiment, the main airflow rate delays the pyrolysis process. The temperature rises when both the primary and secondary air inlets open at the same time, resulting in lesser biochar output. The experiment was carried out at a slow pyrolysis temperature of 167°C, with 15% biomass moisture, 60% humidity, and a 0.35–1.5 kg/s air mass flow rate. At this temperature, 30 kg of feedstock, cup, and paper in the reactor generate 10 kg–23kg and 10–20 kg of biochar, respectively, at a 0.35 m/s airflow rate. As the airflow rate increases within the restricted values, a temperature gradient appears and tends to increase. However, as the pyrolysis temperature and airflow rate rise, the biochar yield decreases. Gasification of cud and species released during pyrolysis is not considered in this study. Further research on the chemical composition and ultimate analysis of the cud is proposed.

Table 1: Experimental results of heating rate during paper and cud biochar production

Primary air inlet open	Secondary air inlet open	Both inlets closed	Both inlets open
Heating rate (^{0}c/min) during waste paper biochar production			
0.6	0.75	1.2	1.7
1.25	1.4	0.3	1.15
0.6	0.5	0.6	1.05
0.5	0.7	0.75	1.55
Heating rate (^{0}c/min) during cud biochar production			
0.3	0.75	0.15	0.7
0.5	0.85	0.25	0.95
0.45	0.35	0.35	0.75
0.95	0.9	0.9	1.45

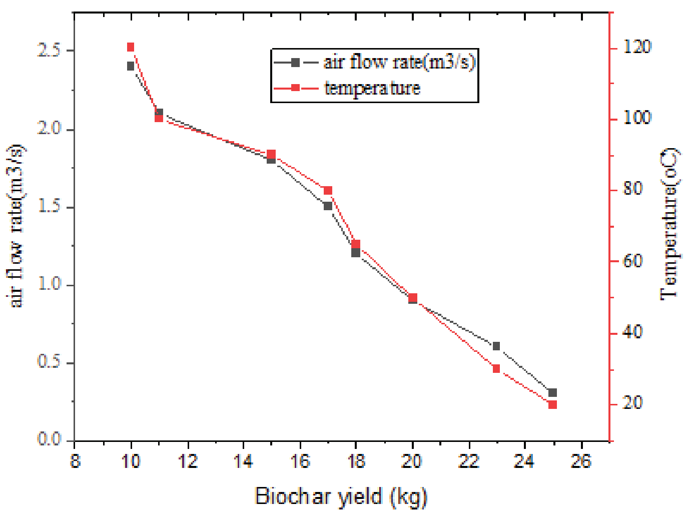

***Figure 1.** Effects of temperature on biochar yield*

Biography

Tayachew Nega Takele, an accomplished professional, earned his M.Sc. from Bahir Dar University's Institutes of Technology. Currently, he serves as a dedicated lecturer at the University of Gondar, contributing significantly to the academic landscape. Tayachew specializes in biomass conversion to fertilizer, with a keen focus on the pyrolysis process of gasification, biomass energy conversion, CFD modeling of gasifiers, and heat exchangers.

His expertise lies at the intersection of sustainable energy and environmental solutions. Through his work, Tayachew has made meaningful contributions to the understanding and application of biomass-related technologies. As a passionate educator and researcher, he plays a vital role in shaping the knowledge and skills of future professionals in his field. Tayachew Nega Takele's commitment to advancing sustainable practices in biomass energy conversion exemplifies his dedication to both academia and environmental stewardship.

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Environmental Magnetic Signatures in Mangrove Ecosystems in Northern Persian Gulf: Implication for Pollution Assessment in Marine Environment

Shadi Karbalaei Hassan[1], **Fatemeh Kardel**[1], **Hamideh Rashid**[2], **Reza Dehbandi**[3], **Philip K. Hopke**[4] and **Sajjad Abbasi**[5]

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[2]*Geological Survey of Iran, Azadi Square, Iran*
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Magnetic properties of different parts of mangrove trees like root, bark, and leaf (Avicenna marina) and sediment were determined for pollution assessment at Bushehr province in tree locations on the Persian Gulf's northern coast. The locations are chosen by different parameters. The study revealed that the sources of the particles deposited (Geogenic and anthropogenic) on leaf surfaces can be discriminated via saturation isothermal remanent magnetization (SIRM) values and heavy metal. However, different factors, including wind direction, size of the magnetic particles, and crown density, play a role in using SIRM for biomonitoring of atmospheric particulate matter. For leaves, the significant correlations between SIRM and leaf elemental contents indicated that the deposited particles on their surface mainly have Geogenic sources. The magnetic analyses revealed that leaves are more suitable than bark for monitoring atmospheric pollution using mangrove trees due to the effect of different factors, including the dense crown of trees, washing of tree trunks by sea waves, and elements translocation from roots and sediments. The leaves are more affected by environmental factors, and the deposition of dust with different origins is more on the surface of the leaves, especially in plants that have relatively large leaves or whose crown is dense. Instead, the positive and significant correlation between the SIRM values for sediments and mangrove roots and no or negative correlation between sediments and roots with barks and leaves indicates that the magnetic properties of the sediments and mangrove roots, which receive particles by water, are suitable indicators of pollution in the aquatic environment.

Biography

Shadi Karbalaei Hassan, a 34-year-old Iranian environmental scientist, holds a bachelor's degree in environmental engineering and a master's degree in marine biology. During her academic journey, she actively engaged in scientific activities related to environmental conservation, focusing on marine species and sea pollution. Shadi's dedication to marine research continued as she joined the Caspian Seal Conservation Center in Iran, where she currently works.

Her contributions to the field are evident through published articles on marine mammals and investigations into heavy metals in the marine environment. With a distinguished thesis defense, Shadi's nine years of professional experience reflect her commitment to advancing scientific knowledge. Inspired by her background, she aims to delve into the study of climate change and its relationship with the sea ecosystem in her future endeavors.

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WD-XRF Analysis of Elemental Valence States in Geological Samples

Ashok Kumar Maurya

Geological Survey of India, India

Elemental speciation has long been a matter of interest to geoscientists because of its significance in determining P-T stabilities of mineral assemblages, mineral equilibrium and deciphering lattice structure of minerals and their thermodynamic properties. The concept of speciation must be emphasized while assessing the potential toxicity. Wavelength Dispersive X-Ray Fluorescence (WD-XRF) is a non-destructive analytical technique that can provide rapid quantitative elemental analysis of geological samples. Investigation from literature indicates that Kβ spectra of 3d transition metals show a pronounced chemical sensitivity. The Kβ line series (Kβ1,3, Kβ2,5, Kβ′ and Kβ'' are related to valence to core shell (VtC) electronic transitions. Due to exchange interaction between 3p and 3d shells, relative intensity of the Kβ′ peak in respect to Kβ1,3 is proportional to the number of unpaired 3d electrons in compounds. Kβ″ and Kβ2,5 lines involve electronic transitions from metal hybrid orbitals. On the other hand X-ray lines Kα1,2 do not involve VtC electronic transitions and are not sensitive to valence state of metal. The major X-ray lines of L-series i.e. Lα1,2 and Lβ1 are also originated from valence shell electronic transitions. However, Lα1,2 and Lβ1 does not involve VtKC electronic transitions and in the best of our knowledge these lines have been never used for characterization of valence state by WD-XRF. In our present study, we have determined the valence state of 3d transition metals Cr, Fe and As using a bit less explored investigating lines i.e. Lα1,2 (3d5/2□2p3/2 and 3d3/2□2p3/2) and Lβ1 (3d3/2□2p1/2). The reason for our choice of Lα1,2 and Lβ1 fluorescence lines is that oxidation states of 3d metals have different number of unpaired electrons in the 3d valence shell and they are directly involved in Lα1,2 and Lβ1 transitions. The study aims to assess the capability of WD-XRF spectrometers for direct quantitative speciation of 3d metals in solid samples without sample dissolution. The results indicate that WD-XRF can effectively study the oxidation states of 3d transition series elements in various compounds.

Biography

Ashok Kumar Maurya is a seasoned geoscientist with a wealth of expertise in chemistry, particularly in the realm of geological sample analysis. Armed with a Bachelor of Science (2005) and a Master of Science (2007) in Chemistry from Purvanchal University, Jaunpur, he furthered his education by pursuing a Doctor of Philosophy (2016) from the CSIR-Central Drug Research Institute. Prior to joining the Geological Survey of India as a Senior Geoscientist (Chemistry), he held the position of "Research Officer" at Uttar Pradesh Jal Nigam, a drinking water supply organization, from 2013 to 2016. Currently, he is actively involved in research at the wavelength dispersive X-ray fluorescence spectrometer laboratory, where his primary focus lies in developing novel analytical methodologies.

Potential of Banana Peel and Peduncle Powder (BPPP) as Dietary Fiber in Bakery Product

Muhammad Wasim Sajid and **Natasha Siddique**

COMSATS University Islamabad, Pakistan

The banana peel and peduncle powder (BPPP) can be used to enhance the dietary and nutritional properties of a bakery product. The purpose of this study is to use the banana fruit waste in an economical way and to enhance the nutritional properties of chicken patties. For this purpose, banana peels and peduncle samples were collected from local fruit market of Sahiwal district. Then, samples were dried completely and grind to form powder. Chemical analysis was done to determine the different contents of this BPPP. Chicken patties with different levels of banana peel powder i.e. 0.0%, 0.5%, 1.0%, 1.5 % and different levels of banana peduncle powder i.e. 0.0%, 0.5%, 1.0%, 1.5 % and mixture of both powders (0.5+0.5) were processed to evaluate the effect on the chemical composition and sensory characteristics. The chemical composition such as moisture and crude fiber were similar among treatments. The level of ash and potassium in chicken patties increased and on other side crude protein level decreased with increasing level of BPPP. According to sensory evaluation, all parameters of control chicken patties and the patties with addition of banana peel and peduncle powder (0.5+0.5%) were similar. Conclusively, the addition of banana peel and peduncle powder (0.5+0.5%), can produce a product with similar properties as that of the control.

Biography

Dr. Muhammad Wasim Sajid, an Associate Professor with nine years of expertise in Food Science, has significantly impacted both academia and the field. Leading as BS Coordinator and Incharge of FSN Labs, he not only molded the curriculum but also enriched practical learning experiences. Dr. Sajid's dynamic teaching style transformed complex Food Science subjects into accessible knowledge, earning him respect among students. Beyond teaching, he mentored several Master's students, guiding them in impactful research projects. His commitment to innovation in pedagogy, blending theory with real-world applications, reflects in the success of his students. Dr. Sajid's legacy lies in shaping minds, bridging the gap between education and industry, and inspiring the next generation of food scientists.

Enhancing Thermal Efficiency of Cookware Through Fin Implantation: Experimental Analysis and Numerical Validation

Saurabh P Joshi and **Dnyaneshwar R Waghole**

Dr. Vishwanath Karad MIT World Peace University, India

Growing need for non-renewable energy, like petroleum, and its extraction challenges urge scientists to prioritize renewable resources for sustainable energy. Extensive research is addressing domestic LPG overconsumption and energy-saving. This study focuses on enhancing energy efficiency by adding fins to the bottom of specific cookware. To achieve this goal, a study involves the analysis of up to five stainless steel cookware, each equipped with a unique fin setup designed to enhance thermal efficiency, raise temperatures more effectively, reduce gas consumption, optimize gas flow rates, and assess various dimensionless numbers. Results shows that among all the five cookware, Cookware 3 (CW3) outperformed by showing the thermal efficiency of 61.5% to the gas flow rate at 15.27 mL s −1. This modified cookware showed an improved thermal efficiency (4.065% at gas flow rate of 15.27 mL s −1) when compared to the performance of a normal cookware with no fin arrangement present. In addition, the experimental data are validated using ANSYS Fluent software and MATLAB platform with Deep Neural Network-based Binary Bat algorithm (DNN-BBA). The results of the DNN-BBA technique showed a strong correlation with the actual results for temperature increase, thermal efficiency, gas consumption, Nusselt number, Prandtl number, and Rayleigh number. Additionally, the present study is able to maintain the burner's thermal efficiency at a higher level of 3%, compared to the previous study which achieved 2.5%

Biography

Mr. Saurabh Pradeep Joshi, working as an Asst.Professor in Mechanical Engineering Department of Shri Sant Gajanan Maharaj College of Engineering Shegaon. He has 10+ years of teaching and research experience in thermal engineering, energy management and food chemistry fields. He has wide experience in researching various cookware parameters influencing its performance and overall chemistry of food engineering incorporated in domestic cooking processes. He has published several research papers on this topic along with two international patents. His contributions to this cooking chemistry field were acknowledged several times by many prestigious felicitations and rewards. Currently he is pursuing his doctoral work on cookware applications from Dr. Vishwanath Karad MIT World Peace University Pune,INDIA.

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Francisella and Tularemia in Western Asia, Iran: A Systematic Review

Farhad Moradi and **Zahra Fooladfar**

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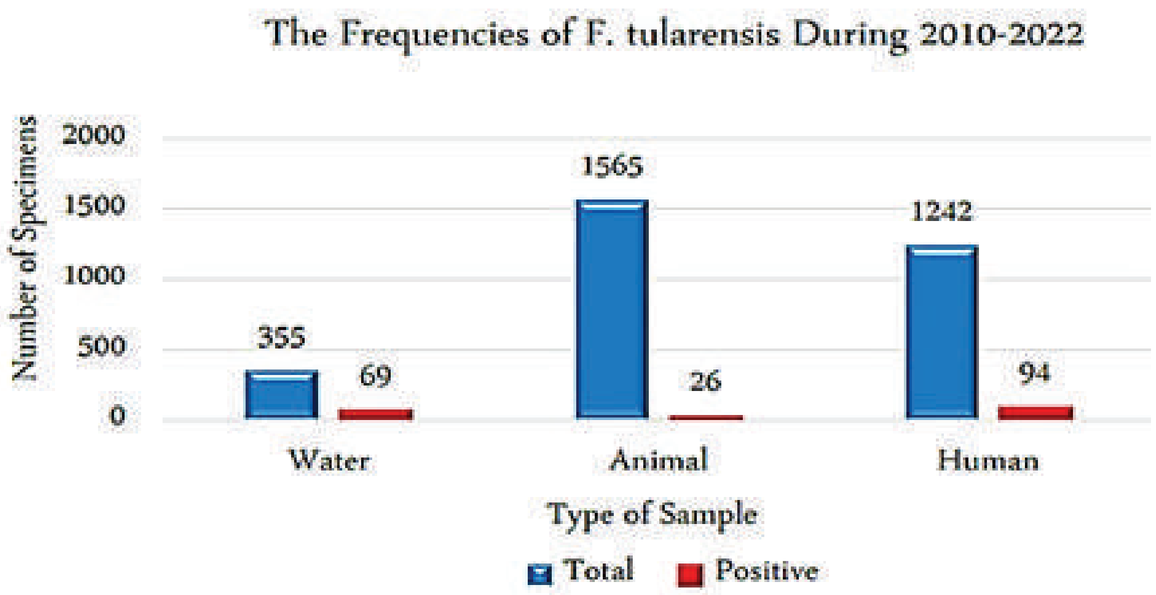
Objectives: Tularemia or rabbit fever is a transmissible disease from animals, rodents, and insects to human populations that is caused by Francisella tularensis. Epidemiological studies showed that tularemia is endemic throughout most different regions of the world. Recent evidence documented the transmission of the F. tularensis in a different part of Asia. Because there is no updated review information for tularemia in Iran, we performed this systematic review.

Methods: In this study, we systematically explored biomedical databases (Google Scholar, Scopus, PubMed, and Web of sciences) to identify epidemiology, reservoirs, and carriers of Francisella in animal and human clinical specimens from 2010 to 2020, either in English or in Persian.

Conclusion: Different studies have shown the different frequencies of F. tularensis among human and animal resources in eighteen provinces of Iran. In total, 1242 human clinical specimens, 1565 animal samples, and 355 environmental water samples were investigated to find F. tularensis in different provinces of Iran. According to the collected documents, 94 human clinical samples, 69 water samples, and 26 animal specimens were introduced as positive samples for the F.tularensis (table 1). According to studies, thirteen species of rodent and hare presented as an inter-epizootic reservoir. Only one species of tick (D. marginatus) was introduced as a vector for Francisella in Iran (fig1). According to these results, it is essential for exclusive attention to the prevalence of F. tularensis in different provinces of Iran. Furthermore, special planning should be done for prevention, control of the outbreak, and proper treatment of the tularemia.



Aquatic and Sylvatic cycle of *Francisella* in Iran

A Deep Learning Approach for Nucleus Segmentation and Tumor Classification from Lung Histopathological Images

P. Mirunalini[2] and **S. M. Jaisakthi**[1]

[1]*School of Computer Science and Engineering, Vellore Institute of Technology, India*
[2]*Department of Computer Science and Engineering, Sri Sivasubramaniya Nadar College of Engineering, India*

Objectives: This work proposes a deep learning based pipeline for multi-class classification of lung tumor type (Benign (B), ADenoCarcinoma (ADC) and Squamous-Cell Carcinoma (SCC)) from histopathological images. The proposed automated method detects and analysis the cancer types significantly improves the diagnosis process.

Scope: The paper proposed a deep learning-based pipeline for multi-class classification of lung tumor types from histopathological images. The proposed pipeline includes two methods: the Pdir pipeline, which classifies Whole Slide Histopathological Image (WSHI) patches using a DCNN classifier, and the Pseg pipeline, which extracts nuclear regions from the WSHI patches using an Xception-style UNet based neural network and then categorizes them into tumor types using the same downstream DCNN architecture. The authors also perform stain color normalization to normalize the effect of H &E staining across all images of the dataset. The proposed pipeline is evaluated on a dataset primarily used for classification, and the authors show that their method outperforms related work based on the same dataset. The paper aims to contribute to the field of health informatics and bioinformatics by providing a more accurate and efficient method for lung tumor classification.

Methods used: The authors propose a deep learning-based pipeline for multi-class classification of lung tumor types from histopathological images. The pipeline includes two methods: the Pdir pipeline and the Pseg pipeline. The Pdir pipeline directly classifies Whole Slide Histopathological Image (WSHI) patches using a DCNN classifier. The proposed method uses a ResNet-50 architecture for this purpose. The ResNet-50 model is pre-trained on the ImageNet dataset and fine-tuned on the lung tumor dataset used in this study. The method use the Adam optimizer with a learning rate of 0.0001 and a batch size of 32 for training the ResNet-50 model. The Pseg pipeline extracts nuclear regions from the WSHI patches

using an Xception-style UNet based neural network and then categorizes them into tumor types using the same downstream DCNN architecture used in the Pdir pipeline. The authors use the Segnet model for segmentation, which is a deep convolutional neural network that is specifically designed for semantic segmentation tasks. The Segnet model consists of an encoder network and a decoder network. The encoder network is a pre-trained ResNet-50 model, and the decoder network is an Xception-style UNet model. The authors use the Adam optimizer with a learning rate of 0.0001 and a batch size of 32 for training the Segnet model. The authors also perform stain color normalization to normalize the effect of H &E staining across all images of the dataset. The proposed pipeline is evaluated on a dataset primarily used for classification, and the authors use stratified k-fold cross-validation to validate model training. They report the overall classification accuracy, class-wise precision, recall, and F1-score of the classifiers. They also compare the performance of their proposed pipeline for class-wise classification. The t-test was performed to compare the accuracy of the proposed classifiers Pdir and Segnet.

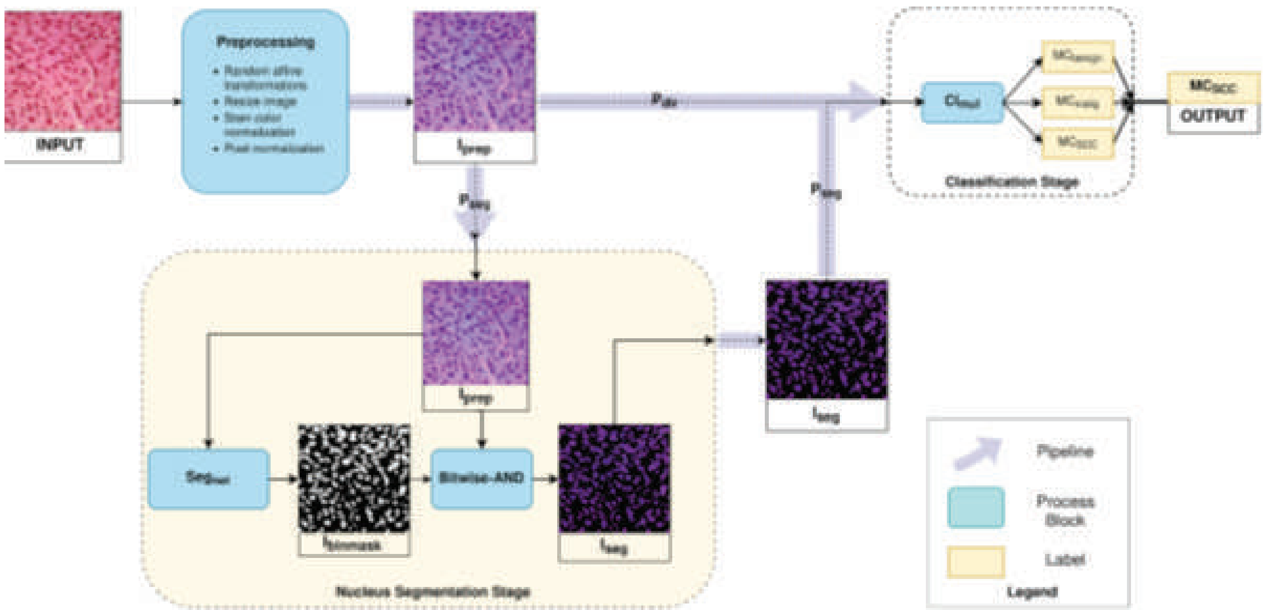


Fig. 1 A flowchart representing the proposed system. Pipelines Pdir and Pseg , as described in Sect. 3.1, represent the pipelines for direct and nucleus segmented classification of the WSHI patches

Results: Performance summary of the multiclass classification DCNN Clmul. Results are presented as a comparison between the two pipelines --- the baseline Pdir and the proposed Pseg.

Conclusion: A deep-learning based classification pipeline was proposed for classifying lung tumors from WSHI patches into B, ADC and SCC types. The authors posited that extracting and retaining only the nuclear regions of the WSHI patches can significantly improve the DCNN classifier's ability to discern tumor classes. To this end, this work designed, compared and presented two classification pipelines — baseline Pdir and proposed Pseg — that uses the same downstream classification architecture — Clmul. The Pdir pipeline performs classification directly on the WSHI patches. It achieves an overall accuracy of 95.40%. On the other hand, the Pseg pipeline first segments the WSHI patches to retain only nuclear regions, and then feeds this image to the classifier. This approach improves the classification accuracy to 99.60%, proving our original hypothesis the nuclei provide key information to characterize the tumor type, and segmenting them out has a positive impact on the classifier performance. The proposed methodology has outperformed state-of-the- art methods and also reduced the computational cost. As future work, our proposed methodology can also be implicated in the effective diagnosis of other diseases.

Biography

Dr. P. Mirunalini working as Associate professor at department of Computer Science and Engineering, Sri Sivasubramaniya Nadar College of Engineering, Chennai. She received her Ph.D. from Anna University, Chennai in 2016. Her doctoral research focused on stenosis detection based on automatic segmentation and tracking of coronary arteries from computed tomography angiography images. Her primary research includes medical image processing and analysis, pattern recognition, Computer Vision, Machine learning and Deep learning. She has published papers in international journal and conferences.

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Bibliographic Review on Drought and Water Level Articles

Kemal Adem Abdela[1,2], **Aragaw Fantabil, Dereba Muleta, Tamirat Yohannes** and **Kazora Jonah**

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[2]*Agricultural ministry of Ethiopia, Ethiopia*

This bibliographic article on Drought and Water Level examined the relationship between organizations, nations, institutions, authors, references, and publishers. It examined 742 papers from Web of Science at the Nanjing University of Information Science and Technology's. The total annual publication volume of articles was increased steadily from 2012 to 2021, with China and the United States ranking first and second in terms of publication volume and citations but in quality Switzerland and England were top-level. Institutional-partnership analyses indicated disparities in network density and connections, with the Chinese Academy of Sciences (2012) receiving the highest citations and degrees. The document co-citation analysis (DCA) network was created to improve understanding of the frequency and amplitude of bursts of various publications in separate clusters. The most cited work was J Hydrol (2012), with 302 citations. The analytical tool from CiteSpace collected high-frequency keywords and performed co-occurrence, grouping, and emerging word recognition. Gorges Dam is the most crowded cluster, followed by drought stress. The greatest burst duration and most significant phrase is reservoir (2019), followed by "water quality," which has a 5 year burst period. Estuaries perform important functions such as water purification and coastal. "Reservoir, water quality, restoration, phytoplankton, temperature, wetland, time series, diversity and carbon dioxide" are the most important terms, while "climate change, drought, water level, impact, growth, variability, response, dynamics, management and model" are the most frequently used keywords. In terms of citations, references, and academic influence, Zhang Q. (2012), the R Core team (2014), and Jappen E. (2015) were the top three contributors. Cook, ER (2013), and Allen, R.G. (2019) ranked first and second in terms of frequency, respectively. In this review work, significant information gaps were discovered in the areas of microbiological dynamics, environmental variables, fen peat incubation, lake water, drought risk reduction, biological ecology, lake acidification, salinity variations, and attribution. Future researchers should focus on these and similar topics, while Chinese and USA authors should concentrate on article quality rather than publishing numbers.

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Biography

Abdela Kemal Adem, a 35-year-old Ethiopian scholar, is currently pursuing a Ph.D. in hydro-meteorology at Nanjing University of Science and Technology, China. His research focuses on the impact of water level and drought on climate change and global warming. With a background in small-scale irrigation and family nutritional well-being in rural Ethiopia, Abdela possesses six years of professional expertise in these critical areas.

Abdela has actively contributed to scientific literature, being the first and corresponding author of a bibliographic review on drought and water level articles (doi.org/10.1007/s43832-023-00038-w). Additionally, he is the second author of a paper exploring the impacts of surface water interchange in the Chu River of Nanjing, China (10.3389/fenvs.2022.1084623). With one review and one research paper currently under review, Abdela Kemal Adem continues to make significant strides in advancing knowledge and addressing pressing environmental challenges.

Electrochemical Biodetection of Glucose Using La0.6Sr0.4Co0.8Fe0.2O3 And La1,7Sr0,3cuo4 Nano-Particles Modified with Black Carbon Deposited on Glassy Carbon Electrode

M. Mekersi[1,2] and **M.Ferkhi**[1,2]

[1]*Laboratory of Materials Interaction and Environment (LIME), University of Jijel, Algeria*
[2]*Department of Chemistry, University of Jijel, Algeria*

Glucose (GO), represents a vital component in human blood that provides energy via a chemical metabolic process. A growing concern of diabetes mellitus has become a globally significant public health challenge, causing other non-communicable diseases and health complications such as obesity and encephalopathy, cardiovascular disease, stroke, and chronic kidney failure. Non-enzymatic developed biosensors, especially with noble nanoparticles received tremendous attention in the field of glucose molecule sensing. Herein low-cost, highly sensitive, and more effective nano-sized perovskites materials such as La1,7Sr0,3CuO4 and La0.6Sr0.4Co0.8Fe0.2O3 were synthesized by a simple citrate method, modified with black carbon and deposited as a matrix on a glassy carbon electrode in purpose to use as electrodes for the simultaneous detection of glucose behavior. The crystallite size, refinement, purity, shape, and morphology of nanomaterials were characterized using X-ray diffraction and Scanning Electron Microscopy techniques. Cyclic voltammetry, Differential Potential Voltammetry, Square Wave Voltammetry, and Electrochemical Impedance Spectroscopy techniques were used as investigative voltammetric monitoring techniques. As a result, the modified electrodes showed excellent response and sensitivity towards glucose molecule detection compared with previous literature, with a wide linear range from 0.1 M to 0.1 nM for La0.6Sr0.4Co0.8Fe0.2O3 and 0.1 M to 0.001 nM for La1,7Sr0,3CuO4, high sensitivities of 614.7 and 876.3 μA.mM−1. cm−2 and low detection limits of 0.972 nM and 0.0194 nM respectively. The performance of electrodes was checked by using two real samples such as synthetic urine and human blood. Both of the modified electrodes demonstrated satisfactory, sensitive, selective and reproducible results in real samples.

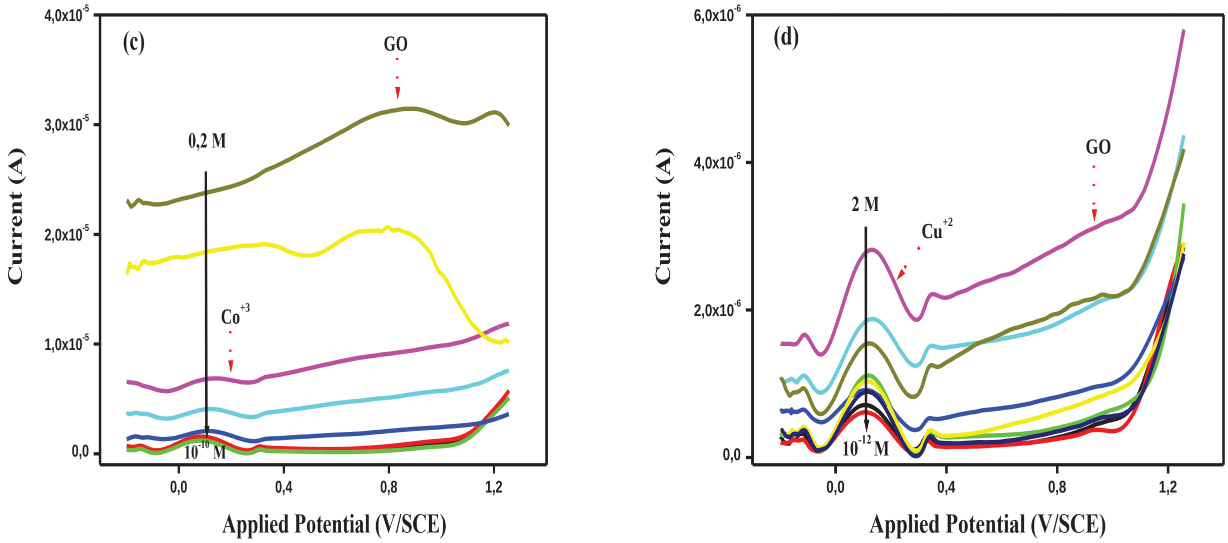


Figure 1. *DPV for several concentrations of glucose varied at LSCF and LSCu nanoparticles.*

Biography

Marital Status:

Full Name: Mouna Mekersi

Date of birth: 26/09/1995 Khenchela-Algeria

Algerian nationality

Trainings/Diplomas:

2017/2018: Obtaining bachelor's degree in analytical chemistry.

2019/2020: Obtaining master's degree in analytical chemistry and environment.

2023/2024: A PhD student 5th year in analytical chemistry at Jijel University.

2022/2023: Short term internship in Malatya-Turkey.

Special skills:

Computer science: Good command of computer tools such as: Excel, Word, Power point, Different software and internet.

Languages: Arabic, English, French and Turkish.

Publications: Publication of an article on glucose detection in Microchemical Journal and sending a second article on nitrates detection.

Soil Fertility and Fertilization of The Field Crops on Typical Chernozem of Moldova

B. Boincean, I. Secrieru, M. Prozorovschi and **A.Rotari**
Seletia Research Institute of Feald Crops Calea Esilor, Republic of Moldova

The researches have been conducted in the long-term field experiment on Typical chernozem soil from the Balti steppe (Northern part of the Republic of Moldova) with different system of the soil fertilization in the crop rotation. The duration of the experiment is more than 50 years. The experiment includes twelve system of soil fertilization in four repetitions. Each plot is 242 sq.m (5,6 m *43,2). The systems of fertilization includes: unfertilized control, mineral fertilizers in three rates (NPK 75, NPK 130 and NPK 175 kg a.i. per ha of crop rotation); 10t/ha of composted manure with the same rotes of mineral fertilizers; 15t/ha of composted manure with the same rotes of mineral fertilizers; 15t/ha composted farmyard manure.

The yields of each crop in the six years crop rotation, are analyzed for 50 years. Nitrogen-use efficient was determined for different system of fertilization and the store of soil fertility in fertilization and the store of soil fertility in yield formation.

Conclusions:

1. The yields of crops are increasing medially, but in time they have the tendency to stabilize and to decrease during the last 20-25 years.
2. Nitrogen- use efficient NUE from mineral fertilizers is relatively low and differ according the crops in the crop rotation. The lowest NUE have been determined for corn, for grain and sunflower, but the highest for winter wheat and sugar beet.
3. The shore of soil fertility in yield formation (from the decomposition of soil organic matter) consists, depending on crops, from 60 up to 95%.

Biography

Agronomist. Head of the Department of Sustainable Farming Systems at Selectia Research Institute of Field Crops, Balti, Republic of Moldova since 1990. After graduation of Moscow Agricultural Academy by name of K.A. Timiriazev, he was recommended to continue studies as postgraduate student of the same academy. In 1982, the PHD thesis was defended on transformation of soil organic matter on non-chernozem soil. In 1998 the doctor habilitate thesis was defended on crop rotation and soil organic matter on Chernozem soil of Moldova. In 2023, Dr. Boincean was elected as member-correspondent of the Academy of Sciences of Moldova.

Exploring the Versatility of Laccases: Fungal and Bacterial Laccases in Environmental Applications

S. Lzaod and **T. Dutta**

Indian Institute of Technology Delhi, India

Laccases are multi-copper oxidoreductases that catalyze the oxidation of a wide array of phenolic and non-phenolic substrates. Wide substrate spectrum of laccase coupled with its ability to catalyze multiple reaction types render it eminently beneficial for diverse applications. Although laccases are ubiquitous in bacteria, fungi, insects, and plants, till date, only fungal laccases have been extensively studied. However, fungal laccases have many shortcomings including sensitivity to extreme pH and temperature and the presence of inhibitors such as certain organic solvents, salts, and metals. These limitations can prevent its widespread industrial use. In such cases, immobilization can improve their stability. Our initial study focused on the immobilization of T. versicolor laccase by two methods – encapsulation in polyacrylamide gel and construction cross-linked laccase aggregates and their application in the biotransformation of phenolic endocrine disruptors (EDCs). Immobilization led to a decrease in turnover number, and substrate affinity. However, it conferred substantial stability and reusability compared to free enzyme. Nevertheless, there are some additional challenges associated with fungal laccases such as slow growth rate, high production costs, and accumulation of biomass. Under such circumstances, a burgeoning interest has surrounded extremophilic bacterial laccases. In addition, bacterial laccases offer the advantage of cost-effective production. Consequently, we explored the potential of a novel thermostable bacterial laccase (LacT) from Brevibacillus agri in the biotransformation of EDCs. Although, LacT was less efficient than fungal T. versicolor laccase, a redox mediator and copper ions were successfully used to improve its efficiency. Moreover, LacT's thermostability and high salt, organic solvent, and metal tolerance provided an added advantage.

Biography

Stanzin Lzaod obtained her M.Sc. in Chemistry from Indian Institute of Technology Delhi, India, in year 2020. Currently, she is a graduate student at the Department of Chemistry, IIT Delhi, India. Her research interests include protein engineering and enzyme technology.

Design and Development of Novel Non-Propellent Foam-Based Formulation for Effective Burn Related Wound Healing

Mohit Kumar, Shruti Chopra and **Amit Bhatia**

Department of Pharmaceutical Sciences and Technology, Maharaja Ranjit Singh Punjab Technical University (MRSPTU, India

Burn and burn related complications pose a serious health, social and economic problems to our society. According to WHO, fire related burns cause annual deaths of more than 3,00,000 people. Conventional burn treatment involves use of silver sulphadiazine and other antimicrobial agents as ointment and cream. They are greasy in nature and stick to clothes. The applications of these formulations by finger or applicator produce pain to the affected area and incur possibility of microbial contamination. In order to overcome these hurdles, we developed a novel non-propellent foam-based formulation containing silver nitrate, chlorhexidine, and asiaticoside for effective burn related wound healing. Initially, Non-propellent foam (NPF) containing Labrasol®, sodium lauryl sulphate, hydroxy propyl methyl cellulose, butylated hydroxytoluene, ethanol and distilled water was prepared and evaluated for its consistency and ability to form a foam when actuated in a propellant-free pump. The drugs, silver nitrate, chlorhexidine, and asiaticoside were then loaded into NPF. The foam-based formulation was statistically optimised by using Box-Benhken design to determine the effect of polymer and surfactants on the critical foam properties. The independable variables showed significant effect on foam collapse time, foam density and in-vitro drug release. The optimised formulation showed a collapse time of 64 sec and had excellent spreadability. The diffusion study showed that more than 90% of the drug released within 6 hrs. The prepared foam formulation has a unique nature of collapsing upon slight touch which is highly beneficial for burn patients. Therefore, the non-propellent foam formulation with quick collapse time, excellent spreadability and excellent antibacterial efficacy represents a promising avenue for burn wound treatment without use of any applicator or finger.

Biography

Mohit Kumar is a PhD scholar and research assistant in Indian Council of Medical Research- sponsored project at the Department of Pharmaceutical Sciences & Technology, Maharaja Ranjit Singh Punjab Technical University, Bhatinda, India. With a remarkable four-years of research background in pharmaceutical sciences and drug delivery. Mohit has dedicated his expertise to addressing the global concern of burn-related wound infections, affecting approximately 11 million people globally every year. His prolific academic journey includes the authorship of 35 papers, published in high-impact science journals. His outstanding contributions have earned him prestigious accolades such as the Young Researcher Award at an international conference in Pondicherry (India 2023) and the Best Paper Award at ICONICA 2020 India. He is recognized by the CENTRAL LIBRARY OF MEDICINE FOUNDATION of Argentina for a groundbreaking paper focused on perfumes. His diverse accolades range from quiz competitions to poster presentations, demonstrating his excellence in academic pursuits. Apart from academia, he has great interest in cricket, dance, music, and reading as part of his hobbies.

Development of Yogurt Fortified with Four Varieties of Common Bean (Phaseolus vulgaris) Whey by Using Response Surface Methodology: A Preliminary Study

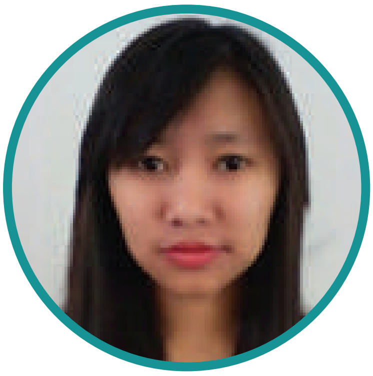
Ahmadullah Zahir[1], **Emal Naseri**[2] and **Muzahir Hussain**[3]

[1]*Department of Food Science and Technology, Afghanistan National Agricultural Sciences & Technology University, Afghanistan*
[2]*Wardak University, Wardak, Afghanistan*
[3]*MoBioFood Research Group Biochemistry and Biotechnology Department, Universitat Rovira i Virgili, Spain*

In recent years, there has been a growing interest in developing novel foods with improved health and nutritional characteristics, particularly through the supplementation and development of dairy products with plant-based ingredients. In this study, the response surface methodology (RSM) was employed to optimize the ingredient formulation and processing parameters of common bean whey-fortified yogurt (CBWFY) production containing Lactobacillus bulgaricus, and common bean whey (CBW) with a high probiotic count, superior physicochemical and textural properties, and desirable sensory attributes. The experiments were planned using the "box-Behnken design" (BBD) with three independent variables: fermentation time (0-10 hr), common bean ratio (25%-100%), and the amount of starter culture (1%-5%). To assess the physicochemical properties of the yogurt, such as pH, titratable acidity, viable cell count, and syneresis of the CBWFY, they were determined and optimized. In all the common bean whey samples, the optimum conditions were obtained by supplementing cow milk with 25% common bean whey (CBW), an inoculation ratio of 1%-4%, and fermentation for 5.54 hr. Fermentation time and CBW concentration significantly affected the viability of L. bulgaricus and the physicochemical attributes of yogurt. This study demonstrated that the addition of cow milk with 25% CBW from the white bean variety produced probiotic yogurt with the highest L. bulgaricus population (up to 8.55 log CFU/mL) compared to the other varieties and an enhancement in the yogurt's pH and acidity, while a decrease in yogurt syneresis occurred. In general, the results of the current study showed that adding up to 25% white common bean whey to probiotic yogurt can be an option for producing yogurt with potential functional and sensory quality.

Highlights:

- Four common bean varieties were used to produce common bean whey (CBW).
- Among the four varieties of common beans, the white bean was most effective in producing common bean whey (CBW).
- Response surface methodology (RSM) was employed, and the optimum conditions were obtained.
- With 25% supplementation of CBW, common bean whey-fortified yogurt (CBWFY) was produced.



Interplay of Proton Transfer, Charge Transfer and Geometrical Isomerism in Bisdemethoxycurcumin with a Donor-π-Acceptor Design: A DFT Study

Sophy A. Shimray and **Francis A. S. Chipem**

Department of Chemistry, Manipur University, India

Bisdemethoxycurcumin (BMC), a natural polyphenol in turmeric, features a π-conjugated system with a six-membered intramolecular hydrogen-bonded ring at the center that displays a π-conjugated donor-acceptor-donor (D−A−D) structure. The molecule exhibits geometrical isomerism around the allylic double bond and excited state intramolecular proton transfer (ESIPT) through the hydrogen-bonded ring at the center. [1] In this work, we present our theoretical investigation, by employing density functional theory, on the photophysical and electronic properties of the system by simultaneously replacing the hydroxyl groups at both ends of the molecule with an electron-releasing dimethylamino (−NMe2) group at one end and an electron-withdrawing cyano (−CN) group at the other end of the molecule. The calculated UV−Vis absorption spectrum of the molecule is characterized by two absorption band maxima at 368 nm and 453 nm. Upon photoexcitation, the substituted molecule undergoes a supplementary photophysical process, vis., twisted intramolecular charge transfer (TICT) in addition to the above-mentioned two processes. The energy and the potential energy curves in the S1 state show that ESIPT, geometrical isomerism and TICT compete each other. While there are three geometrical isomerism pathways occurring at three C=C double bonds along the aliphatic chain, there are possibilities of formation of three different TICT states by twisting of dimethylamino, dimethylanilino and cyanophenyl groups to 90º orientations.

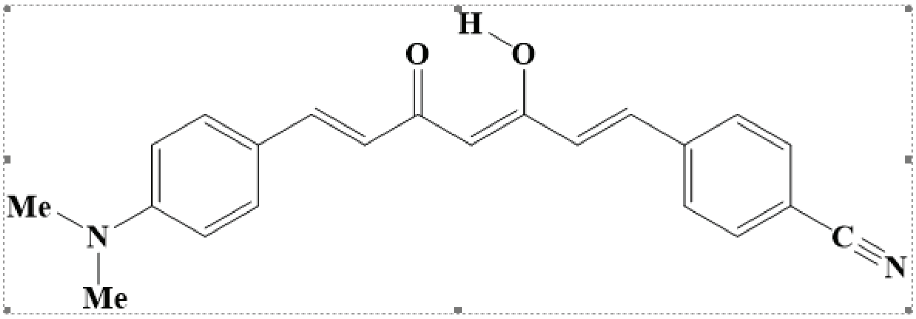


Chart 1. Substituted Bisdemethoxycurcumin

Biography

Sophy A. Shimray studied chemistry at Manipur University and received her M.Sc in Physical Chemistry in 2017. She then joined the research group of Dr Francis A.S. Chipem at the same University and is currently pursuing her PhD studies regarding the structure–function relationship of curcuminoids. Her research interests include photophysical processes, fluorescence, and computational Chemistry.

Fabrication, Characterization, and Mechanical Properties and Wear Characteristics of Graphite Nanoplatelets Incorporated Nanotwinned Cu Composites

P. Shrivastava[1,2], S. N. Alam[1], A. Ghosh[1] and **K. Biswas[2]**

[1]*Bhabha Atomic Research Centre, Mumbai, India*
[2]*National Institute of Technology, Rourkela, India*

The present research is focused on the study of microstructural evolution and mechanical behaviour of graphite nanoplatelet (xGnP, where x = multiple layers of graphene) (a graphene isotope) incorporated Cu composites. The limited excellence of Cu in the mechanical field is enhanced by the incorporation of xGnP nanoreinforcement. A dispersion extent of nanoplatelets over the matrix *via* ultrasonication is reported. The *ex-situ* fabrication is carried out through powder metallurgy followed by particle fusion *via* furnace sintering and spark plasma (SP) sintering. Results of characterization showed the homogeneous distribution of graphite nanoplatelet throughout the Cu matrix at lower graphite nanoplatelet loading concentrations. It is also recognized that both furnace sintered and SP sintered Cu composites showed a remarkable enhancement in mechanical properties and wear behaviour with respect to that of similarly fabricated monolithic pure Cu samples. Cu twins are evident in the optical micrographs. The higher incorporation concentration of the graphite nanoplatelet limits the optimum values thus resulting in the non-uniform distribution of the graphite nanoplatelet, formation of relatively bigger conglomerates, and generation of pores. This in turn limited the mechanical performance at higher graphite nanoplatelet loading concentrations due to uneven hardness, poor densification, formation of cracks, and bigger delamination on the surface during the wear of the samples.

Biography

Dr. Pankaj Shrivastava hails from the state of Rice, Korba Chhattisgarh, India. After completing his bachelor's degree from CSVTU Bhilai, he qualified in GATE and pursued a master's degree in Automotive Technology from the College of Engineering Pune. His master's research focused on the Assessment of High Strain Rate properties of spot-welded dual-phase steel joints.

Following a year of teaching, Dr. Shrivastava embarked on his Ph.D. journey at the National Institute of Technology Rourkela. There, he delved into the realm of Al and Cu-based nanocomposites, reinforcing them with MWCNT and Graphene as individual and hybrid nanofillers. Currently serving as a postdoctoral research associate at Bhabha Atomic Research Centre, Mumbai, Dr. Shrivastava is immersed in hydrogen storage and its applications. His diverse research background showcases a commitment to advancing knowledge in materials science and contributing to innovative solutions in energy storage.

Soil Fertility Indicators and Soil Stoichiometry in Semi-Arid Steppe Rangelands

Sonia Boudjabi[1,2,3] and **Haroun Chenchouni**[2,4]

[1]*Department of Nature and Life Sciences, University of Tebessa, Algeria*
[2]*Laboratory of Natural Resources and Management of Sensitive Environments 'RNAMS', University of Oum-El-Bouaghi, Algeria*
[3]*Laboratory water and environments (EEE)University of tebessa, Algeria*
[4]*Department of Forest Management, Higher National School of Forests, Algeria*

Soil fertility depends on vegetation cover, climatic conditions and soil-specific edaphic factors that regulate transformation processes of plant residues and organic matter. Soil physicochemical characteristics in drylands negatively affect evolutionary process of soil materials resulting in fertility loss. This study investigated the variability of soil physicochemical parameters and fertility estimates in three types of semi-arid steppe rangelands of North Africa, viz. Stipa tenacissima, Artemisia herba-alba and Atriplex halimus. The effect of soil parameters on the evolution of soil fertility was appraised using soil organic carbon (SOC), available phosphorus (AP) and C:P ratio as fertility indicators. In two semi-arid regions with haplic calcisols, soil was sampled in six replicates at each steppe rangeland and a control (bare soil). Using standard protocols, each sample was analyzed to determine pH, electrical conductivity (EC), SOC, AP, C:P ratio, total and active CaCO3. All the soil physicochemical parameters tested, except total CaCO3, showed positive increases in A. halimus and S. tenacissima steppe rangelands. The variation of pH and EC values among rangelands was significant, with A. halimus rangelands had significantly the highest scores and A. herba-alba rangelands the lowest scores. The redundancy analysis showed that the edaphic factors triggering significant increases in scores of soil fertility indicators, when compared to the control, were active CaCO3, EC and pH. These physicochemical parameters positively determined the accumulation of AP and SOC, especially in A. halimus rangelands. The high values of stochiometric C:P ratio were associated to soil characteristics of S. tenacissima and A. herba-alba rangelands. Our findings suggest that soil physicochemical parameters of semi-arid steppe rangelands - compared to bare soil - influenced the evolution of soil fertility and stoichiometric C:P ratio. The type of steppe vegetation differently affects the physicochemistry and stoichiometry of the soil.

Activated Carbon from H_3PO_4-Activated Moringa Stenopetala Seed Husk for Removal of Methylene Blue: Optimization Using the Response Surface Method (RSM)

Natinael M and **Alemu M**

Arba Minch University, Arba Minch, Ethiopia

In this study, an alternative precursor for production of activated carbon was introduced using Moringa Stenopetala Seed Husk (MSSH). Moreover, H_3PO_4 was used as a chemical activator in the thermal carbonization process to convert MSSH into activated carbon. The prepared adsorbent was characterized using proximate analysis and Instrumental like FT-IR, SEM/EDX, and XRD. The optimization process was developed using the Box-Behnken methodology (BBM) and the response surface method (RSM). Analysis of variance (ANOVA) revealed a good agreement between experimental and predicted value. Investigation of the processing parameters was done using the batch adsorption method. The optimal conditions for removing methylene blue were found to be the initial dye concentration (316 mg/L), contact duration (19.3 min), adsorbent dosage (0.055 g), and shaking speed (176 rpm). Maximum efficacy was found to be 99.4%, and the highest adsorption capacity was 436.68 mg/g. The experimental results have been best fitted well by the Langmuir isotherm model with the higher correlation coefficients of $R^2 = 0.954$ rather than Freundlich and Temkin adsorption isotherm. This indicates that the process followed homogenous adsorption of adsorbate on the surface of adsorbent. The adsorption kinetics was best fitted with pseudo-second order kinetics. The result of thermodynamic parameters showed that a negative value of ΔG^o and positive ΔH^o confirms the spontaneous and endothermic nature of the adsorption of MB onto the adsorbents. The positive values of ΔS^o indicate the increase in randomness of at the solid-liquid interface during the adsorption process. Generally, the results indicate that activated carbon prepared from MSSH can be used as a low cost, easily applicable and eco-friendly alternative adsorbent for treatment of effluents containing MB dye.

Biography

Natinael Mekonnen is a dedicated professional serving as Chief Technical Assistant in the Chemistry Department. In 2018, he graduated with distinction from Arba Minch University, earning a Bachelor of Science degree in forensic chemistry and toxicology. Recognizing his achievements, the university provided Natinael with the opportunity to join a research group as a research and technical assistant.

In this role, Natinael contributed his skills and knowledge to the university for a year, demonstrating his commitment to academic and research endeavors. His passion for advancing in the field led him to pursue a Master of Science degree in Analytical Chemistry at Arba Minch University, Ethiopia. Natinael Mekonnen's biography reflects his continuous pursuit of excellence and his dedication to contributing meaningfully to the field of chemistry and research.

DFT Study on The Electronic, Structure, Magnetic and Optical Properties of Tio2 Anatase

Otmane Sadek, Samira Touhtouh and **Abdelowahed Hajjaji**

Laboratoire des Sciences de l'Ingénieur pour l'Energie, Ecole Nationale des Sciences Appliquées d'El Jadida, Marocco

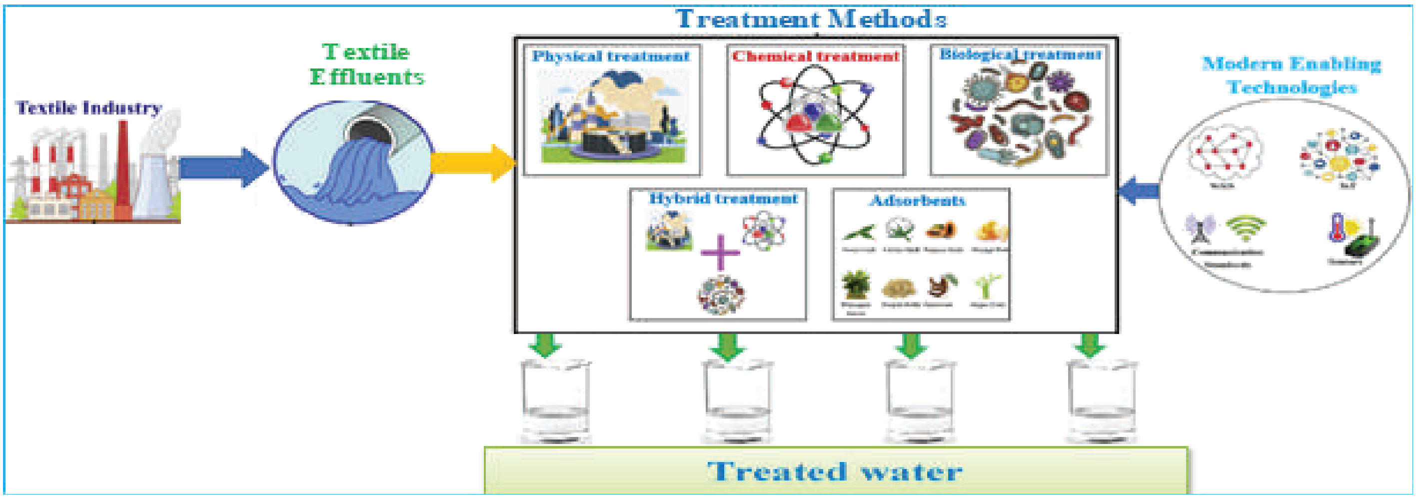
In this work, the electronic structure, magnetic and optical properties of the anatase phase of titanium dioxide (TiO_2) were etudiée by the Density Functional Theory (DFT) method, using the GGA+U method. As a result, the magnetic electronic properties show that anatase is a non-magnetic semiconductor with an indirect gap of 3.202. Optical properties such as dielectric function, refractive index, extinction coefficient, reflectivity, absorption coefficient and conductivity were found to be 8.21, 2.91, 1.98, 0.532, 517000 cm-1 and 8.9 fs-1 respectively. These results are in agreement with the available experimental results.

Textile Effluent Treatment Methods and Eco-Friendly Resolution of Textile Wastewater: Review

Bantamlak Birlie[1,3] and **Aklilu Azanaw**[2]

[1]*Ethiopian Institute of Textile and Fashion Technology, Bahir Dar University, Ethiopia*
[2]*Department of Research and Development at Bahir Dar Textile Share Company, Ethiopia*
[3]*Material science and Engineering, Bahir Dar University, Ethiopia*

The ever-increasing demand for textile products, textile mills, and their effluent have all increased in recent years, resulting in a serious pollution problem around the world. Many chemicals used in the textile industry are harmful to the environment and human health. Dyes are considered major contaminants among the many compounds found in textile effluent. Water pollution produced by the discharge of untreated wastewater and the use of toxic chemicals, during processing, are global environmental issues linked with the textile industry. Textile mills discharge a considerable amount of wastewater that contains poisonous and dangerous substances that harm the environment. When hazardous wastes are released into the air, water, or on land, they can quickly travel throughout the ecosystem, causing higher health risks. The global environmental problems associated with the textile industry are related to water pollution caused by the discharge of untreated effluent, and the use of toxic chemicals, during processing. Textile effluent is a critical environmental concern because it reduces oxygen concentrations due to the presence of hydrosulphides and blocks the passage of light through water bodies, both of which are harmful to the water ecosystem. Thus, this review focuses on textile effluent treatment techniques and the physical-chemical treatment parameters taken into consideration during primary, secondary, and tertiary treatment. It also discusses effluent of biological-oxygen-demand (BOD) and chemical-oxygen-demand (COD), total dissolved solids (TDS), total suspended solids (TSS), and turbidity. With more severe restrictions expected in the future, control measures must be implemented to minimize effluent pollution. As a result, new treatment procedures and environmentally friendly chemicals must be employed to reduce the impact of textile effluent on humans and the environment. As a result, the article review covers all of the causes of textile effluents, wastewater reuse, and energy generation, as well as its treatment approaches and future perspectives.



Biography

Bantamlak Birlie is a passionate researcher and lecturer at Bahir Dar University, specializing in Material Science and Engineering, as well as Textile. At the young age of under 28, Bantamlak aspires to become a distinguished professor in the field, with a vision to contribute significantly to the advancement of science and technology in Ethiopia.

Driven by a desire to foster development in his country, Bantamlak is dedicated to engaging in projects related to STEM education, particularly in material science and textile sectors. His ambition is to innovate advanced materials and textiles, from conceptualization to realization, thus contributing to societal progress and knowledge expansion.

With a deep commitment to education and knowledge dissemination, Bantamlak aims to elevate the understanding of students and society alike. Through his dedication and passion, he endeavors to leave a lasting impact on future generations, ensuring a brighter and more innovative future for all.

Development of an Operational Procedure based on Issues Management Methodologies in the FRACAS Process

B. Sakhaei

Department of Electrical Engineering, Ferdowsi University of Mashhad, Iran

This paper presents a practical approach to addressing the failure reporting and corrective action system (FRACAS) requirements in the product design and development life cycle. The FRACAS process should be integral to the systems engineering process. For this purpose, first, this article provides a suitable strategy development for the FRACAS process in the acquisition phase. Also, using appropriate methodology, identify the root causes of problems in the design process and manage corrective and preventive measures. This article aims to quickly and operationally implement the FRACAS process to identify and analyze issues in the system so that we can use it to provide an appropriate and immediate response to data issues and improve product reliability. For this purpose, this research, in addition to guidelines for identifying and recording issues in the FRACAS process, to analyze the issues, a hybrid method as modifying the FTA-FMEA approach proposed for locating and investigating the root causes of issues, as well as evaluation and criteria for improving the quality Provides reliability. Also, to manage the corrective actions, these actions are prioritized according to the quality and cost criteria with the help of the expected monetary value (EMV) method and Table QFD, respectively. Finally, they are finalized prioritization using the AHP method. The industry standard practice for FRACAS is to employ automated systems that rely on computerized database applications. Hence, this work uses a software platform that systematically implements all steps of the FRACAS process. Its strengths include a customizable workflow process, built-in verification to control process step flow, and signatures. However, it can also adapt the system design and development process to this process to implement design changes effectively.

Biography

Behrang Sakhaei earned his Master's degree in Electrical Engineering, specializing in Control, from Ferdowsi University of Mashhad in 2012. Currently serving as the "Reliability and Risk Capability Manager" within the "System Engineering Team," Behrang boasts a decade of experience in extensive research and work in the field. His contributions span across "Studies and Innovation," where he has played a pivotal role in formulating technological roadmaps and delivering various projects for diverse organizations. Proficient in "Model-Based System Engineering," Behrang is actively engaged in ongoing research in this area. His dedication to advancing the field and proven track record make him a valuable asset in the realm of system engineering.

GIS Based Groundwater Potential Site Suitability Using Arc GIS Weighted Overlay Techniques in Gelda Watershed, Upper Lake Tana Sub-Basin Dera District, Amhara Region, Ethiopia

Dawit Yihunie

Department of Water and Energy, South Gondar Zone, Ethiopia

Geo-spatial technology is widely used to find and exploit a significant amount of groundwater in the saturated zone of the earth's crust. Unconsolidated sediments are the main source of aquifers in the Gelda watershed that deliver enough water to the wells. The main objective of the present study has been improved to find and assess the aquifer's potential for domestic, irrigation, and industrial uses. Moreover, the assimilation of Geographic Information System (GIS), Remote Sensing (RS), Multicriteria Decision Analysis (MCDA), and Analytical Hierarchy processes (AHP) was used to delineate the groundwater potential zone in the Gelda watershed. The methodology of this research was constructed from satellite and attribute-based geospatial data and prepared in Geographic Information System (GIS 10.4). For instance, the framework of the methodology has seven thematic factors, such as lithology, soil type, lineament density, drainage density, slope type, geomorphology, and land use/cover. Furthermore, all thematic factors have been reclassified into one type of raster data set through AHP-GIS analysis. To give weight to thematic factors in the groundwater potential zone, the integration of Multicriteria Decision Analysis (MCDA) and Analytic Hierarchy Process (AHP) was used. Therefore, a groundwater potential zone map was developed through the use of weighted sum overlay analysis in the Geographic Information System (GIS 10.4). For most, Multicriteria Decision Analysis (MCDA) and Analytical Hierarchy processes (AHP) also used to classify the groundwater potential zone, such as (1) excellent potential (37.51%), (2) good potential (42.61%), and (3) poor potential (19.87%). The accuracy and prediction of the investigation were used to validate the model through the spatial well data (23), receiver operating characteristics (ORC), and linear regression techniques. In general, the research predicts 86.9% of the time.

Biography

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- Yihunie, D. Categorize Groundwater Potential Zone in Soft Rock Formation in Rib River Basin by Geospatial Technology: in the Case of South Gondar District, Amhara Region, Ethiopia. Water Conserv Sci Eng 8, 18 (2023). https://doi.org/10.1007/s41101-023-00193-0,
- Yihunie, D. Categorize Groundwater Potential Zone in Soft Rock Formation in Rib River Basin by Geospatial Technology: in the Case of South Gondar District, Amhara Region, Ethiopia. Water Conserv Sci Eng 8, 18 (2023). https://doi.org/10.1007/s41101-023-00193-0

This research investigates groundwater potential zones in an area, using GIS to contribute to efficient groundwater management and protection policies, enhancing the scientific community's understanding. Since, this investigation would be proving that the food sustainability of the community instead of irrigation, industries and domestic uses.

Mitigating Swelling and Ettringite Formation in Lime-Stabilised Sulfated Soft Soil Through Natural Pozzolana-Fiber Reinforcement

Gadouri hamid[1,2], Meziani Brahim[1,2] and **Hadj-Mohamed Nacéra[1]**

[1]Khemis Miliana University, Algeria
[2]Laboratory of Agricultural Production and Sustainable Development of Natural Resources, Khemis Miliana University, Algeria

This study explores the impact of natural pozzolana (NP) and polypropylene fiber (PF) as reinforcement on the free swell potential of lime-stabilised expansive grey clayey soil (GS). In simulated real-world conditions, GS is artificially contaminated with sodium and calcium sulfates. Lime (8%), NP (20%), and PF (0–3%) are introduced into the GS by dry weight of soil. Various sulfate contents (0–6%) are applied, and swell potential is monitored over curing periods (1–120 days). Results indicate that 8% lime, either alone or with 20% NP, reduces swell potential. Intriguingly, swell potential decreases with PF content up to 2% (optimal dosage) and increases thereafter. The inclusion of 2% PF facilitates stress transfer from GS to PF through bonding, but exceeding 2% leads to lump formation, reducing contact and increasing swell potential. Conversely, calcium sulfate has a positive impact, reducing swell potential with increased content and curing period due to observed cementing agents in XRD and SEM results. Crucially, the adverse effects of expansive ettringite mineral due to sodium sulfate contamination are effectively mitigated by incorporating 2% PF and 20% NP into lime-stabilised GS. In conclusion, this study unveils nuanced relationships between PF content, sulfate contamination, and curing period in lime-stabilised GS. The findings offer valuable insights for the effective reinforcement and mitigation of swelling in soft soils under diverse sulfate conditions.

Biography

Dr. GADOURI Hamid, born in 1986 in Tacheta Zougara, Ain Defla, Algeria, is a distinguished scholar in Geotechnical Engineering. He earned both his Licence and Master's degrees from Khemis Miliana University in 2008 and 2010, respectively. In 2017, he achieved a Ph.D. in Construction Engineering and Geotechnical Risks from Yahia Farès University of Medea.

Dr. GADOURI's research endeavors, spanning over 15 years, encapsulate ground improvement methods and more. With a wealth of academic contributions, he has authored over 30 scientific papers and served as a peer reviewer for more than 50 esteemed journals. In addition to his academic accomplishments,

Dr. GADOURI brings practical experience from his tenure at the Habitat Laboratory and Construction Center, Oued-Smar, Algiers. Currently, he holds the position of a researcher at the Laboratory of Agricultural Production and Sustainable Development of Natural Resources, Khemis-Miliana, Algeria, and concurrently serves as a Geotechnical Engineering lecturer at Khemis Miliana University.

Alternative Concept of Solids Plasticity

Liubomyr Kozak

Chornoty st. Ivano-Frankivsk, Ukraine

In the presentation, an alternative concept of solid plasticity is described. This concept is based on the idea of the instability of the crystal lattice. According to this alternative concept, the crystal lattice is stable in non-plastic bodies but unstable in plastic bodies. The formation of a stable or unstable crystal lattice depends on the electronic structure of solids.

Depending on the nature of the electron density distribution of valence electrons, the geometry of the interatomic interaction potential is formed. Atoms with a spherically symmetric long-range potential of interatomic interaction form an unstable crystal lattice (mainly metals), and in the case of an asymmetric potential with directional bonds, they form a stable lattice (covalent and ionic crystals).

Solids with an unstable crystal lattice are plastic and fragile. They are characterized by the lack of shear resistance relative to small shear deformations in certain crystallographic directions. Solids with a stable lattice are highly durable and non-plastic (brittle).

An important feature of the alternative concept is the explanation of the low shear stress of atomic planes in an ideal crystal lattice without dislocations (principle of Occam's razor). It should be noted that the existence, emergence, and movement of dislocations are not denied according to the new concept. It is believed that dislocations are formed during deformation and rather prevent the shear of atomic planes than aid in this process.

The presentation provides a brief critique of the classical concept of plasticity and describes the alternative concept. It discusses the grounds for creating the alternative concept and presents theoretical and experimental data supporting its validity. Furthermore, it highlights the advantages of the proposed concept of plasticity in comparison with the classical one.

I believe that this presentation will contribute to a wide and interesting discussion. The new ideas and contrasting perspectives presented in this work hold the potential to stimulate further research and facilitate advancements in the field of solid plasticity.

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Development of Non-Destructive NIRS Models to Predict Oil and Major Fatty Acid Contents of Ethiopian Sesame

Girmay Tsegay, Yibrah Ammare and **Samuel Mesfin**

Food Science and Nutrition Research, Ethiopian Institute of Agricultural Research, Ethiopia

Sesame is a crucial oilseed crop that contains vital fatty acids. The objective of this study was to build calibration equations using near-infrared reflectance spectroscopy for quality screening of sesame. A total of 136 sesame samples were scanned in the reflectance mode and their wet chemistry was determined by n-hexane extraction and gas chromatography mass spectroscopy. Models for oil and four fatty acids were developed with 110 samples and had an acceptable value of calibration coefficient of determination (R2 c), with suitable one minus the ratio of unexplained variance divided by variance (1-VR) value were found except palmitic acid. The prediction of an external validation with 26 datasets revealed a blameless correlation between reference values and NIRS values based on the coefficient of determination of validation (R2 v) and relative prediction deviation (RPDv). The models for oil, stearic, oleic, and linoleic acids had suitable values of coefficient of determination of validation and relative prediction deviation, which were more than 2.0 and 0.8, respectively. As a result of this research, it was discovered that the NIRS technology could be used to examine the oil and fatty acid contents of sesame seed qualities directly in breeding program, standard agency and commodity exchanges.

Biography

Graduated BSc degree in Chemistry, Addis Ababa University, Department of Chemistry, College of Natural Sciences, Governmental Organization, Addis Ababa, Ethiopia (July 21, 2011)

Chemist at quality control department, East African Pharmaceuticals Plc, Addis Ababa, Ethiopia

Graduated MSc in Analytical Chemistry, Addis Ababa University, Department of Chemistry, College of Natural Sciences, Governmental Organization, Addis Ababa, Ethiopia (July 21, 2018)

Have a Certificate in Near-Infrared reflectance spectroscopy

Laboratory head at Ethiopian institute of agricultural research, Addis Ababa, Ethiopia.

US oil supply shocks and economies of oil-exporting African countries: A GVAR-Oil Resource Analysis

David Oluseun Olayungbo

Obafemi Awolowo University, Nigeria

This study examined the effects of US Shale-oil supply which started in 2013. The study employed GVAR-Oil resource model from the first quarter of 1980 to the fourth quarter of 2018 for 36 trading countries with special focus on 4 oil-exporting African countries. Given that shale supply is a recent phenomenon, we estimated two models to capture these effects. The first model spanned from 1980 to 2013, while the second model was from 1980 to 2018. After implementing the preliminary tests of optimal lag length selection, cointegration test and the weak exogeneity test, we conducted the persistence profile to find Egypt and Gabon adjust to US oil supply shocks faster than Algeria while Nigeria did not. The result of the generalized impulse response functions showed negative effects of the US shale oil supply in Egypt, positive effects in Nigeria and Gabon but insignificant in Algeria. The generalized forecast variance error decomposition function conducted found output of China, Japan, US, Europe, Asia and Latin America respectively to contribute the largest variations in oil supplies during the study period. African countries, on the other hand, were found to contribute in small proportion. We recommended that robust oil savings funds by oil-exporting African countries can act as buffers against oil supply shocks.

Biography

David Oluseun Olayungbo is currently a Professor in the Department of Economics, Obafemi Awolowo University, Ile-Ife Nigeria. David, who had his PhD in Economics in 2014, has published several articles on energy. He was at the University of Ca Foscari, Venice Italy for a period of a session during his Ph.D. programme in 2011. He has close to 50 publications in reputable journals to his credit. He has contributed to five international books with three published by IntechOpen in United Kingdom, one by global IGI in Switzerland and the last by Springer in South Africa with the books published in the year 2019, 2021 and 2022 respectively. David is currently working on a Macroeconomic text book for both undergraduate and graduate use. He has also supervised more than 45 undergraduate projects and 19 post graduates. David has taught many graduated students Macroeconomics, Monetary Economics and Econometrics both at undergraduate and graduate level over the last 16 years in this University, Obafemi Awolowo University, Ife. In addition, he is a reviewer to some international journals such as: Economic Research Ekonomska Istrazivanja-Taylor and Francis Online, Cogent Economics and Finance-Taylor and Francis, African Development Review-Wiley, Resources Policy Elsevier and OPEC Energy Review-Wiley. He teaches macroeconomics, monetary, banking, energy economics and finance at both undergraduate and graduate levels at the university.

Effect of Growth Medium Nitrogen and Phosphorus on Nutritional Composition of Lemna Minor (An Alternative Fish and Poultry Feed)

Hafiz Ullah[1], **Bakhtiar Gul**[2], **Haroon Khan**[3], **Naveed Akhtar**[4], **Khushnood Ur Rehman**[5] and **Umar Zeb**[6]

[1]*Department of Botany University of Chitral, KP, Pakistan*
[2,3]*Department of Weed Science, The University of Agriculture Peshawar-Pakistan*
[4,5]*Ialamia College University, Pakistan*
[6]*Department of Biology, the University of Haripur, Pakistan*

Duckweed (*Lemna minor L*.) is an aquatic macrophyte and grows profoundly on the surface of polluted water reservoirs of Pakistan. The plant can be used as a potential alternative for the fish and poultry industry to meet the promptly growing demand for feed. Our study investigates the effect of varying concentrations (ppm) of nutrients like N, P, and their combination, NP on biomass production, carbohydrate, lipid, protein, and mineral (Ca, Mg, Fe, Mn & Zn) contents of *L. minor*. The varying concentrations of N and P substantially affected the above-stated parameters. The highest biomass yield was recorded in the 30 ppm NP tank as 172g/m2 day in comparison with the control tank. Higher protein, lipid, and carbohydrate contents were recorded for 30 ppm NP, 20 ppm NP, and 10 ppm NP respectively. Minerals like Ca, Mg, Fe, Mn & Zn increased in 20 ppm P and all N concentrations. The combined application of NP was more effective in boosting the protein, carbohydrate, and lipid content whereas less effective in increasing the mineral contents. A rise in the concentration of N and P showed a positive correlation with the nutritional composition of *L. minor*.

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Exploring Promising Photovoltaic Properties of Dithiophene-Based Non-Fullerene Chromophores for Efficient Organic Solar Cells: A DFT Approach

Iqra Shafiq[1,2], **Muhammad Khalid**[1,2] and **Nadeem Raza**[3]

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[2]Centre for Theoretical and Computational Research, Khwaja Fareed University of Engineering & Information Technology, Pakistan

[3]Department of Chemistry, College of Science, Imam Mohammad Ibn Saud Islamic University (IMSIU), Saudi Arabia

Currently, non-fullerene-based acceptors in organic solar cells (OSCs) have gained significant attention of researchers owing to their particular characteristics. Herein, new W-shaped dithiophene based acceptor chromophores (D1-D8) possessing A-π-D-π-A configuration were fabricated *via* end group structural tailoring by utilizing promising acceptors groups. To probe the effect of end group manipulation on the optoelectronic properties of entitled chromophores, density functional theory/time-dependent density functional theory (DFT/TD-DFT) calculations were accommodated at B3LYP/6-311 G(d,p) functional. Frontier molecular orbitals (FMOs) findings revealed that the derivatives (D1-D8) exhibited narrow band gap (1.191–2.110 eV) than that of reference chromophore (R=2.380 eV) due to efficient acceptor moieties. UV–Vis data collected in chloroform solvent revealed that λmax values of D1-D8 were existed in visible region (738.6–692.5 nm). Moreover, D2 and D4 proves to be the best chromophores exhibiting least band gap of 1.191 and 2.000 eV and broad absorption spectrum i.e., 738.573 and 735.986 nm, respectively. Among all the designed compounds, D2, D3, D4 and D6 manifested higher open circuit voltage values. Theoretical analysis disclosed that all the designed molecules exhibited almost comparable results with each other. Nevertheless, D2 and D4 provided significant findings and can be utilized as best candidate for use in optoelectronic devices.

Biography

Iqra Shafiq, born in 1993 in Punjab, Pakistan, is a dedicated Ph.D. scholar currently conducting research under the esteemed guidance of Prof. Dr. Muhammad Khalid at Khwaja Fareed University of Engineering & Information Technology in Pakistan. In addition to her Ph.D. studies, she serves as a research associate on the NRPU project, collaborating closely with Dr. Muhammad Khalid. She has made significant contributions to the field of research, with a notable focus on the exploration of novel nonlinear optical chromophores through a DFT-based study. Her expertise also extends to the investigation of efficient non-fullerene-based electron acceptors for organic solar cells, demonstrating her commitment to advancing sustainable energy solutions. An accomplished researcher, Iqra Shafiq has an impressive publication record, with more than 40 papers published in reputable international journals with a cumulative impact factor (IF) of 171. These publications highlight her proficiency in diverse areas, including the theoretical exploration of materials and the practical applications of her findings.

The Heterogeneous Effect of Technology and Macroeconomic Policies on Financial Market Development

Muhammad Hussain[3], **Farzan Yahya**[1], **Muhammad Waqas**[2] and **Abdul Haseeb Tahir**[4]

[1]*Nanchang Institute of Technology, Nanchang, China*
[2]*Jiangsu University of Science and Technology, Zhenjiang, China*
[3]*Xidian University, Xi'an, China*
[4]*Nanjing University of Science and Technology, Nanjing, China*

This study examines the heterogeneous effect of technological advancement, anti-monopoly policies, government transparency, and macroeconomic stability on financial market development. A panel data of 74 countries over the period 2007 to 2017 is selected. Based on simultaneous panel quantile regression (SPQR), the findings reveal that macroeconomic stability improves financial market development after the financial markets attain a certain level of efficiency (50th and 90th). Similarly, there is an asymmetric effect of antimonopoly policies on financial market development and a stronger effect is observed for intermediate markets. On the other hand, no significant effect of transparent government policy is indicated at any quantile. Lastly, the "noise trading" mechanism of technology advancement is demonstrated by SPQR estimations, especially for least and highly developed financial markets. These findings suggest that countries could attain financial market efficiency by implementing anti-monopoly policies so that corruption and bureaucratic power could be cramped effectively. Nonetheless, continuous monitoring is essential to sustain the value enhancing mechanisms for financial activities so that information asymmetry issues emerge from technology advancement and competition is avoided.

Biography

Farzan Yahya is working as Professor (Associate) at Nanchang Institute of Technology China. His of area of research interest is Financial Analysis and Policy, Behavioral Finance, Corporate Governance, Sustainable Finance. Muhammad Waqas is currently working as Professor (Associate) at Jiangsu University China. His area of research interest is Human Resource Management and Organizational Behavior. Muhammad Hussain is doing PhD at Xidian University China. His area of research interest is Sustainable Finance, financial development and digital economy. Abdul Haseeb Tahir is doing his PhD at from Nanjing University China. His area of research interest is Green HRM, Knowledge Management, Environmental Performance and ESG Performance.

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Blockchain Based Money Donation System in Healthcare

Bipin Kumar Rai

ABES Institute of Technology, Ghaziabad, India

In this paper, I proposed a blockchain-based traceability of donations and transparency in the donation process in healthcare sector. With the development of online platforms and mobile devices, the charities are also transitioning to the internet, posing more security and privacy threats. We aim to provide donors with a reliable, immutable record of their donations, tracking capabilities are also available for donations instantaneous by implementing tracking of donation using smart contracts on the Ethereum blockchain. In health sector it is difficult to keep record of appropriate fund usage. Blockchain technology can solve integrity, data privacy, security and fraud issues that are a major cause of concern in the healthcare sector while donating money. It provides a reliable and trustful mode to donate money for healthcare sector as we have used blockchain technology which removes the involvement of intermediaries and provides ledger that keep records of all transactions which once performed can never be modified. As a result, the system intends to implement a tamper proof and efficient blockchain dapp for donation of funds in healthcare.

Objectives:

- Secure and Transparent Donations: Blockchain technology provide transparent method to track donations, achieving proper allocation of funds.
- Automated Payment Processing: Blockchain-based charity systems can automate payment processing, eliminating manual processing and reduces fraud.
- Improved Efficiency: Blockchain-based charity systems can streamline the donation process, reducing the time and cost associated with traditional donation methods.
- Increased Accountability: Blockchain-based charity systems can provide a public ledger of donations, ensuring that funds are being used for their intended purpose.

Biography

Ph.D. from Banasthali University, Rajasthan and M.Tech. & B.Tech. in Computer Science and Engineering, Prof. (Dr.) Bipin Kumar Rai has more than 18+ years teaching experience in different renowned Institutions. His areas of interest are Cryptography & Information Security, Blockchain and Data Structures. He has published 30+ research papers in ESCI/Scopus indexed Journals/Conferences(Scopus indexed), 4 books and 6 book chapters in Springer/CRC Press Taylor & Francis Group. He has published his Ph.D thesis work entitled "Pseudonymization Based Mechanism for Security & Privacy of Healthcare: PcPbEHR Solution for Healthcare" and M. Tech. dissertation work entitled "An Optimized Solution for Certified e-mail with Trusted Third Party". He has worked as a Guest Editor/Reviewer of several SCI/Scopus Indexed Journals.

To See the Possibility of Considering Magnesium-24 as a Simple Cold Nuclear Fuel

U.V.S. Seshavatharam[1,2] and **S. Lakshminarayana**[3]

[1]*Honorary faculty, I-SERVE, Survey no-42, Hitech city, India*
[2]*Q.A. Dept, DIP Division, Electrosteel Castings Ltd, AP, India*
[3]*Dept. of Nuclear Physics, Andhra University, India*

Considering our recently proposed nuclear binding energy dependent cold nuclear mechanism, we try to explore the possibility of considering Magnesium-24 as one of the simple cold nuclear fuels. In this context, we would like to appeal that, upon absorbing one neutron in the form a colliding a hydrogen atom at around 1000 deg C, Magnesium-24 transforms to Magnesium-25. In this nuclear reaction, expected maximum possible thermal energy is [8.8–(205.5896–198.2592)] = 8.8–7.3304 = 1.47 MeV. In this context, we would like to emphasize the point that, considering our proposed strong and electroweak mass formula pertaining to nuclear binding energy scheme, for Magnesium-24, estimated coulombic energy is around 1.16 MeV and its proportion seems to be 0.5% of its estimated volume energy. As the whole world is facing many environmental and economical issues with current fossil and nuclear fuels, our proposal can be given a chance with reference to stable isotopes of Magnesium against beta decay and gamma radiation.

Biography

U.V.S. Seshavatharam is a honorary member of I-SERVE, (Institute of Scientific Research in Vedas) Hyderabad, Telengana, India. Working as Q.A. deputy manager in Electrosteel Castings Ltd, Srikalahasthi, India. He is having 100+ publications in numerous peer-reviewed physics journals and availing the kind guidance of retired Prof. S. Lakshminarayana associated with Dept. of Nuclear Physics, Andhra University, Visakhapatnam, A.P, India. His current theoretical interests include Nuclear quantum gravity, Quantum cosmology and Cold nuclear fusion. Under the kind guidance of Dr. Eugene Terry Tatum, he is working on 'Flat Space Cosmology' associated with light speed growing black hole universe. He is working on developing a theory for preparing gold- like costly elements with Tungsten like heavy metals *via* cold nuclear fusion. Extending cold nuclear fusion technology to Nuclear Fission, he is working on converting high level nuclear radioactive waste into stable and safe elements. Recently, he proposed a simple mechanism for considering Iron-56 as a cold nuclear fuel.

Impact of Cisplatin Administration on Cerebellar Cortical Structure and Locomotor Activity of Infantile and Juvenile Albino Rats: The Role of Oxidative Stress

Mohey A.E. Hulail, Hanan E.L. Mokhtar, Samar Mortada Mahmoud and **Doaa Mohammed Yousef**

Human Anatomy and Embryology, Zagazig University, Egypt

Objectives: To evaluate the effect of cisplatin on the postnatal development of cerebellum of albino rats

Scope: Cisplatin is a platinum compound very effective as a cancer therapy. It is one of the most widely used chemotherapeutic agents. However, it is highly toxic and has dose-limiting side effects including hepatotoxicity, neurotoxicity, nephrotoxicity, and ototoxicity. The mechanism of CisPt-induced neurotoxicity is unclear. This study was designed to evaluate its effects on postnatal development of rat cerebellum

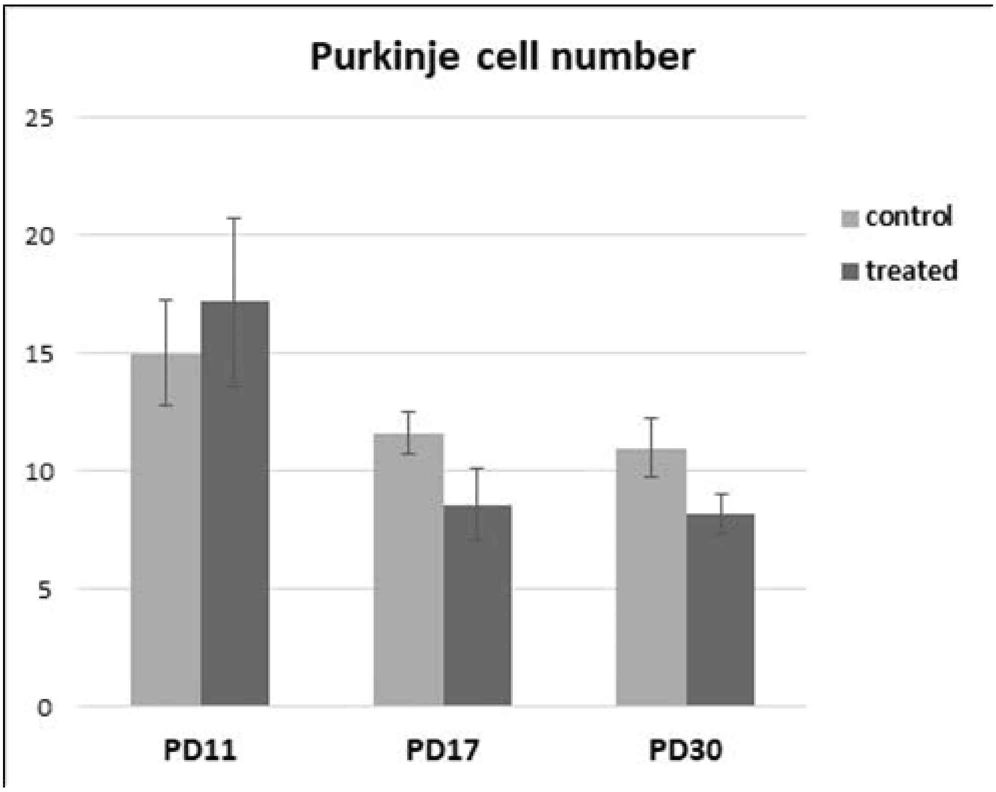
Methods: Eighty infantile rat pups (10 days old age) were used in this study.

For evaluating the locomotor activity, 20 rats were divided into equal 2 groups; control group kept without any treatment and CisPt-treated group received (5 μg/g b.w.) by subcutaneous injection in their nape at PD10.

For histological study: 60 rats were divided into equal two groups; control group subdivided into equal three groups sacrificed at postnatal days 11, 17 and 30 respectively and Cisplatin treated group. Each rat received (5 μg/g b.w.) by subcutaneous injection in their nape at PD10 then divided into three groups sacrificed at postnatal days 11, 17 and 30 respectively.

Results: Physiologically CisPt-treated rats had decreased body and cerebellar weights, and decreased motor activity

Histologically CisPt caused decreased thickness, vacuolations and hemorrhage within the cortical layers of the cerebellum. Purkinje cells showed profound degenerative effects in the form of swelling, distortion, nuclear shrinkage, and disrupted arrangement.



Histochemistry CisPt-treated rats, GFAP showed upregulated, hypertrophied, branched Bregman glial fibers and reactive astrogliosis. Immunolocalization of Ki-67 positive cells revealed oxidative stress and defective migration associated decreased proliferation in early ages in addition to glial proliferation in PD30.

Conclusion: CisPt causes toxic effects on the histological structure of the developing cerebellar cortex, decreased enzymatic antioxidants (SOD and CAT) and the non-enzymatic antioxidant defense (GSH) and increased lipid peroxidation marker (MDA). and affects locomotor activity.

Biography

Prof. Dr Mohey hulail a professor of anatomy and embryology, faculty of medicine zagazig university egypt. Chaiman and head professor of the department. He has recently many researches in medical education. His researches deal with the possible protective effects of supposed materials either chemicals or nutritional to ameliorate the toxicity of drugs used in treatment of high risk diseases or on Preservatives, paints, anti-insects, mosquitoes, etc.

From Wood Waste to Wealth: Advancing Eco-Friendly Solutions with Sawdust-Derived Nanomaterials

Gyasi-Antwi Daniel and **Apea Ohene Boansi**

Department of Applied Physics, C. K. Tedam University of Technology and Applied Sciences, Navrongo, Ghana

Sawdust, an abundant and cost-effective lignocellulosic material derived from nature, poses a disposal challenge as a by-product of industry and agriculture. This study addresses the burgeoning interest in managing and repurposing sawdust for specialized applications. The focus is on transforming sawdust into a valuable bio-waste resource. Employing the chemical reduction method, Copper-Sawdust nanocomposites were synthesized into powder and rectangular slabs. Transmission Electron Microscopy identified spherical particles with diameters between 3 and 14 nm. Crystallographic planes (111), (200), and (220), which show the presence of metal copper, were confirmed by electron diffraction. These results were validated by X-ray diffraction, which showed Miller indices for angles of 18.3°, 21.7°, and 30.8°, with crystallite sizes that matched the dimensions of the nanocomposite. According to the study, the structure of copper nanoparticles is Face-Centered-Cubic (FCC), which is consistent with the properties of bulk copper. The accuracy of the findings highlights the prospective uses of copper nanocomposites in the industrial and medical fields, highlighting their promising value to science.

Biography

Mr. Daniel Gyasi-Antwi completed his B.Sc. Physics degree at KNUST Kumasi in 1996. He was a Mathematics and Physics Tutor at SDA Senior High School and Kumasi Anglican Senior High School (1998-2001). He completed a program in M.Sc. Materials Science at the University of Augsburg, Germany (02-2008). He is a Senior Lecturer and a Final year PhD Applied Chemistry Student at C. K. Tedam University of Technology and Applied Sciences.

Riboflavin Potentially Attenuates Arsenic Hepatotoxicity: A Focus on Oxidative Changes, Apoptosis and PINK1 Pathway

Pouneh Rahemi[1] and **Co. Reza Saiefar**[2]

[1]*Kermanshah university of medical sciences, Kermanshah, Iran*
[2]*Urmia university of medical sciences, Urmia, Iran*

In natural ways and as a result of human activity arsenic (As_2O_3) is widely distributed in our surroundings, with toxic effects on liver functions. This study investigates riboflavin's hepatoprotection (a flavoproteins component) on toxicity induced by As_2O_3. Twenty-four male Wistar rats were randomly assigned into four equal groups, and the experimental group orally received As_2O_3 (3 mg/L/day) alone or in combination with riboflavin (40 mg/L/day) for 30 consecutive days. To detect liver abnormalities the major oxidative stress indices (reactive oxygen species and total antioxidative status), lipid peroxidation (malondialdehyde (MDA)), inflammatory markers (interleukin 6 and C-reactive protein), liver enzymes, and mRNA expression levels of apoptosis and PINK1 pathway genes (for mitochondrial quality control) were evaluated. $p < 0.05$ was considered statistically significant. After receiving As_2O_3, blood serum levels of oxidative stress indices, MDA production, inflammatory markers, and liver enzymes increased. Regarding the genes expression profile of apoptosis (Bax and TNF-α) and PINK1 pathway (PINK1, Parkin, LC3-I, Mfn2, Fis1, and p38), As_2O_3 upregulated all expressions (except Bcl-2). Riboflavin therapy is potentially an effective strategy for modifying hepatic dysfunction *via* As_2O_3 damages through the abrogation of oxidative changes. These findings can enhance the clinical diagnosis of hepatotoxicity.

Biography

In the realm of practical application, she demonstrated over a decade of expertise at Kosar Hospital (2012-2014) and Dr. Rahemi Pharmacy (2014-now) in West Azerbaijan Province, Urmia. Her analytical acumen was further showcased through a groundbreaking 2023 study. Collaborating on "Riboflavin potentially attenuates arsenic hepatotoxicity," her work illuminated the hepatoprotective potential of riboflavin against arsenic-induced liver damage. Through extensive experimentation on Wistar rats, she unraveled critical pathways, paving the way for advanced clinical diagnoses in hepatotoxicity.

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