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VIRTUAL EVENT

6th EDITION OF

ADVANCED CHEMISTRY WORLD CONGRESS

MARCH 27-28, 2025

ADV. CHEMISTRY 2025

SCIENTIFIC PROGRAM

DAY 01
THURSDAY

MARCH 27, 2025

06:55-07:00	**Opening Ceremony**

Sessions: Analytical Chemistry | Industrial Chemistry | Agricultural Chemistry | Medicinal Chemistry | Chemical Engineering | Green Chemistry | Environmental Chemistry | Biochemistry | Organic Chemistry | Physical Chemistry | Geochemistry | Food Chemistry | Materials Science | Molecular Biology | Polymer Chemistry and Technology

DISTINGUISHED SPEAKER TALKS

07:00-07:20	Title: Chromium-Extracted Aluminum Catalyst for Co-Pyrolysis of Cotton Fabric Waste and Polypropylene Plastic Waste to Bio-Oil **Wan Zuraida Wan Kamis,** *Universiti Teknologi MARA Cawangan Pulau Pinang, Malaysia*
07:20-07:40	Title: YidC Membrane Insertase: A Promising Target for Combating Antibiotic Resistance **Sharbani Kaushik,** *Dr. Vishwanath Karad MIT-World Peace University, India*
07:40-08:00	Title: Green Synthesis of Diverse Heterocyclic Library as Biologically Potent Agents **M. Sarasija,** *Satavahana University, India*
08:00-08:20	Title: Enhancing Sustainable Agriculture: The Role of Microbial Biocontrol Agents and Plant Growth-Promoting Microorganisms in Crop Management **Beema Jainab S.I.,** *Justice Basheer Ahmed Sayeed College for Women (Autonomous), India*
08:20-08:40	Title: High Strength Hydrogel using Phenolated Lignin **Taslima Ferdous,** *University of Dhaka, Bangladesh*
08:40-09:00	Title: Cytotoxic Effect of Isolated Coumarin Compounds of *Luisia Tenuifolia* Blume in A431 Squamous Cell Carcinoma Cell Lines **Sakthi Priyadarsini. S,** *SRM Institute of Science and Technology, India*

09:00-09:20	Title: Dermatology Benefits of *Punica Granatum*: A Review of the Potential Benefits of *Punica Granatum* in Skin Disorders **Farshad Akbarnejad,** *Dr. Akhavi Lab Co, Iran*
09:20-09:40	Title: Assessing the Effect of Preservation Temperature on Nutrient Retention in Grain-Milk Beverage **H.M. Theja Herath,** *Industrial Technology Institute, Sri Lanka*
09:40-10:00	Title: Coupled Methyl Ethyl Ketone Condensation as a Modern Route for Associated Petroleum Gas Processing **Lebedev Ilya Vladislavovic,** *MIREA Russian Technological University, Russia*
REFRESHMENT BREAK 10:00-10:15	
10:15-10:35	Title: Novel Nanoemulsions of *Cymbopogon winterianus* and *Eucalyptus globulus* Essential Oils for Sustainable Pest Management of Lepidopteran Pest *Spodoptera litura*: Development and Bio-Efficacy **Alka Gupta,** *University of Delhi, India*
10:35-10:55	Title: Ensuring Environmental Safety of Water Resources in Alagir District: A Study of the Ardon River **Alan Lolaev,** *Vladikavkaz Scientific Center of the Russian Academy of Sciences, Russia*
10:55-11:15	Title: Green Synthesis of Nanoparticle for Detection of Hazardous Gas **Sharad B. Patil,** *SSMM Arts, Science and Commerce College, India*
11:15-11:35	Title: Spectroscopic Methods as an Alternative Tool for Determining Qualitative Changes in Edible Oils Subjected to Oxidation **Grażyna Neunert,** *Poznan University of Life Sciences, Poland*
11:35-11:55	Title: Bioactive Phytochemicals **Sujata V. Bhat,** *Indian Institute of Technology, India*
11:55-12:15	Title: Micro Electronic Speckle Pattern Interferometry on Chemical Interaction with Single Biological Cells **Andreas H. Foitzik,** *Technical University of Applied Sciences Wildau, Germany*

12:15-12:35	Title: Unravelling the Hydrogen Bonding Patterns in Telomeric G-Quadruplexes **Eugène S. Kryachko,** *Bogolyubov Institute for Theoretical Physics, Ukraine*
12:35-12:55	Title: Unlocking the Potential of Natural Rubber-Based Polymer Electrolytes: Modification, Challenges, Key Strategies, Bibliometric Insights, and Future Directions **Rawdah Abduh Ghaleb Whba,** *Taiz University, Yemen*
LUNCH BREAK 12:55-13:35	
13:35-13:55	Title: Usage of the Blockchain in Pharmaceutical Field **Samia Aitouche,** *Batna University, Algeria*
13:55-14:15	Title: Fourier Transform Infra-Red (FTIR) Spectroscopy: A Versatile Analytical Technique for Coal Characterisation **Umar Abdullahi Isah,** *University of Maiduguri, Nigeria*
14:15-14:35	Title: First Principal Investigation of Optical and Thermoelectric Properties of Hybrid Organic-Inorganic Perovskite $[NH_3\text{-}(CH_2)_4\text{-}NH_3]MCl_4$ Compound **Hafida. Ziouani,** *Moulay Ismail University, Morocco*
14:35-14:55	Title: Design and Science: A Case Study of Meta-Textile **Hanen Zribi,** *Higher Institute of Arts and Crafts of Sfax (ISAMS), Tunisia*
REFRESHMENT BREAK 14:55-15:10	
15:10-15:30	Title: Influence of the Sun on Water Structuring on the Day and Night Sides of the Earth. Manifestation of Underground Radiation. Solving the 'Water Memory' Mystery **Igor V. Shevchenko,** *M.P. Semenenko Institute of Geochemistry Mineralogy and Ore Formation, Ukraine*
15:30-15:50	Title: Seasonal Variations of Landfill Leachate on *Medicago Sativa* Germination, α-Amylase Activity and Metal Transfer in Soil-Plant System **Belasri Lamiaa,** *Hassan II University, Morocco*
15:50-16:10	Title: The Effect of Influencer's Follower Count on Moroccan Consumer Behavior **Imane Margom,** *Sidi Mohamed Ben Abdellah University (USMBA), Morocco*

16:10-16:30	Title: Routing a Quantum State in a Bio-Inspired Network **Elham Faraji,** *Jülich Research Center, Germany*
16:30-16:50	Title: Dynamic/DDDAS-Based Digital Twins for Chemical Contaminants Transport Predictions **Frederica Darema,** *InfoSymbiotic Systems Society, USA*
16:50-17:10	Title: Role of Geological Understanding in Developing Bioremediation Strategy in LNAPL Impacted Sites **Junaid Sadeque,** *AECOM, USA*
17:10-17:30	Title: Propolis: Advancing from Traditional and Complementary Medicine Toward Clinical Therapy against Infectious Diseases **Antonio Salatino,** *University of São Paulo, Brazil*
17:30-17:50	Title: Molecular Geometry: From 3D to 5D **Carlile Lavor,** *University of Campinas (IMECC - Unicamp), Brazil*
17:50-18:10	Title: Some Considerations on the Risks to Human Health of Contaminants of Emerging Concern **Amado Enrique Navarro Frómet,** *Universidad Tecnológica de Izúcar de Matamoros, México*
NETWORKING	
End of Day 1	

SCIENTIFIC PROGRAM

DAY 02

FRIDAY

MARCH 28, 2025

06:55-07:00	**Opening Ceremony**

Sessions: Analytical Chemistry | Industrial Chemistry | Agricultural Chemistry | Medicinal Chemistry | Chemical Engineering | Green Chemistry | Environmental Chemistry | Biochemistry | Organic Chemistry | Physical Chemistry | Geochemistry | Food Chemistry | Materials Science | Molecular Biology | Polymer Chemistry and Technology

DISTINGUISHED SPEAKER TALKS

07:00-07:20	Title: Piecewise Taylor Series Enabling Algebraic Molecular Orbital Methods **Jun Yasui,** *Kwansei Gakuin University, Japan*
07:20-07:40	Title: The Formation of Supramolecular Chiral Materials from Achiral Molecules using a Liquid-Crystallin System: Symmetry Breaking, Amplification and Transfer **Atsushi Yoshizawa,** *Hirosaki University, Japan*
07:40-08:00	Title: An Architecture of Intelligent Tutoring System with Augmented Reality for Learning Chemistry **Trishna Paul,** *BITS Pilani, India*
08:00-08:20	Title: Qualitative Analysis of a Novel Numerical Method for Solving Non-Linear Ordinary Differential Equations **Sonali Kaushik,** *VIT-AP University, India*
08:20-08:40	Title: Photochemistry of the Retinal Chromophore in the Process of Seeing (Vision) **Ruhi Das,** *Bolpur College, Burdwan University, India*
08:40-09:00	Title: Effect of *Solanum lycopersicum* and *Citrus limon* Derived Exosome-Like Vesicles on Chondrogenic Differentiation of Adipose-Derived Stem Cells **Merve Yıldırım Canpolat,** *Yeditepe University, Turkey*

09:00-09:20	Title: Study on Physicochemical Treatment Measures for the Emerging Contaminants **Leena Singh,** *Galgotias College of Engineering & Technology, India*
09:20-09:40	Title: Enhancing Fe Grade and Silica Rejection using Corn and Rice Starch as Depressants through Reverse Flotation **V. Mitra Duggirala,** *JSW Steel Ltd, India*
09:40-10:00	Title: Effect of H_2S Gas Flow Rate on the Stoichiometric Ratio of S:Zn and Transparency of ZnS Nanostructure Ceramic in IR Region **Saeed Zahabi,** *Malek Ashtar University of Technology, Iran*
REFRESHMENT BREAK 10:00-10:15	
10:15-10:35	Title: CAR-T Cell Therapy – A Potential Treatment Strategy for Pediatric Midline Gliomas **Mainak Sinha,** *All India Institute of Medical Sciences, India*
10:35-10:55	Title: Modulation of Media and Light to Enhance C-Phycoerythrin in *Phormidium* sp. A01 Isolated from the Indian Coast **Rajagopal Ramya,** *Tamil Nadu Dr. J. Jayalalithaa Fisheries University, India*
10:55-11:15	Title: Investigating Novel Natural Polymeric Carrier Linked Prodrugs for IBD Treatment **Shakuntala Chopade,** *Bharati Vidyapeeth University, India*
11:15-11:35	Title: Electrospun Polyurethane as a Novel Support in Heterogeneous Fenton Reaction for Highly Efficient Removal of Pollutants **Nikhi Maria Raju,** *Amal Jyothi College of Engineering, India*
11:35-11:55	Title: Beyond a Single use: Understanding the Longevity and Reusability of Fire Proximity Suit **Shivangi Dwivedi,** *Delhi Technological University, India*
11:55-12:15	Title: Studies on Degradatoin of Textile Dyes in Wastewater using Immobalized Photocatalyst in a Continuous Process **Sailu Chintha,** *Osmania University, India*
12:15-12:35	Title: Leaching of Elemental Heavy Metals in Deep Eutectic Solvents from Spent Zinc-Carbon Batteries **Jyothi Thati,** *Osmania University, India*

12:35-12:40	Title: Modeling of the Temperature Dependence of the Diffusion Characteristics of Vacancies in BCC Iron **Madina Boboqambarova,** *National Research Nuclear University MEPhI, Russia*
12:40-12:45	Title: Kinetics of Vacancies Segregation Formation in Elastic Field of Edge Dislocation in BCC Iron **Gusev Aleksei Andreevich,** *Institute for Theoretical and Experimental Physics named by A.I. Alikhanov of NRC "Kurchatov Institute", Russia*
12:45-12:50	Title: Modelling of Diffusion Characteristics in Fe-Al Alloys **G. V. Sergeev,** *National Research Nuclear University "MEPhI", Russia*
12:50-12:55	Title: The Loss of Biodiversity as a Serious Environmental Threat: The Need for a New Legal Paradigm. The Interconnections between Biodiversity and Public Health **Maria Vittoria Ferroni,** *Sapienza University of Rome, Italy*
12:55-13:00	Title: Attaining Zero Emission *via* Energy Transition: A Myth or Reality **John Bentil,** *Takoradi Technical University, Ghana*
LUNCH BREAK 13:00-13:35	
13:35-13:55	Title: Cell Membrane Cholesterol and Regulation of Cellular Processes: New and the Same Old Thing **Antonina Dunina-Barkovskaya,** *Moscow Lomonosov State University, Russia*
13:55-14:15	Title: A Novel Approach to Weld Flow Analysis of Electric Resistance Welded (ERW) Tubes: Significance and Implications **P. Aravind,** *Vision Research & Innovation Laboratory, India*
14:15-14:35	Title: Evaluation of Media Protocols for *in vitro* Propagation of an Improved Variety and Two Landraces of *Dioscorea rotundata* **Nana Oforiwaa Ntorinkansah,** *KNUST, Ghana*
14:35-14:55	Title: Breathing Atom **Navin Khaneja,** *IIT Bombay, India*
REFRESHMENT BREAK 14:55-15:10	
15:10-15:30	Title: Elucidation a New Mechanism for Synthesis the New Therapeutics Organic Molecules 2,4-Diene-Aryls and Polyphenolics **Mostafa Mahrouz,** *FSSM Université Cadi Ayyad, Morocco*

15:30-15:50	Title: Body and Mind in Virtual Dark Tourism Experiences and Artwork Creations: Embodied Cognition Reaction Perspectives **Benjamin Quarshie,** *Mampong Technical College of Education, Ghana*
15:50-16:10	Title: Unraveling the Enigma: Molecular Mechanisms of Berberrubine-Induced Nephrotoxicity Reversed by its Parent form Berberine **Kai Wang,** *Tianjin University of Traditional Chinese Medicine, China*
16:10-16:30	Title: Two-Dimensional MOF–Based Materials: Preparations and Applications as Electrodes in Li-ion Batteries **Narges Nobakht,** *Institute for Research in Fundamental Sciences, Iran*
16:30-16:50	Title: Towards the Understanding of Precipitation Evolution in Two-Phase Steel: Application of a Novel Computational Model to Grain-Oriented Electrical Steel **Vanessa Quaranta,** *NLMK Group, Belgium*
16:50-17:10	Title: The Importance of Financial and Non-Financial Information in Ensure the Financial State of an Economic Entites to Monitorise the Position and Financial Performance **Cristina Mihaela Ionescu (Haralambie),** *Valahia University of Târgoviște, România*
17:10-17:30	Title: Transition Metal-Catalyzed Synthesis of Quinazoline Derivatives **Nitesh K. Nandwana,** *Virginia Tech University, USA*
17:30-17:50	Title: Statistical Inference of Missing Data Probability for Nonmonotone Missing at Random Data **Yang Zhao,** *University of Regina, Canada*
17:50-18:10	Title: Effect of Cathode Surface Area on the Electrodeposition Rate, Composition and Microhardness of Co–W Coatings Deposited from a Citrate Bath **Gotelyak Alexandr Vyacheslavovich,** *Shevchenko Pridnestrovie State University, Moldova*
NETWORKING	
End of Day 2	

ADV. CHEMISTRY 2025

DAY 01

VIRTUAL EVENT

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SPEAKER TALKS

Chromium-Extracted Aluminum Catalyst for Co-Pyrolysis of Cotton Fabric Waste and Polypropylene Plastic Waste to Bio-Oil

Wan Zuraida Wan Kamis[1], Nur Alwani Ali Bashah[1], Muhammad Zahiruddin Ramli[1], Siti Shawalliah Idris[2], Mohamad Anuar Kamaruddin[3], Ahmad Syahir Zulkipli[3] and **Moses Aderemi Olutoye[4]**

[1]Universiti Teknologi MARA Cawangan Pulau Pinang, Malaysia
[2]Universiti Teknologi MARA, Malaysia
[3]Universiti Sains Malaysia, Malaysia
[4]Department of Chemical Engineering, Federal University of Technology Minna, Nigeria

Heterogeneous catalysts of chromium-extracted aluminum (CE) were prepared and used to produce bio-oil from the co-pyrolysis of cotton fabric waste (CFW) and polypropylene waste (PPW). The catalysts were synthesized via wet impregnation at 5–20 wt% catalyst loading and calcined at 600 °C for 5 h. The co-pyrolysis was conducted in a fixed-bed reactor at 500 °C for 1 h with 1:1 CWF/PPW ratio and 1:1 catalyst/feedstock ratio. The physical and chemical properties of the catalysts and bio-oil were characterized by several techniques such as Brunauer–Emmet–Teller, scanning electron microscopy, energy dispersive x-ray spectroscopy, x-ray diffraction, temperature-programmed desorption and gas chromatography-mass spectrometry. Investigations into the effects of metal loadings revealed that the 15CE catalyst was the most active, achieving a maximum bio-oil yield of 76.4 % and producing valuable chemical compounds like hydrocarbons, alcohols, phenols, and furans. The XRD of 15CE catalyst confirmed the presence of chromium oxide and assigned to the rhombohedral phase of the crystal lattice. BET indicated 15CE has the largest surface area (50.4 m^2/g) among the CE catalysts which contributed to its high activity. The SEM revealed CE catalysts at different metal loadings contain irregular shapes and sizes with a rough surface texture. The NH_3-TPD profiles indicated alterations in acid site distribution due to the interaction between the introduced Cr metal and EA. The 15CE catalyst also demonstrated significant reusability, maintaining performance after two regeneration cycles. These results confirm the potential of CE catalysts in enhancing bio-oil production from CFW and PPW.

Biography

Dr. Wan Zuraida Wan Kamis is a senior lecturer at Centre of Chemical Engineering Studies, Universiti Teknologi MARA, Malaysia. She has a BSc in Chemical Engineering from University of Illinois at Urbana-Champaign, U.S.A and obtained her PhD from Universiti Sains Malaysia in 2016. She holds a Chartered Engineer qualification from Engineering Council U.K. and Professional Engineer from Board of Engineers Malaysia. She has more than 10 years working experience in semiconductor industry and 15 years in academic. Her research team focus on renewable energy, heterogeneous catalysts, thermochemical conversion such as pyrolysis and hydro-thermal carbonization, and the synthesis of bio-oil and biochars from biomass waste. She has published more than 30 articles in indexed journals and conference proceedings.

YidC Membrane Insertase: A Promising Target for Combating Antibiotic Resistance

Sharbani Kaushik[1], Ross E. Dalbey[2] and **Andreas Kuhn[3]**

[1]Department of Chemical Engineering, Dr. Vishwanath Karad MIT-World Peace University, India
[2]Department of Chemistry and Biochemistry, The Ohio State University, USA
[3]Institute of Biology, University of Hohenheim, Germany

The emergence of antibiotic-resistant bacterial infections poses a significant global health threat, underscoring the urgent need for novel antibiotic targets. Membrane proteins are particularly promising candidates due to their essential roles in bacterial survival and their accessibility to drugs without requiring cytosolic import.

Among these, the membrane insertase YidC, a multi-spanning protein in the inner membrane of *Escherichia coli*, plays a critical role in the folding and insertion of membrane proteins during biogenesis.

Its functional interactions with substrates and partner proteins such as the SecYEG translocase and the signal recognition particle (SRP) underscore its essentiality for bacterial growth, protein stability, and environmental stress tolerance.

This study highlights the structural and mechanistic features of YidC, particularly its catalytic hydrophilic groove and "greasy slide," which facilitate substrate binding and translocation.

The greasy slide, capable of accommodating diverse hydrophobic substrates, and the hydrophilic groove within the membrane provide promising targets for inhibitors that could block YidC's insertase function. The functional significance of YidC in bacterial physiology is further emphasized by studies demonstrating its indispensability for cell survival, with dual inactivation of paralogs in certain bacteria proving lethal.

By exploring the intricate interactions of YidC with its substrates and partners, this review lays the groundwork for developing YidC-targeted therapeutics. The feasibility of designing drugs that bind to the hydrophilic groove or the greasy slide is particularly promising,

offering a pathway to combat bacterial infections. Such strategies could provide an innovative approach to addressing antibiotic resistance by exploiting previously unexplored bacterial membrane proteins as therapeutic targets.

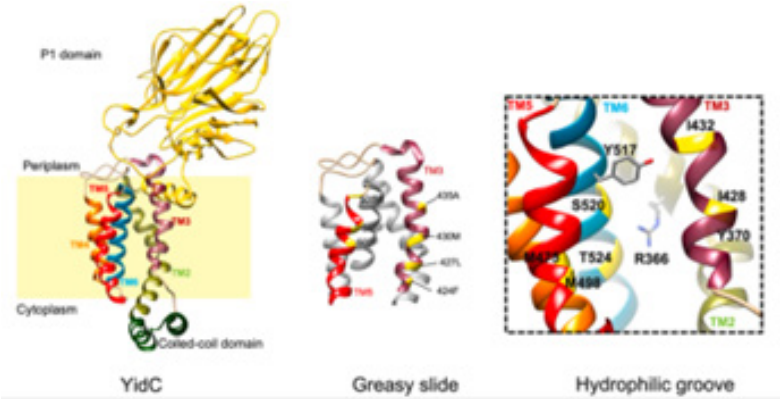

Fig-1: The insertase YidC with greasy slide and hydrophilic groove

Biography

Dr. Sharbani Kaushik is a distinguished biotechnology researcher specializing in bioenergy, bioelectronics, and membrane proteins, working as an Assistant Professor in MIT-WPU, Pune, India. She earned her Ph.D. from IIT Guwahati's School of Energy Science and Engineering, focusing on renewable energy innovations like microbial fuel cells and biofuel cell biosensing devices. Her postdoctoral research at The Ohio State University, USA, expanded her expertise to synthetic biology, drug discovery and membrane proteins, leading to high-impact publications.

Dr. Kaushik has also served as a lecturer at Meghalaya's Regional Institute of Science and Technology, where she introduced advanced courses in biosensors and biomedical instrumentation, mentoring aspiring scientists. Recognized with honors like the Young Scientist Award (Materials Research Society of India) and the ISEES Best Ph.D. Thesis Award, she is known for her impactful research and presentations.

Her administrative roles and extensive publications underscore her commitment to advancing membrane proteins and bio electrochemical devices.

Green Synthesis of Diverse Heterocyclic Library as Biologically Potent Agents

M. Sarasija[1], D. Ashok[2] and **B Vijaya Lakshmi[3]**

[1]Department of Chemistry, Satavahana University, India
[2]Department of Chemistry, Jawaharlal Nehru Technological University, India
[3]Department of Chemistry, TSWRDCW, India

Heterocyclic compounds are the most often encountered scaffolds in pharmaceutically relevant substances and are essential for the human wellbeing. The remarkable ability of heterocyclic nuclei to serve as reactive pharmacophores has largely contributed to their unique value as traditional key elements of numerous drugs. Certain possible modifications on the heterocyclic moiety may lead to new compounds with better biological profiles. Heterocyclic rings are commonly found structural units within the frame work of a variety of natural products, which is the main reason for the growing importance of such class of compounds. The relevance of compounds composed from two or more heterocyclic rings for drug discovery, irrespective of the target, bis-heterocyclic compounds are identified as the most potent ones. Among the top 50 prescription drugs there are twelve bis-heterocyclic compounds. Therefore, methods for the synthesis of such systems are of significant interest. The environmental protection has become a global concern and the synthetic organic chemists are searching the ways of developing and applying more efficiently and environmentally benign strategies for future sustainable growth.

One of the thrust areas for achieving this target is use of Green Chemistry Techniques in Organic Synthesis. The salient features of these methodologies are enhanced reaction rates, easy workup, high yields, operational simplicity, greater selectivity and experimental ease of manipulation, low cost and economy. In view of these advantages of the above environmental benign approaches and as a part of our ongoing research program towards the nontraditional methods, the concept of green synthesis has been adapted for the rapid and efficient synthesis of diverse heterocyclic library of pharmaceutical interest.

As a part of our research program towards the green synthesis of pharmaceutically active molecules and above observations prompted us to take up the green synthesis of diverse heterocyclic library.

Biography

Dr. M. Sarasija Assistant Professor, Department of Chemistry; currently Additional Controller of Examinations and BC Cell Director, Satavahana University. She received Master's Degree and Ph.D. from Osmania University, Hyderabad. She has 26 years of teaching and 12 years of research experiences. Her research interests on Green & Medicinal Synthetic Chemistry. She has published over 74 research papers in various reputed National and International journals. She has presented 35 oral and poster presentations in National and International Conferences. She awarded best paper presentations in National conferences. She also attended international conferences in various countries such as Glasgow, UK; Salt Lake City, USA; Sydney, Australia; and Dresden, Germany. Delivered several guest lectures at Government and affiliated colleges. She Conducted many Medical camps in service Organizations. She has organized FDP and Webinars.

Enhancing Sustainable Agriculture: The Role of Microbial Biocontrol Agents and Plant Growth-Promoting Microorganisms in Crop Management

Beema Jainab S.I.[3], S. Renga Sushma[1], Amzad Basha Kolar[2], Shaik Azeem Taj[3], N.P.M. Mohamed Tariq[4], M.D. Saravanamoorthy[5], C. Mariappan[1], Abdulrahman I Almansour[6], Sinouvassane Djearamaneh[7], Ling Shing Wong[8] and **Saminathan Kayarohanam[9]**

[1]Department of Microbiology, Justice Basheer Ahmed Sayeed College for Women (Autonomous), India
[2]Department of Botany, The New College (Autonomous), India
[3]Department of Botany, Justice Basheer Ahmed Sayeed College for Women (Autonomous), India
[4]Department of Biotechnology, Islamiah College (Autonomous), India
[5]Department of Botany, Thanthai Periyar Government Arts & Science College (Autonomous), India
[6]Department of Chemistry, King Saud University, Saudi Arabia
[7]Department of Allied Health Sciences, Jalan University, Malaysia
[8]Faculty of Health and Life Sciences, INTI International University, Malaysia
[9]Faculty of Bio-Economics and Health Sciences, University Geomatika Malaysia, Malaysia

Plant infections and pests pose significant threats to global food security, often managed through excessive use of chemical pesticides. A more sustainable approach is needed to enhance agricultural productivity for a growing population. Microbial biocontrol agents (MBCAs) have proven effective in managing plant diseases, promoting crop growth, and increasing yields as part of a green strategy. Plant growth-promoting bacteria and fungi (PGPR/PGPF) not only boost growth but also suppress diseases by producing inhibitory compounds and activating plant defenses against pathogens. As biofertilizers and biopesticides, they offer a cost-effective and sustainable solution for agriculture, leading to a "win-win" scenario. Certain strains of PGPR and PGPF have shown promise under controlled conditions as biocontrol agents. However, challenges remain before MBCAs can be widely registered and used for disease and pest management. Effective MBCAs can enhance nursery crop performance while reducing the need for fertilizers and chemical pesticides. This

review aims to bridge knowledge gaps on plant growth-promoting microorganisms (PGPM), providing a scientific basis for policy development and recommendations, and highlights the need for further research into their commercial application.

Biography

Dr. Beema Jainab S. I serves as Associate Professor in the Department of Botany at Justice Basheer Ahmed Sayeed College for Women (Autonomous) in Chennai, she commenced her career as B.Ed. Lecturer, subsequently progressing as Lecturer in Management and then to Assistant Professor in a Government Aided Institution.

She is a Doctorate in the field of Phycology. District coordinator for Biodiversity Conservation, Assistant Director in World Women's Welfare Association, Committee member of Ariviyal Poonga, Staff selection Committee member, Board of studies and Scrutinizing member, Lead Auditor and Editor for esteemed publications.

She has been invited as renowned speaker in Schools, Colleges and Universities. She has garnered received 30 accolades including Outstanding award 2023 (U.K) and 2018(Malaysia), the Best paper presentation Award 2023 and Doctor of Letters (U.K) She has delivered presentations in Thailand. She has authored a book entitled Frontiers in Molecular Genetics and Genomics. She has co-authored four books and Booklet on "Trees of J.B.A.S College". She has published 40 research papers in esteemed journals and presented 35 research papers in National and International conferences.

High Strength Hydrogel using Phenolated Lignin

Taslima Ferdous[1], Lubna Jahan Sarkar Hany[2], M Mostafizur Rahman[2] and **M Sarwar Jahan[2]**

[1]Department of Applied Chemistry and Chemical Engineering, University of Dhaka, Bangladesh
[2]Pulp and Paper Research Division, Bangladesh Council of Scientific and Industrial Research (BCSIR), Bangladesh

In this experiment, lignin was modified through phenolation and then used to synthesize hydrogels with polyvinyl alcohol (PVA). The highest yield in phenolation was achieved at 120 °C with a Lignin/Phenol ratio of 1/4 and 10% sulfuric acid charge, resulting in a yield of 123%. Successful phenolation of lignin was indicated by the increasing yield and the intensity of the bending vibration of the phenolic hydroxyl group (O–H) at 1356 cm^{-1} in the FTIR spectra. A remarkable difference was observed between hydrogels containing phenolated lignin (PhL) and non-phenolated lignin (L). PhL had a yield of 98%, while L yielded 88% at a 1:1 Lignin/PVA ratio. When the PVA/L ratio was changed to 1:2, L was unable to form a stable hydrogel. Instead, it formed a soft, jelly-like liquid after 24 h. On the other hand, PhL was able to form a stable hydrogel up to a 1:5 PVA/PhL ratio with 78% yield. Additionally, the phenolated hydrogel showed higher mechanical stability than the L hydrogel. However, the L-PVA hydrogel had a higher swelling ratio than the PhL-PVA hydrogel.

Biography

Dr. Taslima Ferdous joined Department of Applied Chemistry and Chemical Engineering, University of Dhaka, Dhaka-1000, Bangladesh, on 18.09.2010 as a Lecturer and currently working as an Associate Professor. She did her PhD from the same department and the title of her PhD was 'Morphological and Chemical Characteristics of Different Non-wood Species and Their Effect on Pulping'. Currently she is doing research on lignocellulose chemistry, pulp and paper and biorefinery concepts. She has over forty international papers.

Cytotoxic Effect of Isolated Coumarin Compounds of *Luisia tenuifolia* Blume in A431 Squamous Cell Carcinoma Cell Lines

Sakthi Priyadarsini. S and **Kumar. P.R**

Department of Pharmacognosy, SRM Institute of Science and Technology, India

Coumarins are compounds possessing a fused benzene and α-pyrone structure. The majority of coumarins are found in grasses, and they have been proven to have several biological effects, including antibacterial, antiviral, anticancer, antithrombotic, and anti-inflammatory. *Luisia tenuifolia* Blume., (Orchidaceae), an epiphytic orchid is common along the western Ghats at an altitude of 900m. The whole plants are used traditionally for the treatment of boils, abscess and tumors. The present study aimed on the isolation of coumarin compounds from the active ethanolic extract of whole plants of *Luisia tenuifolia* and further, the cytotoxic effect was studied by MTT assay. Two coumarin compounds were isolated and elucidated as Osthole and Isoarnottinin 4'- Glucoside by IR, Mass, and NMR spectroscopical studies. Further, we studied the anticancer effect of the isolated compounds against squamous cell carcinoma cell line, A431 cultured *in-vitro*. The percentage cell viability of A431 cell lines after treatment with isolated compounds were found to be ranging from 39.05 ± 0.60% to 40.89 ± 0.79% at the maximum concentration of 200 µg/mL compared to the standard 5-flurouracil (28.30 ± 0.60 %). The isolated osthole showed promising cytotoxic effect with an IC_{50} value of 5.81 µg/mL in A431 cells compared to standard (11.62 µg/mL). Thus, the results of the study revealed that the higher cytotoxic effect was found in osthole. Further studies can be enhanced in studying the chemotherapeutic potential *in-vivo*.

Biography

Dr. Sakthi Priyadarsini. S is currently working as an Assistant Professor in the Department of Pharmacognosy, SRM College of Pharmacy, SRM Institute of Science and Technology, Tamil Nadu, India. After her B. Pharm, she has worked as an Eye Camp Co-ordinator and later as a Hospital Counsellor at Dr. Agarwal's Eye Hospital, Ashok Nagar, Chennai. Then, she worked as a Research Analyst, Experimental Pharmacology Division at Clarivate Analytics (Formerly Thomson Reuters), Mylapore, Chennai. To her credit, she has published 25 articles in various National and International peer reviewed journals, 4 book chapters and 2 patents. She is a recipient of young scientist award and is a reviewer in various national and international journals. Her research interests include pharmacognostical and phytochemical standardization of herbals, anti-cancer, anti-diabetic screening of medicinal plants, isolation and characterization of secondary metabolites in epiphytic orchids and antibacterial study against skin and soft tissue infections.

Dermatology Benefits of *Punica Granatum*: A Review of the Potential Benefits of *Punica Granatum* in Skin Disorders

Farshad Akbarnejad

Dr. Akhavi Lab Co, Iran

Pomegranate, known as Anar in Persian, has been used for centuries to treat various diseases. Since 3000 BC. Since 2000 BC, different parts of the plant have been used in traditional medicine for various purposes, such as eliminating parasites with the fruit, treating diarrhea with the seeds and bark, and treating diabetes with the flower. In addition, the bark and roots can stop bleeding and promote wound healing, while the leaves are used to reduce inflammation and treat gastrointestinal problems. The *P. granatum* tree, which typically grows 5 to 8 meters tall, is native to Iran, but is also found in Afghanistan, Pakistan, India, China, the United States and throughout the Mediterranean region. Pomegranate pericarp contains a large amount of phytochemicals, mainly polyphenolic flavonoids and ellagitannins, which contain ellagic acid and punicalagin. Hydrolyzable tannins constitute the main group of polyphenols in pomegranate, which are composed of gallotannins, ellagitannins, galagyl esters, hydroxycinnamic acids and hydroxybenzoic acids. The main component of ellagitannins is punicalagin, which is mainly found in the pericarp, skin, flowers and seeds. In addition to punicalagin and its isomers, pomegranate contains isomers of punicalin A, punicalin B and pedunculagin. Likewise, gallic acid, ellagic acid, caffeic acid, chlorogenic acid, p-coumaric acid, aglycone and ferulic acid are present in the pomegranate. Pomegranate contains phytochemicals in its various parts, which have many pharmacological functions. Punicgranatum L (pomegranate) which contains special compounds such as polyphenols and anthocyanins, has antioxidant, anti-inflammatory, wound healing, whitening, anti-acne and antibacterial potential. It is also viricidal against herpes simplex virus infection and prevents photoaging of the skin due to UVB.

Biography

Dr. Farshad Akbarnejad received his DVM from Shahid Chamran University in Ahvaz. He is currently the head of the scientific and educational department at Dr. Akhavi Lab Co. in Iran. He has over 30 publications and has authored 10 books. Dr. Akbarnejad has presented speeches at international congresses and serves as an editor for several scientific journals. With over 17 years of experiences, his professional focus is on medicinal plants and cosmetic formulations.

Assessing the Effect of Preservation Temperature on Nutrient Retention in Grain-Milk Beverage

H.M.T. Herath[1], L.A. Wickramaarachchi[1,2], D.U. Rajawardana[1], M.M.N. P[1], Gunasekara[1] and **M.A. Jayasinghe[2]**

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[2]Department of Food Science & Technology, Faculty of Applied Sciences, University of Sri Jayewardenepura, Sri Lanka

Processing of multiple grains and milk into a grain-milk beverage (GMB) is an innovative concept on excellent functional food. The aim of present study was to develop a low fat -low calorie, gluten free functional multi-grain beverage by improving nutritional and flavor profiles. Grain extract was prepared using grains of sorghum: horse gram: red rice variety 'kuruluthuda at ratio of 5:2:3, followed by soaking overnight, pressure cooking and blending with water (1:3). Formulation of GMB were performed in three different grain extract ratios (60% 65% and 70%) with cow's milk, sesame milk, sweetener (Kithul treacle or sugar), and carrageenan followed by homogenizing (6000 rpm) and using two-way preservation techniques of sterilizing (at 121°C for 15 min) and pasteurization (at 85°C 30 mins). The 70% multi-grain extract containing sugar beverage was selected as the best formulation based on sensorial attributes. The crude fat, crude protein, crude fiber, total ash, carbohydrate and caloric value of pasteurized GMB containing sugar and treacle were (1.42± 0.05%;2.35± 0.01), (1.58± 0.04%; 1.48± 0.04%), (0.46± 0.05%; 0.49± 0.02%), (0.34± 0.00%; 0.35± 0.00%), (13.20± 0.00%; 12.26± 0.01%) and (74.60 Kcal; 74.57 Kcal) where as in sterilized GMB containing sugar and treacle were (1.46± 0.02%; 1.03± 0.21), (1.46± 0.12%; 1.46± 0.10%), (0.78± 0.13%; 0.82± 0.01%), (0.37± 0.01%; 0.37± 0.01%), (11.66± 0.01%;11.70± 0.01%) and (66.06 Kcal; 65.41 Kcal) respectively. There was a significant difference ($p<0.05$) observed in moisture%, fat%, crude fiber% and caloric values of two samples in different heat treatments. Mineral contents of GMB containing sugar had Na (21.30 mg/100ml), K (76.00 mg/100ml), Ca (2.64 mg/100ml) and Mg (15.56 mg/100ml) while GMB containing treacle had Na (14.90 mg/100ml), K (74.80 mg/100ml), Ca (2.41 mg/100ml) and Mg (13.76 mg/100ml) respectively. Vitamin B1, B2, B3, B6, B9 and

E, were not detected while Vitamin B5 was 1.9 mg/100g; 2.1 mg/100g respectively. Since the developed beverages had acceptable organoleptic properties, they have a high potential to introduce as healthy functional beverages.

Biography

She is the Principal Research Scientist attached to the Food Technology Section of Industrial Technology Institute, Sri Lanka and currently working as a Director, Advance Food Research Centre. She has obtained the Bachelor of Science (B.Sc. Special Degree in Chemistry; 1993), University of Peradeniya, Sri Lanka, Master of Philosophy (M.Phil. Degree in Food Sci & Food Chem.: 2004), Doctor of Philosophy (Ph.D. Degree in Food Sci & Nutri.: 2013). The Professional qualification of Chartered Chemist was obtained from the Institute of Chemistry, Sri Lanka in 2022. Her fields of specialization are Food Science and Technology, majoring Food Chemistry, Nutrition, grain processing, Food Product Development and Process Development, Food Analysis, Nutritional labeling, Enzyme Technology, Functional Food formulation and analysis of functional food factors. She has published more than 30 journal articles, 70 abstract communications and several book chapters. She was also participating in several technical and national committees a resource person.

Coupled Methyl Ethyl Ketone Condensation as a Modern Route for Associated Petroleum Gas Processing

Lebedev I.V., Martsinkevich E.M. and **Bruk L.G.**

MIREA Russian Technological University, Russia

The processes involving the formation of new carbon-carbon bonds are of considerable interest for fine and basic organic synthesis. Among the numerous methods, the reactions of aldol and croton condensation of aldehydes and ketones occupy an important place.

One of the most promising base compounds for these purposes is methyl ethyl ketone (MEC). It has a high potential for the development of catalytic methods for the production of synthons for medicines and general-purpose products, as well as effective additives to motor fuels.

The idea of our group was to organize a new coupling node and transform the primary unsaturated condensation products into the same saturated carbonyl dimer with a reduced ability to further transformations.

Thus, it was supposed to suppress the sequential reactions of the transformation of unsaturated dimeric ketones, the primary products of aldol-croton condensation. The idea was implemented in the “one pot reaction” variant, where MEK condensation takes place in a hydrogen atmosphere with the participation of a multifunctional condensation/ hydrogenation catalyst.

The purpose of this work was to develop a bifunctional catalyst capable of selectively conducting the process of condensation of MEC followed by hydrogenation of its products.

Aldol-croton condensation, coupled with hydrogenation, proceeds sequentially. At the first stage, an aldol is formed, which undergoes dehydration to form at least two isomeric ketones. Their hydrogenation leads to the formation of a single 5-methyl-3-heptanone.

This scheme, presented in Fig. 1, allows us to explain the suppression of successive transformation reactions of unsaturated dimeric ketones formed during MEK condensation, but

does not clarify the mechanism of the almost complete disappearance of competing dimers, as well as the absence of their hydrogenation products. Perhaps palladium in the presence of hydrogen stimulates the formation of aldol from MEC.

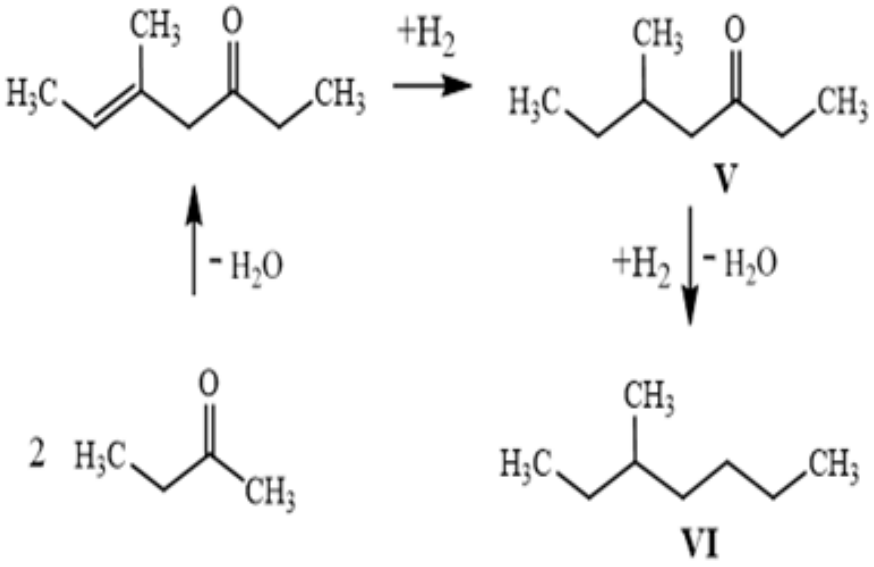

Fig-1: The scheme of the main products formation

Thus, the coupling of the processes of MEC condensation and hydrogenation of intermediately formed products on the Pd catalyst/C allows a targeted effect on the process, increasing the selectivity for 5-methyl-3-heptanone.

The technique we used - the coupling of various processes on a multifunctional catalyst in one reactor - seems to be of a general nature and can be used to improve the technological performance of similar processes.

Biography

Lebedev Ilya was born in Moscow in 1997 year. He graduated from the Gubkin University of Oil and Gas called after Gubkin I.M. For four years he worked at the Rosneft Research and Development Center in the laboratory of catalytic processes of oil refining. As a result of this work, a hydrofinishing catalyst to obtain stable oils was invented and implemented at oil refinery.

Then he worked for two years at Gazprom VNIIGaz LLC in the natural gas processing laboratory, developing a new system of absorbents for gas purification.

At the moment he works at MIREA, where he teaches general chemical technology at the Department of Physical Chemistry. The topic of his PhD thesis is the coupled process of methyl ethyl ketone condensation for the purpose of obtaining octane additives to fuels.

Novel Nanoemulsions of *Cymbopogon winterianus* and *Eucalyptus globulus* Essential Oils for Sustainable Pest Management of Lepidopteran Pest *Spodoptera litura*: Development and Bio-Efficacy

Alka Gupta[1], Ankur[1] and **Sanjiv Mullick[2]**

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[2]Department of Zoology, Dyal Singh College, University of Delhi, India

The increased resistance of agricultural pests against conventional chemical pesticides, with growing concerns about environmental and human health consequences, has necessitated the development of alternative, environmentally friendly pest management strategies. Essential oils (EOs) extracted from plants have gained popularity for their natural pesticidal capabilities, notably against key agricultural pests like Lepidopteran species. However, the high volatility, rapid degradation, and poor water solubility of essential oils have restricted their use as biopesticides. Nevertheless, these drawbacks can be overcome by developing their nano emulsions. These homogeneous dispersions allow uniform application of EO on plant surfaces. Presented research work is concerned with comprehensive development of nano emulsions based on plant essential oils for integrated pest management of Lepidopteran pests. Development of stable and homogenous O/W Citronella and *Eucalyptus* EO-based nano emulsions and detailed *in vitro* studies against the highly destructive pest *Spodoptera litura* are described. The emulsions are optimized for stability hydrodynamic diameter, and polydispersity index while monitoring using Dynamic light scattering (DLS), creaming index (CI), and oil loading assessment studies. The formation of nanometric spherical droplets was confirmed by Transmission electron microscopy (TEM) techniques. In laboratory bioassay, citronella nano emulsions showed a 100% mortality at 12.50 mg mL^{-1} with an LC_{50} value of 4.19 mg mL^{-1} against *S. litura* larvae. The larval feeding on leaf discs was substantially decreased ($P < 0.05$) having an Antifeedant index (AFI) value of 51.83. Eucalyptus EO-based nano emulsions showed significant ovicidal activity with an LC_{50} value of 22.331 mg mL^{-1}. Furthermore, the nano-emulsion exhibited a significant repellent effect on *S. litura* neonate larvae in glass tunnel olfactometer tests. Hence, both Citronella and *Eucalyptus* EO-based nano emulsions are viable options for developing botanical insecticides for the management of *S. litura*.

Biography

Prof. Alka Gupta is a Professor in the Department of Chemistry, Dyal Singh College, University of Delhi. She obtained her M.Sc. with Specialization in Organic Chemistry followed by PhD from the Department of Chemistry, University of Delhi in 1991. Later she joined CSIR-National Physical Laboratory, Delhi, India as a Research Associate for five years (1997-2002). Her primary research interests include solid and solution phase synthesis of constrained peptides and their conformational analysis using 2D-NMR, IR, and CD. Self-assembled nanostructures using short peptides, polymers, conjugates, synthesis, characterization, and biomedical applications. She is a life member of several scientific organizations in India. Her current area of research includes the Development of smart biopesticide-based nano formulations and their efficacy against insect pests (Lepidopteran pest). She has published research articles in a journal of international repute and has been a reviewer of several highly rated journals. She has guided the research work of several PhD students. Currently, two PhD students are working under her guidance. Her laboratory has been funded by the University of Delhi and other national agencies such as UGC, DST, and CSIR.

Ensuring Environmental Safety of Water Resources in Alagir District: A Study of the Ardon River

Alan Lolaev[1], Stanislav Dzeboev[2], Aleksan Oganesyan[1] and **Aleksandr Badoev[3]**

[1]Vladikavkaz Scientific Center of the Russian Academy of Sciences, Russia
[2]North Ossetian State University Named by K.L. Khetagurov, Faculty of Geography and Geoecology, Russia

The Terek River is the primary water artery of the Republic of North Ossetia-Alania, spanning a total length of 623 kilometers. As the second largest river in the North Caucasus region, the Terek River boasts an expansive catchment area exceeding 20,000 square kilometers in the vicinity of the city of Mozdok.

The focus of this article, however, is the Ardon River, which extends for 107 kilometers and encompasses a basin area of 2,700 square kilometers, with an average slope of 17%. The Ardon River's catchment area measures 1,180 square kilometers, and its average basin height reaches an elevation of 1,860 meters above sea level.

The environmental health and safety of the Ardon River are directly tied to the presence of a technogenic deposit located within the valley - the Unal tailings dam, which is part of the Sadon lead-zinc combine operated by the Mizur mining and processing plant. Of critical importance is the fact that environmentally hazardous elements, including arsenic (As), cadmium (Cd), boron (B), nickel (Ni), lead (Pb), zinc (Zn), and others, are constantly being introduced into the Ardon River. This contamination stems not only from the tailings dam itself, but also from the mine waters of the Sadon combine and the lateral tributaries of the Ardon River, such as the Sadonka, Arkhon and Unal-don rivers. As a result, these pollutants are not only contaminating the Ardon River but also accumulating within its waters and sediments.

The environmental degradation of the Ardon River poses significant concerns, as it represents a vital water resource for the region and its inhabitants. The continued presence

and influx of hazardous elements threaten the ecological balance and the long-term viability of this important waterway, underscoring the urgent need for comprehensive environmental monitoring, risk assessment, and remediation efforts to address this pressing issue.

Biography

Alan Batrazovich Lolaev is a Russian scientist, specialist in the field of Engineering Geology, Permafrost Science, and Geoecology. A graduate of the North Caucasian Institute of Mining and Metallurgy, he began his career at the Norilsk Industrial Institute. In 1988, he defended his Candidate of Sciences (PhD) dissertation, and in 1998 he defended his Doctoral dissertation on the study of engineering-geocryological conditions in the permafrost zone. He is a professor, the author of over 350 scientific works, including 5 monographs. He successfully combines scientific and pedagogical activities. He actively participates in international scientific cooperation and has made presentations at numerous international conferences. He is a member of reputable academies and expert councils, and has been awarded honorary titles and certificates for his many years of work.

Green Synthesis of Nanoparticle for Detection of Hazardous Gas

Sharad B. Patil[1] and **Ganesh E. Patil**[2]

[1]SSMM Arts, Science and Commerce College, India
[2]SNJB's KKHA Arts, SMGL Commerce and SPHJ Science College, India

This study works the environmentally friendly manufacturing of SnO_2 nanoparticles utilizing leaf extract from Delonix elata. Synthesis routes *via* sonication method are employed to prepare SnO_2 nanoparticles. Numerous physical and chemical methods are being used these days to produce tin oxide nanoparticles. However, these methods are expensive, require high energy, and also utilize various toxic chemicals during the synthesis. Experimental conditions were precisely optimized for the preparation of films. The XRD and SEM study revealed the cubic nature of the SnO_2 nanoparticles. The sensor demonstrates rapid reaction (9 s) and rapid retrieval (15 s). SnO_2 nanoparticles exceptional sensitivity is due to interactions between CO molecules and adsorbed oxygen species on the sensor surface. The finding was analyzed and discussed.

1. Introduction: The detection of poisonous, explosive, and dangerous gases has found widespread use for N-type chemiresistive oxide semiconductors, such as SnO_2, WO_3, ZnO, TiO_2, and In_2O_3. The main advantages of oxide semiconductor sensors are their affordability and ease of use, as well as their capacity to identify a variety of gases. High gas responses for the detection of analyte gas at trace quantities can be made possible by using. [3]. However, because different types of reducing gases can interact electrochemically with negatively charged surface oxygen, selective gas detection with oxide semiconductor sensors can frequently be challenging. A small CO gas sensor is one of many types of chemical sensors that is needed to monitor carbon monoxide produced by incomplete combustion in natural gas and vehicle exhaust. A key challenge in the development of CO sensors is not only to increase the sensitivity to CO, but also to improve the selectivity of CO among the various coexistent gases such as H_2, hydrocarbon and water vapor. For a technical perspective, transparent conducting oxide (TCO) material indium oxide thin

film is important [4].

The Caesalpinoideae family includes the Delonix elata (D. elata) tree. The members of the genus are the blooming timbers. Since the leaves and bark of this plant are recognized to have therapeutic qualities, it has been investigated for several pharmacological uses. A cost-effective and ecologically friendly method for producing it has been developed as a result of growing concerns about its effects on human health and the environment [5]. Tin oxide nanoparticles have recently been produced utilizing environmentally friendly techniques using a variety of biological entities, including bacteria, plant extract, and natural proteins. However, industrial-scale production using green synthesis approaches remains a challenge due to the complexity of the biological substrates that poses a difficulty to the elucidations of the reactions and mechanism of formations that occur during the synthesis. Furthermore, the application of the prepared SnO_2 nanoparticles as CO gas detection was proceeded by using static gas sensing system.

2. Experimental method:

Synthesis of SnO_2 nanoparticles: The SnO_2 nanoparticles were green synthesized using the leaf extract of D. elata through synthesis routes namely i.e., Sonication methods. The base solution was prepared by adding 2.256 g of tin chloride (0.1 M) precursor, (an analytical grade (AR) from Merck, India) to 100 ml of D. elata leaf extract and stirred for 24 h at constant rpm to synthesize SnO_2 nanoparticles. Hereafter this solution is called as a base solution for the preparation of SnO_2 nanoparticles. All the AR grade chemicals were utilized without any further purification.

3. Characterization techniques:

3.1 XRD Profile

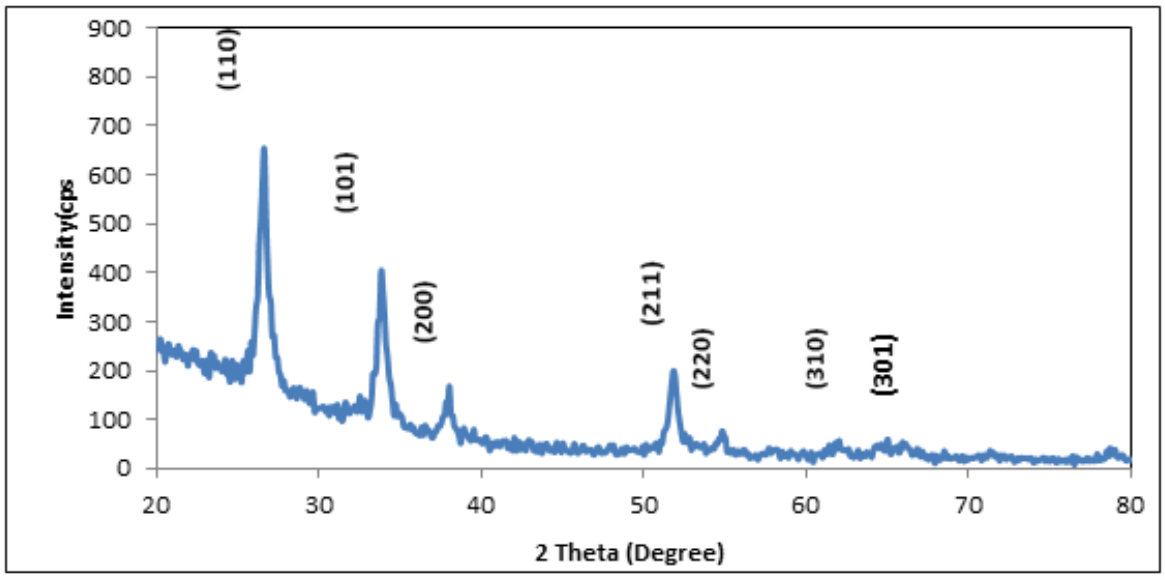


Fig-1: X-ray diffractogram of SnO_2 nanoparticle.

Fig. 1 shows XRD profile of nanoparticles. These XRD patterns exhibit well solved peaks that correspond to the phase of SnO_2. The SnO_2 diffraction peaks: (110), (101), (200), (211), (220), (310) and (301) match with standard ASTM data SnO_2. The (110) peak predominates indicating a preferential growth. This means that the grains have c-axis perpendicular to the substrate surface. The average crystallite sizes were calculated to be around 17 nm by using the well- known Scherrer equation.

3.2 SEM Profile

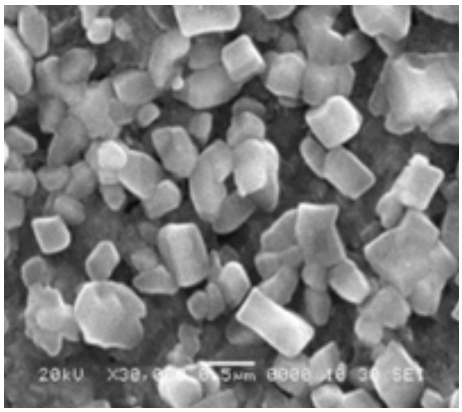


Fig-2: SEM of SnO_2 nanopartilcle.

SEM imaged of SnO_2 nanopartilce was represented in **Fig.2**. The particle displayed a homogeneous dispersion and seems to be cubic in shape. The grain size observed to be 27 nm respectively.

4. Gas sensing Performance of nanopartilce:

4.1 Gas Response

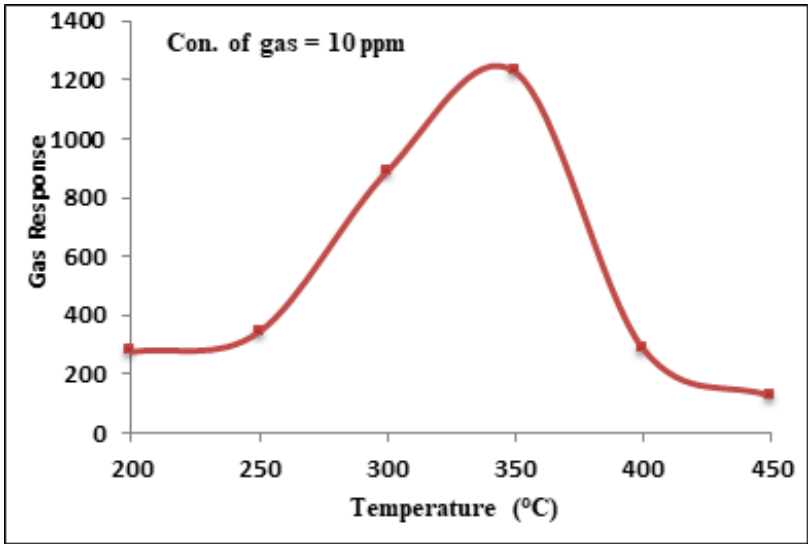


Fig-3: Detection of gas response against operating temperature.

The CO gas response increases with increase in operating temperature and reaches maximum (S = 1230) at 350°C and falls with further increase in operating temperature. It can be observed that the sensor response decreases for temperatures lower and higher than 350°C. The temperature value 350°C was found to be an optimum temperature for which the sensor shows high response.

4.2 Stability

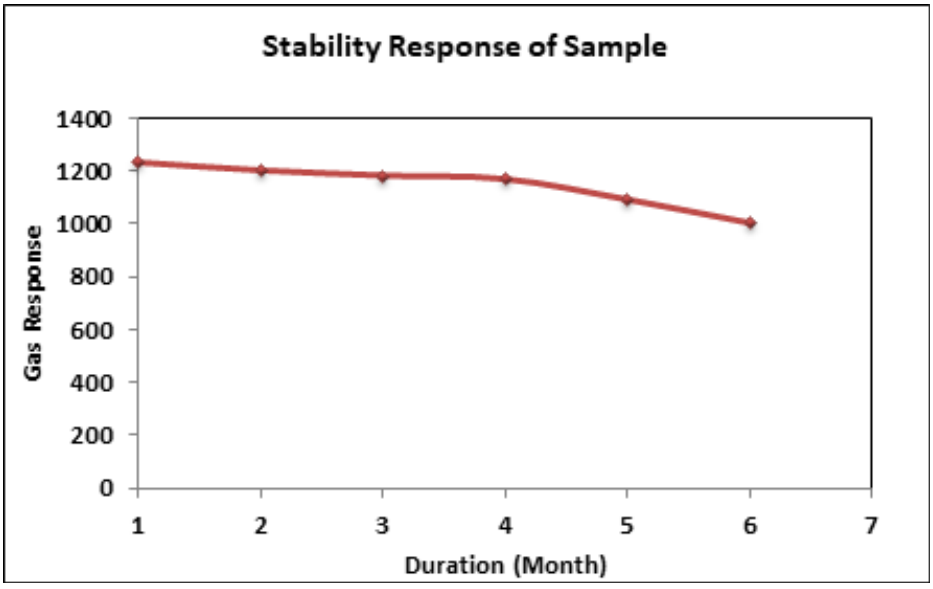


Fig-4. Long-term stability of the SnO_2 nanoparticle gas sensor for 10 ppm CO gas.

As illustrated in **Fig. 4**, the CO gas performance of the thin film for SnO_2 nanoparticle, diminished steadily over 6 months of investigation; however, the steadiness of the sensor response was justly noble. This specified good sensor consistency and steadiness for commercial application.

5. Conclusions: SnO_2 nanoparticle was prepared by green synthesis method. The structural and morphological properties confirm that the as-prepared SnO_2 are nanostructured in nature. The SnO_2 nanoparticle was most sensitive to CO gas and exhibit the response of S = 7499 to the gas concentration as 10 ppm at the temperature of 350°C. The findings highlight the potential of SnO_2 nanoparticle for practical gas sensing applications, offering significant improvements in sensitivity as well as stability.

6. Acknowledgements: Authors are thankful to the Principal of SSMM Arts, Science, and Commerce College, Pachora for providing the laboratory space needed for this study.

Biography

Sharad B. Patil is Assistant professor in Physics at Nanomaterials Research Lab., Department of Physics at SSMM Arts, Science, and Commerce College, Pachora. He received the M.Sc. degree in Physics and PhD in nano science. His topics of interest are: gas, sensors, MOS, nanocomposites nanomaterials, ceramics gas sensors, photo-conducting and photoluminescent materials, growing crystals, dielectric properties of materials, nanomaterials, thin and thick film physics.

Spectroscopic Methods as an Alternative Tool for Determining Qualitative Changes in Edible Oils Subjected to Oxidation

Grażyna Neunert and **Wiktoria Kamińska**

Department of Physics and Biophysics, Faculty of Food and Nutrition Sciences, Poznan University of Life Sciences, Poland

Chemical methods are commonly used for routine quality analyses in many areas of food industry. These analyses are typically labor-intensive and often require the use of large amounts of toxic solvents and reagents. As an alternative, simpler methods utilizing spectroscopic techniques can be employed, which are less time-consuming and generally do not require special sample preparation.

In this work, spectroscopic methods, such as FTIR analysis, spectrofluorimetric technique and emission spectral measurements were used as alternatives to chemical methods for determining parameters that characterize the oxidation process of edible oils. The oils studied, including: nigella seed, pumpkin seed, flaxseed, linseed, evening primrose seed, and thistle seed oils, were underwent accelerated thermal aging at 60°C.

To monitor the oxidation process using FTIR technique, the peak at 721 cm^{-1}, associated with *cis* double bonds of unsaturated fatty acids (UFAs), and the peak intensity at 986 cm^{-1}, corresponding to the bending vibration of C-H *trans* and *cis* conjugated diene groups of hydroperoxides (HPs), were analyzed. The ratio of unsaturated/saturated fatty acids (UFAs/SFAs) was qualitatively expressed by the peak ratio of 3011/2925 cm^{-1}. Additionally, the peroxide value (PV) was calculated using the Triphenylphosphine/Triphenylphosphine Oxide (TPP/TPPO) assay. At the same time, the presence of primary and secondary oxidation products was determined by measuring the specific absorptivity at 232 nm and 268 nm. Using fluorescence emission spectra in the range of 400–500 nm, changes in band intensity associated with polar compounds formed during aging were monitored. All of the spectroscopic parameters mentioned above were compared with those calculated by chemical assays, like: PV, iodine value (IV), and acid value (AV).

The correlations found between the determined parameters confirm the usefulness of spectroscopic methods in assessing the degree of oil oxidation. Moreover, all parameters indicated the highest oxidative stability of nigella seed oil compared to the other cold-pressed oils.

Biography

Grażyna Neunert received her Ph.D. in Physics from Poznan University of Technology, Poland, in 2005. Since 2006, she has been working as an Adjunct in the Department of Physics and Biophysics at Poznan University of Life Sciences, Poland. In 2021, she obtained her postdoctoral degree in Agricultural Sciences in the field of Food and Nutrition Technology.

During her research career, she has been involved in many research projects, with her primary focus on the spectroscopic properties and antioxidant activity of biomolecules in homogeneous environments and model phospholipids. Recently, she has expanded her research interests to the study of biomolecule monolayers using the Langmuir technique.

She is a member of the Editorial Board of the Journal of Molecular Sciences and a Topic Editor for Molecules. She is also a member of the Reviewers' Panel for Antioxidants and Frontiers in Nutrition. To date, she was a co-author of 24 original papers, with a cumulative Impact Factor of 69.9.

Bioactive Phytochemicals

Sujata V. Bhat

Former Professor Chemistry Department, Indian Institute of Technology, India

Several phytochemicals with interesting bioactivities will be discussed. New molecules were isolated through bioassay–directed separations and were characterised after further purifications, through chemical transformation and spectroscopic identifications. New bioactive molecules were subjected for structure modifications to arrive at structure-activity relationships. Her contributions in development of the following important Phyto-chemicals will be discussed:

Forskolin-adenylate cyclise stimulation,

Andrographolide-antitumour, anti-HIV, anti-Cov-19,

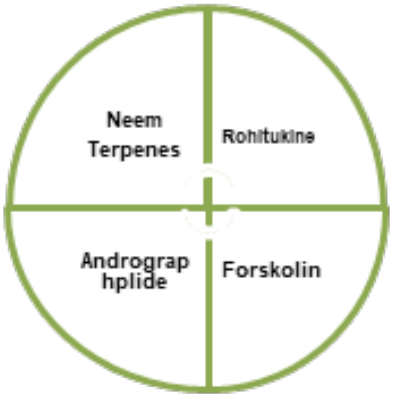
Rohitukine Chromone alkaloid -analogues-antitumor,

Integric acid analogues- Anti-HIV.

Neem molecules and **terpenoids**- Insect control agents,

Mono terpenoids- Perfumery molecules.

The work on computer-aided design and Green synthesis of bioactive molecules will also be discussed.



Bioactive Molecules

Biography

Bhat's work has been documented by 260 articles published in peer-reviewed journals and oral presentations in conferences and her writings have been cited by many authors.

She has published 7 books and 26 patents. She has guided 107 students in their research work leading to Ph.D., M. Tech and M. Sc. Degrees of Indian Institute of Technology and Mumbai University, Mumbai, India. She headed the Basic Research Centre of Hoechst Pharmaceuticals.

Micro Electronic Speckle Pattern Interferometry on Chemical Interaction with Single Biological Cells

Andreas H. Foitzik, Carsten Stollfuss, Josefine Gottschalk, Erik Krumnow and **Kai-Henning Lietzau**

Technical University of Applied Sciences Wildau, Germany

Aiming to determine the interaction of chemical treatment in general and cytostatic chemical treatment in particular on biological cells, Electronic Speckle Pattern Interferometry (ESPI) was adopted to identify the 3D morphological change in fluidic and microbiological samples. An appropriate Micro Electronic Speckle Pattern Interferometer (Micro-ESPI) was developed and applied to mesoscopic and microscopic fluidic microstructures like water droplets and oil droplets to prove the suitability of the device and the method. Finally, such measurements were carried out on micro-sized transparent biological samples for static as well as dynamic Micro-ESPI down to the optical resolution limit. The results were transferred to cancer cells and their equivalent interaction with cytostatic chemical treatment.

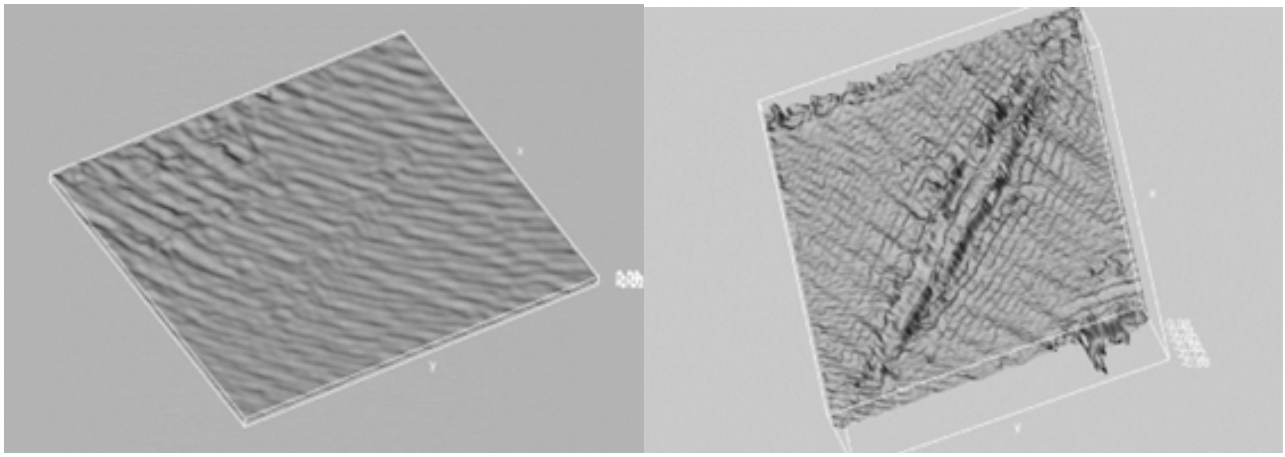


Fig-1: 3D-Deformation of a 30µm x 5µm sized Forisom in the relaxed status (left image) and after chemo-electrical stimulation (right image). In In this kind of Micro-ESPI the object

itself is not depicted but just the relative deformation compared to a “zero” status or “relaxed” status”, respectively.

Single biological cells could be observed under chemical influence or during chemical attack, while Micro-ESPI allowed to determine the 3D change in the morphology of the biological cells (i) at high magnifications up to 1000x, (ii) contact free, (iii) in fluidic environment *in vitro*, (iv) statically and dynamically, (v) without alteration due to any staining and (vi) during additional interaction with electro-mechanical vibrations. As an example, in Fig. 1 the static deformation of a Forisome (a protein complex found in plants) being 5µm x 30 µm in size is depicted. Fig. 1 reveals the swelling of three individual Protein strands each 1 µm in diameter. Such swelling of the three protein strands is due to a Ca++ oversupply or an equivalent static electrical impulse, respectively. Similarly, the deformation and the death of HeLa-cells being treated with cytostatic drugs could be determined.

Biography

Andreas H. Foitzik studied physics and earned his PhD in physics at the University of Goettingen in Germany. He was granted twice an Alexander von Humboldt – Stipend for the USA at Case Western Reserve University in Cleveland/OH. He was called 3 times as a professor: in Mechatronics, in Bio-System-Technology and in Automation Technology, he developed ca. 120 products and processes with a research group of 20 scientists, engineers and technologists working on 14 topics, and he published 300+ papers. He is a life-time Humboldtian, served 12 years as a referee for the German Academic Exchange Service (DAAD) for the Overseas Programs, and served for 4 years as an elected member in the review board System-Technology of the German National Science Foundation (DFG).

Unravelling the Hydrogen Bonding Patterns in Telomeric G-Quadruplexes

Eugene S. Kryachko[1], Preston MacDougall[2] and **Skye Neal[2]**

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The paradigm of aging (vs. longevity) is now on everyone's lips and thoughts. People wish to live longer, and this is natural: life matters.

In 2009, the Nobel Prize in Physiology or Medicine was awarded to E.H. Blackburn, C.W. Greider, and J.W. Szostak "for the discovery of how chromosomes are protected by telomeres ...". Actually, they solved a major problem in biology of how the chromosomes can be copied in a complete way during cell divisions and how they are protected against degradation.

It was demonstrated that the solution is to be found in the caps of the chromosomes – the telomeres – and in an enzyme that forms them – telomerase: the long, thread-like DNA molecules that carry our genes are packed into chromosomes, capped by telomeres. The latter contain G (for guanine)-rich repeat sequences that are capable to fold into four-stranded so-called G-quadruplexes or G4 structures unveiled in X-ray diffraction experiments conducted in 1962 and "initially considered a structural curiosity".

In this work we investigate the molecular basis of the telomere model of ageing. Its key trait is the hydrogen (H-) bonding patterns of G-tetrads that serve a top of G-quadruplexes composing telomeres. We show that these patterns demonstrate a variety of bonding characters – from classic hydrogen bonds to so called 'over-coordinated oxygen (OCO)' bifurcated H-bonds that thus result in non-rigidity (floppiness) of G-tetrad structures. This work has implications for the functionality of G-quadruplexes and, in turn, for the quadruplex-based telomere model of aging.

Biography

Eugène S. Kryachko (b. 07.10.1951) is the Leading Research Fellow at the N.N. Bogolyubov Institute for Theoretical Physics (ITP) of the Natl. Academy of Sciences of Ukraine in Kyiv, Professor of Theoretical & Mathematical Physics. Educated in I.M. Lifshits Department of Theoretical Physics of Kharkov State Universit. Obtained Ph.D. in Theoretical & Mathematical Physics at ITP. The Alexander v. Humboldt Fellow at the Ludwig-Maximilians University of Munich; Professor: IBM-CERN Centre CRS4, Cagliari; CNRS, C.E.N.G., Grenoble; C. L. Emerson Fellow at the Emory University, Atlanta; The Johns Hopkins University, Baltimore; Technical University of Denmark, Lyngby; C.S.I.C., Madrid; Faculties Universitaires Notre-Dame de la Paix, Namur; Kyoto University, Kyoto; Catholic University of Leuven, Leuven; University of Liege, Liege; German Cancer Research Center (DKFZ), Heidelberg; Universität Bonn, Bonn; University of Saarland, Saarbruecken. The Associate Editor of the International Journal of Quantum Chemistry (2008-2011). His biography is presented in the Encyclopedia of Modern Ukraine.

Unlocking the Potential of Natural Rubber-Based Polymer Electrolytes: Modification, Challenges, Key Strategies, Bibliometric Insights and Future Directions

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[2]Department of Engineering Physics, Istanbul Medeniyet University, Türkiye
[3]Solar Energy Research Institute (SERI), Universiti Kebangsaan Malaysia, Malaysia
[4]Istanbul Technical University, Physics Department, Turkiye
[5]Department of Physics, Faculty of Applied Sciences, Yemen
[6]Department of Chemical Science, Faculty of Science and Technology, University Kebangsaan Malaysia, Malaysia
[7]Department of Physics, Faculty of Science and Technology, Airlangga University (Campus C), Indonesia

The issue of efficient energy storage is now becoming critical and mobilizing researchers and industrial companies worldwide. As energy demands grow, strict strategies will ensure that energy sources are available and accessible at a low cost and with the least possible effect on the environment. Polymer electrolytes (PEs) based on natural rubber (NR) and their derivatives are regarded as eco-friendly and have attracted increasing interest due to their renewable nature and biodegradability. The flexibility, mechanical strength, and ease of processing of NR-based PEs make them suitable candidates for various energy storage applications, including batteries, supercapacitors, and fuel cells. However, continuous efforts are still being made to improve this type of PEs for energy storage applications. Despite their potential, challenges such as low ionic conductivity, limited electrochemical stability, and poor interfacial compatibility with electrodes need to be addressed. Researchers are actively exploring various modification techniques to enhance the properties of NR-based PEs. This includes chemical cross-linking, blending with other polymers, and incorporating nanofillers to create composite materials with superior performance. This review addresses the synthesis routes of modified natural rubbers (MNRs), challenges, and typical amendment methods to design flexible structures for electrochemical devices. Detailed

attention is given to the various strategies employed to modify the molecular structure of NR to improve its ionic conductivity and electrochemical stability. Furthermore, this review also discusses in depth the evolution of MNR-based PEs from the points of view of adaptable design strategies, fundamental thermomechanical and electrochemical characteristics, and future uses for energy storage. The integration of nanotechnology and advanced materials science has paved the way for innovative approaches to tailor the properties of NR-based PEs, making them more efficient and reliable for practical applications. Overall, this review highlights eco-friendly materials like rubber to open doors for novel approaches towards sustainable and renewable energy and boost the economy's value of NR. By emphasizing the environmental benefits and economic potential of NR-based PEs, this review aims to inspire further research and development in this field, ultimately contributing to a greener and more sustainable future. The advancement of NR-based PEs not only supports the transition to renewable energy sources but also aligns with global efforts to reduce carbon footprints and promote circular economies. The ongoing innovation in this area underscores the vital role of interdisciplinary collaboration in overcoming the current limitations and realizing the full potential of natural rubber in energy storage technologies.

Biography

Ms. Rawdah Whba earned her bachelor's degree in chemistry with first-class honors from Taiz University, Yemen, in 2008, achieving a 93.18% grade. She was recognized for her academic excellence with two presidential awards. Since 2009, she has been a lecturer at Taiz University and was elected to represent the university staff syndicate in 2014. Awarded a Yemeni government scholarship, she completed her master's degree with first-class honors in Chemistry Science at the University Kebangsaan Malaysia (UKM) in 2017 with a 3.84 GPA. Ms. Whba then worked as a research assistant at UKM from 2018 to 2021 and earned her Ph.D. in 2022. Her research focuses on polymer chemistry, particularly the synthesis of grafted polymers and energy storage devices. She has published in international journals and is currently a Türkiye Scholarships Postdoctoral Fellow at Istanbul Medeniyet University, Turkey, from September 2023 to September 2024.

Usage of the Blockchain in Pharmaceutical Field

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The blockchain is an emerging technology presenting a large scale of security and transparency, initiated in using the financial transactions of crypto currencies without intermediates like banks, thus, minimizing the extra fees of transactions.

Currently, its famous smart contracts make it a technology used in all fields, for non-financial transactions like managing information and knowledge. These smart contracts diminish conflicts and time wasting in negotiations between the partners and stakeholders, guaranteeing more immutability of the chain of blocks; no deletion or modification of a block. This immutability allows the tracking of perishable products like medicines and food and very reliable tool to detect and predict counterfeits in pharmaceutical products.

Biography

Prof. Samia Aitouche received her Diploma of Engineer in Computer science from the High school of Computer Science Algiers, in 1994. She received her Master, Ph.D. and Postdoctoral Diplomas from the Industrial Engineering Department, Batna University, Algeria (2009, 2013 and 2017). She is currently a full professor and senior Lecturer in the same university. She is affiliated to the laboratory of Automation and manufacturing. Her research interests include: Intellectual capital measurement, Knowledge management, Data mining and knowledge discovery, Business intelligence and decision support, Human performance in industrial context, Lean management, Industry 4.0, Automatic summarization, Information Systems, Flexible manufacturing systems, Blockchain and its applications in industry and knowledge management. She published several articles in national and international journals, and participated to national and international conferences as an author, organiser, a member of scientific program committee or chair of special tracks (editor of conference).

Fourier Transform Infra-Red (FTIR) Spectroscopy: A Versatile Analytical Technique for Coal Characterisation

Umar Abdullahi Isah[1], Muhammad Imran Rashid[2], Silas Kiman[3] and **Habu Mohammed Iyodo[4]**

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[2]University of Engineering and Technology, Pakistan

This presentation reviewed previous work on FTIR and its peak assignments, such as the aromatic -CH- stretching vibrations, the aliphatic -CH- stretching vibration, the aromatic -CH- (out-of-plane) deformation vibrations, and the oxygenated functional groups. The impact of coal rank on some of the derived FTIR structural characteristics, such as aromaticity, degree of condensation of aromatic rings (DOC), and aliphatic chain lengths would be presented. FTIR is a versatile analytical technique when compared to other vibrational spectroscopy techniques. It provides a far greater correlation between the molecular structure and the physical properties of materials and offers insightful data that cannot be found using other methods. However, it is crucial to prioritize the acquisition of high-resolution spectra, spectra processing, peak fitting, and peak assignments when characterizing coals and other carbonaceous materials for proper utilization.

Table 1. Peak assignments for the -CH- aromatic stretching vibration, -CH- aliphatics stretching vibration and -CH- aromatic (out-of-plane) deformation vibration (Isah et. al 2024)

Functional groups	Peak position (cm^{-1})	References
Aromatic -CH- stretching vibration	3100 – 3000	[86, 113]
	3100 – 2990	[114]
	3080 – 3035	[115]
	3060 – 3020	[116]

Aliphatics -CH- stretching vibration	3000 - 2800	[83, 86, 113, 116]
	3000 - 2815	[106]
	3000 - 2700	[15, 21, 111, 117]
	2990 - 2795	[114]
	2975 – 2955	[115]
	2975 – 2953	[118]
Aliphatic CH_3 (asymmetric) stretching vibration	2975 – 2950	[22, 83, 116]
	2955	[114, 119]
	2936 - 2916	[118]
Aliphatic CH_2 (asymmetric) stretching vibration	2925 – 2919	[115]
	2921	[21, 111, 119]
	2900 – 2880	[118]
Aromatic -CH- (out-of-plane) deformation vibration	900 – 750	[116]
	900 – 700	[15, 21, 83, 86, 106, 111, 113-115, 117]

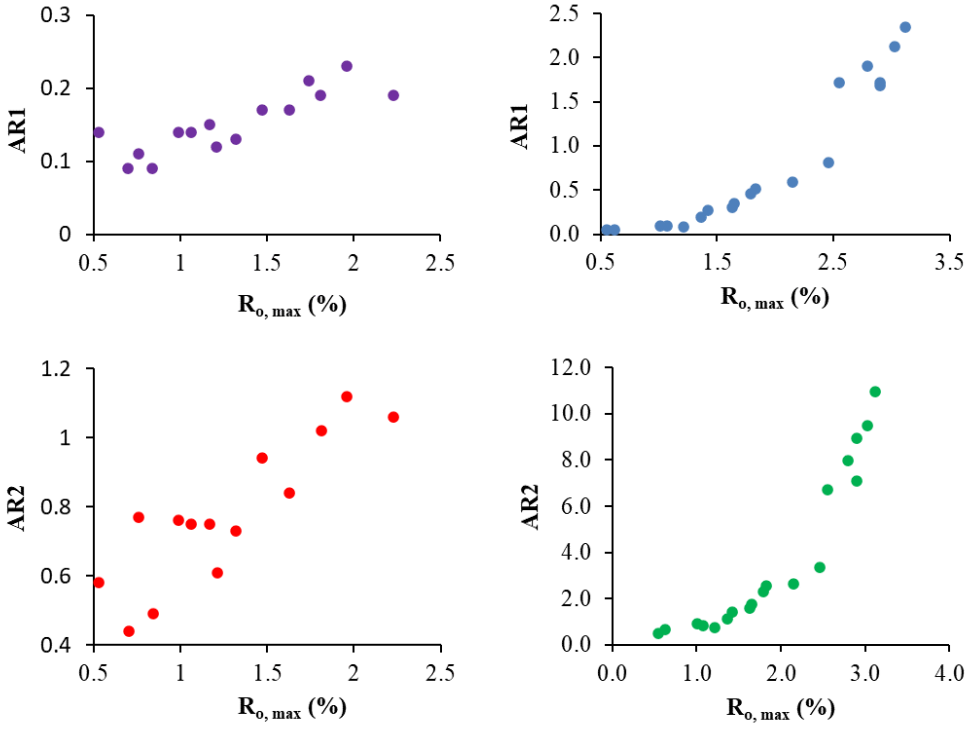

Fig-9: Influence of coal rank on Aromaticity (Isah et. al 2024)

Biography

Dr. Umar Abdullahi Isah received both his bachelor's and master's degrees in Chemical Engineering from the University of Maiduguri-Nigeria and Universiti Teknologi Malaysia (UTM) in 2009 and 2012, respectively. He also obtained his PhD in Chemical Engineering from the University of Newcastle, Australia in 2023.

At the University of Newcastle, Australia, Dr. Umar led an industrial project in collaboration with BHP Australia, a major player in Australia's energy and mining industries. The project involved the development of an *in-situ* FTIR/MS technique for online, real-time, accurate spectra acquisition. Other analytical techniques such as Raman, 13C-NM and TGA were also explored. The project's outcome offered a fundamental understanding and further insights into the interactions between the molecular structure of coal and the macromolecular changes that occur during the conversion of coal into metallurgical coke. The body of work generated was invaluable in understanding the chemistry of coal conversion to high-quality metallurgical coke for steelmaking.

Dr. Umar is currently a senior lecturer in the Department of Chemical Engineering, University of Maiduguri, Nigeria. His research interests include clean coal utilization technologies, energy and process systems engineering, renewable energy and energy management.

First Principal Investigation of Optical and Thermoelectric Properties of Hybrid Organic-Inorganic Perovskite $[NH_3\text{-}(CH_2)_4\text{-}NH_3]MCl_4$ Compound

Hafida. Ziouani[1], Sanaa Mazouar[1], Jean-Pierre Tchapet Njafa[2], Taoufik Abdelilah[1], Mahmoud Ettakni[1] and **El Mostafa Khechoubi[1]**

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[2]Department of Physics, University of Maroua, Cameroon

The structural, thermoelectric and optical properties of $[NH_3 – (CH_2)_4 – NH_3]MX_4$ (where M is a divalent metal ion and X is a halide) were investigated using Density Functional Theory (DFT) within the ABINIT code. The Generalized Gradient Approximation (GGA) in the Perdew-Burke-Ernzerhof functional was used, with the plane wave pseudopotential formalism. A kinetic energy cutoff of 35 Ha was used to perform the geometry optimization of the compound. The Monkhorst-Pack mesh scheme k-points grid sampling was set to 11x8x8 to perform the irreducible Brillouin zone integrations. The crystal data of $[NH_3 – (CH_2)_4 – NH_3]MX_4$ reported in the literature was used as a starting point. The structures of $[NH_3 – (CH_2)_4 – NH_3]\ MCl_4$ composites can be divided into three distinct components: (i) a sublattice comprising mineral sheets ($[MCl_4]_2^-$), (ii) another sublattice consisting of organic layers ($[NH_3 – (CH_2)_4 – NH_3]_2^+$), and (iii) hydrogen bonds (N – H – X) that provide cohesion between the mineral and organic sublattices. This study focuses on investigating the optical and thermoelectric properties of the material. Additionally, the influence of Cu and Mn metals on these properties is explored. The results show that the substitution of Cd and Mn for M leads to significant changes in the electronic optical and thermoelectric properties of the material. In particular, the band gap is reduced and the optical absorption is enhanced. These findings suggest that $[NH_3 – (CH_2)_4 – NH_3]MX_4$ composites with Cu and Mn could be promising candidates for optoelectronic applications.

Design and Science: A Case Study of Meta-Textile

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This article presents the development of wearable metamaterials : the meta-textile, focusing on the design of several frequency selective surface (FSS) textile absorbers. The FSS structure primarily consists of a fabric with distinct patterns, a conductive background plate, and a textile substrate. The influence of the substrate on performance and absorption was analyzed to identify the most effective material. After determining the optimal substrate, the impact of different patch shapes on the wearable material's performance was investigated. The results revealed that the fabric yielding the best performance was made of 65% polyester and 35% cotton, with cross-shaped patches proving to be the most effective. The FSS developed can be integrated into textile designs to protect the human body from microwave radiation.

The weaving process of meta-textile need to identifie two key roles within a collaborative design process : the engineer and the designer. We explore the factors that contribute to the challenges of collaboration between these two professions within a multidisciplinary team. A key characteristic of the design engineer is their connection to knowledge. The engineer's professional identity is shaped by their societal role in advancing scientific understanding. This process is evident in the development of the meta-textile, where engineers employ methods such as observation, experimentation, calculation, and modeling. The engineer's problem-solving approach contrasts with that of the artist. While the engineer's reasoning leads to a definitive conclusion, the artist's perspective on design marks the start of an idea that can be interpreted and developed by the viewer. Both designers and artists use reasoning and knowledge, but these do not serve as the central or final aspect of the process. In fact, the textile designer plays an essential role in the creation of textile metamaterials,

contributing significantly to the development of innovative and functional textiles that extend beyond the limitations of traditional fabrics.

Biography

Hanen Zribi is a product design researcher specializing in the field of smart textiles. She earned her PhD in 2024, with the highest honors, for her thesis titled "User-Centered Design : The Creation of Woven Meta-Materials for Electronic Textiles for Functional Applications," an innovative project at the intersection of design, technology, and functional textiles. Her research focuses on the creation of smart textiles that integrate advanced technologies to enhance interactivity and material performance in various usage contexts, while ensuring user comfort. Passionate about innovation and sustainable development, she explores solutions to integrate technology in an aesthetic and functional way within textile design, considering environmental and social issues. Currently, she holds the position of adjunct lecturer at the Higher Institute of Arts and Crafts of Sfax, Tunisia, where she shares her expertise with design students and encourages them to explore the possibilities offered by smart textiles within the framework of creative and interdisciplinary projects.

Influence of the Sun on Water Structuring on the Day and Night Sides of the Earth. Manifestation of Underground Radiation. Solving the 'Water Memory' Mystery

Igor V. Shevchenko

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Even 0.02% water in acetonitrile can form clusters, the size and chemical reactivity of which can change under the influence of the Sun in a very wide range. Bulk water added to such acetonitrile can copy and reproduce these original clusters and acquire different hydrolytic activities depending on the size of the copied clusters. As a result, the rate of hydrolytic reactions with the added water can vary greatly depending on where the acetonitrile was located before the reaction - outdoors, inside buildings or underground. This discovery sheds light on the water memory phenomenon and explains the reason for its experimental instability.

The influence of the Sun may be accounted for by the decomposition of water clusters by muons, which are generated in the upper atmosphere by the solar wind. Due to the anisotropy of the muon flux the rate of hydrolysis depends on the geometry of the reaction solution, its position in space and constantly changes during the day depending on the solar activity and position of the Sun in the sky.

For example, at noon, when the Sun is at its zenith, the rates of hydrolysis of triethyl phosphite [$(EtO)_3P$] in three 5-mm NMR-tubes directed North-South, East-West and Vertically are considerably higher in the horizontal tubes, and at sunrise and sunset when the Sun shines along the East-West line the rate is higher in the vertical tube.

It was logical to assume that at night when the Sun irradiates the opposite side of the Earth, it cannot have the same influence as during the day, and the rates of this reaction in multidirectional NMR-tubes should become equal. However, experiments carried out at midnight did not confirm this. At night the rate of hydrolysis decreases substantially, but the distribution of rates remained the same as at noon - in the vertical tube the rate was significantly less than in the horizontal tubes. The same distribution of triethyl phosphite

hydrolysis rates in multidirectional tubes day and night allowed us to conclude that on the night side of the Earth the influence of the Sun can induce the appearance of some radiation from underground. Our research has confirmed that the Sun influences the structuring of water molecules not only directly, but also through the Earth's crust, where secondary radiation is constantly generated. Due to the heterogeneity of the Earth's crust, the intensity of the influence of underground radiation varies in different places. This previously unknown phenomenon is important for biological, chemical, physical and ecological studies and requires detailed comprehensive study. This can be done by measuring the rate of hydrolysis of triethyl phosphite in acetonitrile in multidirectional 5-mm NMR tubes at different locations on Earth at different latitudes.

Biography

Dr. Shevchenko studied Chemistry at the Kiev University, Ukraine and graduated as MS in 1979. He then worked at the Institute of Organic Chemistry in Kiev and received there his PhD degree in 1985. In 1990 he won Alexander von Humboldt scholarship and until 1996 was invited scientist at the Braunschweig University in Germany and at the Southern Methodist University in Dallas, Texas, USA. Then he worked in Kiev at the Institute of Bioorganic Chemistry and Petrochemistry and the Institute of Geochemistry Mineralogy and Ore Formation, Ukrainian Academy of Sciences. He has published more than 70 research articles.

Seasonal Variations of Landfill Leachate on *Medicago Sativa* Germination, α-Amylase Activity and Metal Transfer in Soil-Plant System

Belasri Lamiaa[1], Cherki Mounia[1], Hmimid Fouzia[1,2] and **Ait Benichou Samah[1]**

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[2]Department of Biology, Chouaib Doukkali University, Morocco

The objective of this study was to assess the seasonal variations in the composition of leachate from the Mediouna landfill in Casablanca and its impact on the germination and α-amylase activity of *Medicago sativa*. Leachate samples were collected during the four seasons of 2022 directly from the collection conduit of the untreated leachate pond. Physicochemical characterization was conducted for the raw and diluted leachate. Germination tests involved exposing seeds of *Medicago sativa* to various dilutions of leachate (1%, 3%, 5%, 7% and 10%) with tap water as a control, which was maintained in darkness at room temperature for 72 hours. Severe toxicity was observed at higher concentrations, resulting in a germination index below 50%. This toxicity was linked to the presence of heavy metals, particularly lead (Pb) and mercury (Hg), with average concentrations of 0.22 ppm and 0.01 ppm, respectively, and sodium (Na) at 359.94 ppm. Additionally, the α-amylase activity decreased proportionally to the germination index. The findings indicate that leachate pollution can harm agricultural activities and the ecosystem, but its richness in organic matter and nutrients suggests potential benefits. As a complementary part of the principal study, phytotoxicity tests were conducted to explore the broader environmental impacts of the leachate. In an open-field setup, *Medicago sativa* plants were irrigated with different dilutions of leachate. The morphological parameters showed stimulation at lower leachate doses and inhibition at higher leachate doses. The transfer factor (TF) index was calculated to evaluate the transfer of heavy metals from soil to plant tissues. Pb, Cd, and Hg exhibited TF ranges of 0.55-0.93, 0.07-0.21, and 0.1-0.37, respectively. This study highlights metabolic disruptions from landfill leachate, emphasizing its harmful effects on agriculture and ecosystems. While leachate is suggested for use as fertilizer, its long-term impacts on crops and soil require further investigation.

Biography

Lamiaa Belasri is a Ph.D. candidate at the Ain Chock Science Faculty of University Hassan II of Casablanca, specializing in environmental science, plant biology, and biochemistry. Belasri is an active member of both the Health and Environment Laboratory at the Department of Biology in the Ain Chock Science Faculty and the Moroccan Society of Bioinformatics.

In collaboration with the unit of chemistry and toxicology at the National Office of Food Safety, Belasri is conducting various studies, such as the assessment of heavy metals in spices imported to Morocco. Recently, her focus has shifted to investigating the agricultural potential of Moroccan leachate, starting with characterizing the leachate and studying its impact on seed germination and enzyme activity in plants. Belasri has presented her findings at international conferences, published article, and ongoing submissions. Her work contributes to environmental understanding, sustainable waste management, impacts of heavy metals on plants, and metabolic disruptions.

The Effect of Influencer's Follower Count on Moroccan Consumer Behavior

Imane Margom[1] and **Mohammed Ben Amar**[2]

[1]Sidi Mohamed Ben Abdellah University (USMBA), Morocco
[2]National School of Business and Management (ENCG), Morocco

Influencer marketing, a crucial driver of e-commerce, heavily relies on social media to shape consumer choices, particularly on platforms like Instagram. This study focuses on exploring the role of influencers' follower count in shaping the attitudes and purchase intentions of Moroccan consumers.

Research Objective: This study aims to answer the following question: Does the follower count of influencers influence consumer perceptions and behavior in a specific cultural context, such as Morocco? The goal is to examine how this metric acts as an influence lever in an environment characterized by unique social and cultural dynamics.

Methodology: A qualitative approach was adopted, including: 1. Semi-structured interviews with influencers to gather their perspectives on the importance of follower count in their influence strategies. 2. Semi-structured interviews with consumers to understand how this metric shapes their attitudes and purchase intentions.

Findings: The study highlights three major observations:

• Follower count as an indicator of credibility and popularity: Some participants perceive a high follower count as a sign of trustworthiness, boosting confidence and purchase intentions.

• Social conformity in a collectivist context: In the Moroccan context, marked by strong collectivist tendencies, a large follower count is viewed as a form of social pressure, shaping consumer behavior.

• Importance of engagement rates and micro- influencers: In contrast to the emphasis on numbers, several participants stress the value of engagement rates, seen as a more

reliable indicator of real influence. Micro-influencers, despite having a smaller follower count, often generate more authentic and engaging interactions, strengthening the emotional connection with their audience.

Conclusion: This study enhances the understanding of influencer marketing in the Moroccan context by shedding light on the influence of follower count on consumer perceptions and behavior. The results offer strategic insights for brands and influencers, emphasizing the importance of combining a large follower base with a strategy focused on authentic engagement and high- quality content.

Biography

Imane Margom holds a Ph.D. in Economic and Management Sciences and is a professor- researcher in digital marketing, innovation, and influence. She has published numerous scientific articles exploring consumer behavior, social influence, and marketing strategies.

Dr. Margom is dedicated to advancing the understanding of cultural dynamics in marketing and equipping her students with innovative tools that align with the modern digital world to succeed.

Routing a Quantum State in a Bio-Inspired Network

Elham Faraji[1], Alireza Nourmandipour[2], Stefano Mancini[3], Marco Pettini[4] and **Roberto Franzosi[5]**

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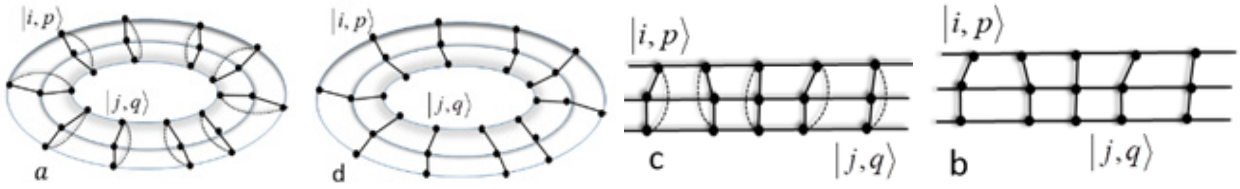
[2]Department of Physics, Sirjan University of Technology, Iran
[3]School of Science and Technology, University of Camerino, Italy
[4]Aix Marseille Univ, Université de Toulon, CNRS, CPT, France
[5]DSFTA, University of Siena, Italy

Recent advances in quantum science have pioneered the way towards the comprehension of quantum information processing in biological systems. The Davydov model proposes that the mechanism for energy storage and transport in biomolecules can be considered soliton formation and propagation. In this scenario, the self-localization of quantum units of peptide vibrational energy might be the result of interactions with lattice phonons. Specifically, he suggested this mechanism in protein α-helix which is composed of three channels of one-dimensional spring chain coupled with each other. Motivated by these considerations, we investigate the transition of quantum states in a bio-inspired spin network modeled after the α-helix structure of proteins. We utilize the biological Davydov model, in its elementary version without a phononic environment, as a two-dimensional spin network, with the pair (n, α) denoting the n-th molecule along a chain, and α-th particular channel. We explored four configurations based on cyclic and non-cyclic boundary conditions for both n and α, and studied quantum transition probability from the input state to the output state across such a network of qubits. Based on our findings, for only one of the boundaries it was possible to find the analytical eigenvectors of the exciton Hamiltonian of Davydov model and thus investigate the analytical scale times where quantum perfect state transfer (PST) occurs, consistent with numerical computations. We numerically reported the transmission probability and the possibility of PST for other boundaries which are influenced strongly by the spin-spin coupling because PST requires the coupling parameters to provide the right phase matching, admitting the perfect transfer of both amplitude and phase of a quantum

state from one node to another. These results emphasize the potential of bio-inspired networks in developing of quantum communication technologies, like in biocomputers for diagnosing medical serious issues like cancer, as well as in photosynthesis processing.



Cyclic and non-cyclic boundary conditions for both n and α

$$p_t([i,p],[j,q]) = \left| \sum_{n=0}^{N-1} \sum_{\alpha=1}^{3} \langle i,p| \prod_n^{\alpha} |j,q\rangle e^{-i\lambda_n^{\alpha} t} \right|^2$$

Quantum transition probability from the input state $|i, p\rangle$ to the output state $|j, q\rangle$

Biography

Dr. Elham Faraji is a physicist specializing in theoretical physics, quantum technologies, and biophysics. She has work experience as a Postdoctoral Research Assistant at the Research Center Jülich in Germany. She completed a Joint Ph.D. thesis in the 34th cycle of the Quantum Technologies program at the University of Naples Federico II and Aix-Marseille University, focusing on '*Quantum Transport Phenomena in Macromolecules*.' Her doctoral research involved studying charge and energy transfer processes through electron-phonon interactions, as well as quantum information transfer along biomolecules. Dr. Faraji has published several papers in reputable scientific journals. She is passionate about exploring the intersection of quantum physics and biological systems, contributing to advancements in quantum technologies and their applications in areas such as biosensing and bio-computation, quantum chemistry, and quantum biology.

Dynamic/DDDAS-Based Digital Twins for Chemical Contaminants Transport Predictions

Frederica Darema

InfoSymbiotic Systems Society, USA

This talk will present advanced methods for predictive capabilities for events which involve complex, multicomponent, multimodal, and multilevel aspects, under time-variable conditions and dynamically interrelated. Case examples are situations that occurs in the release of chemical pollutants into the atmosphere which can result either from adverse natural events (wildfires, volcanic eruptions) or industrial operations (accidents or systemic processes, such as combustion, or incineration plants). Such situations cause harm to humans and the environment at large – water, soil, vegetation, animals – in urban/rural settings. Therefore, it becomes imperative to accurately and in real-time predict the pollutant transport, so that mitigating actions can be taken to safeguard assets (human and other), minimize or avert the negative impacts.

Predictive capabilities for the complex conditions referenced above, will be addressed in this talk in the context of the DDDAS-concept (Dynamic Data Driven Applications Systems) - the essence for Dynamic (or Predictive) Digital Twins, whereby the executing model of a system is adaptively augmented through (on-line or archival) instrumentation-data and in reverse the executing model controls the instrumentation for acquisition of targeted data (real-time or from archival storage). As case study of such DT frameworks, the talk will highlight the situation of wildfires-induced smoke and its spread, which involve complex models and instrumentation data (from ground sensors measurements to aerial and space-based observations), for assessment of the pollutant(smoke) generated, turbulence models for the pollutant transport cognizant of variable atmospheric and terrain conditions, among other modeling involved, such as hydrological modeling to assess smoke-induced chemical pollution in aqueous environments.

The DDDAS paradigm has been applied to many other areas, from: the fundamentals of materials design, to bioinformatics for drug(pharmaceuticals) design, to advanced (additive)

manufacturing methods, and leading to autonomic capabilities in engineered systems. The talk will overview the range of areas where DDDAS(www.1dddas.org) is enabling Dynamic Digital Twins.

NASA schematic of Earth System Digital Twin for continuous observation and environmental assessment (Source: https://esto.nasa.gov/aist/)

Biography

Dr. Frederica Darema is President and CEO of the InfoSymbiotic Systems Society. Retired (2019) as Senior Executive Service (SES) Member & Director of the Air Force Office of Scientific Research, USA; also served in the Office of the Secretary/AF, as Research Director in the AF/Chief Data Office, and as Associate Deputy Assistant Secretary in the AF/Office for Science, Technology and Engineering.

Prior career history includes: Research Staff positions at the University of Pittsburgh, Brookhaven National Laboratory, and Schlumberger-Doll; management & executive-level positions at: T.J. Watson IBM Research Center and IBM Corporate Strategy; National Science Foundation and Defense Advanced Research Projects Agency; Director of the AFOSR Directorate for Information, Math, and Life Sciences.

Dr. Darema, PhD, Nuclear Physics (UC Davis; MS – IIT/Chicago; BS - University of Athens/Greece), Fulbright Scholar and Distinguished Scholar; IEEE Life-Fellow; WAAS Fellow; seminal contributions in the supercomputing field (SPMD), DDDAS (Digital Twins). Presently serves in university Advisory Boards and governmental research review panels.

Role of Geological Understanding in Developing Bioremediation Strategy in LNAPL Impacted Sites

Junaid Sadeque and **Co. Ryan Samuels**

AECOM, USA

Objective: The efficacy of *in-situ* aerobic bioremediation techniques for petroleum contamination, such as biosparging, largely depends on soil permeability for the proliferation of aerobic microbes. Therefore, accurate delineation and prediction of high permeability zones in the subsurface of a site is a prerequisite for optimal installation of bioremediation tools. However, complex geological sites with significant subsurface heterogeneity pose a major challenge in correctly recognizing the spatial distribution of target high permeability zones. This paper demonstrates a case-study where geological understanding was used to guide the successful installation of biosparging tools at a hydrocarbon contaminated site.

Approach: In this study, a high-resolution geological framework was developed, taking account of the true heterogeneity of depositional environments for a LNAPL-contaminated site at the Los Angeles basin in California, USA. A detailed facies analysis of the bore-hole data was conducted within the sequence stratigraphic framework, to determine the dimensions and permeability of various depositional units beneath the site for targeting the screening intervals for biosparging.

Results: Results of the investigation at the site led to strategic placing of 60 biosparging locations with precise screening interval based on identified high-permeability zones. The biosparging tools are presently functioning at the site with optimal biodegradation of LNAPL because of their strategic positioning. This case study emphasizes the need for conducting detailed geological investigations for achieving effective implementation of aerobic bioturbation.

Biography

Dr Junaid Sadeque earned his PhD. in geology, specializing in sequence stratigraphy from the University of Texas at Dallas, USA. He is a recognized Subject Matter Expert in sequence stratigraphy and sedimentology with experience both in the petroleum and environmental sector. As a Senior Stratigrapher at AECOM USA, Dr. Sadeque plays a pivotal role in the application of sequence stratigraphic concepts for predicting preferential flow-paths in groundwater aquifers and developing contamination remedial strategies. He has led several key projects in developing conceptual site models for the Department of Defence (DoD) in the US since the last eight years. Also, his strong background of previously working as a clastic stratigrapher for the petroleum industry for over a decade helps him bring in fresh and innovative concepts of geology to the environmental world. In his career, he has taught numerous professional both in the environmental industry related to contamination investigation and remediation.

Propolis: Advancing from Traditional and Complementary Medicine Toward Clinical Therapy against Infectious Diseases

Antonio Salatino

Department of Botany, Institute of Biosciences, University of São Paulo, Brazil

Propolis is honeybee product produced with beeswax and plant resins. Honeybees use propolis to seal holes and protect the hive against microorganisms and other enemies. Propolis exhibits many biological activities, including antioxidant, antimicrobial, immunostimulant, anticenter, anti-inflammatory, antiulcer, wound-healing. hepato- and kidney-protection. Propolis composition varies according to geolocation. Thus, European and temperate propolis contain flavonoids and esters of caffeic acid; prenylated phenylpropanoids are main constituents of Brazilian green propolis, while in red Brazilian propolis is flavonoids and polyprenylated benzophenones are predominant; the characteristic constituents of Okinawan and Taiwanese propolis are geranyl-flavanones. Despite their wide chemical diversity, most propolis types contain predominantly phenolic constituents, which accounts for their universal antioxidant and antibacterial activity. Most uses of propolis lie in the realm of traditional and complementary medicines. However, propolis has been used successfully in dentistry and periodontic. Little use has been made of propolis is clinical therapy, a notable example being the use of a standardized extract of green Brazilian propolis revealing efficacy as an adjuvant in the treatment COVID-19 patients. Many experiments have evidenced synergistical interaction of propolis with antibiotics, allowing administration of lower doses of antibiotics, as well as reducing the probability of the development of bacterial resistance. So far, no medicines based on propolis are commercially produced by the pharmaceutical industry, aiming their uses in clinical therapy. The main reasons are the chemical complexity of propolis (hundreds of constituents) and its chemical variability. A proposal is presented toward attainment of products derived from propolis, combining high antioxidant and antimicrobial activities, allied with known composition, based on a limited number of constituents. The methodology for obtaining such products is based on biologically guided chromatographic fractionation of propolis extracts.

Biography

Antonio Salatino was graduated in Pharmacy and Biochemistry by University of São Paulo (Brazil). Obtained PhD by the same university. Developed post-doctoral programs at the University of Texas at Austin, with Dr. Tom Mabry and at the University of Georgia at Athens, with Dr. David E. Giannasi. Presently is Senior Professor (a retired member of the faculty, still exerting teaching and research activities) of the Department of Botany of the University of São Paulo. Is member of the Academy of Sciences of São Paulo and of the Editorial Board of several scientific journals. He has authored published papers on chemotaxonomy, applied botany, medicinal plants and propolis.

Molecular Geometry: From 3D to 5D

Carlile Lavor

Institute of Mathematics, Statistics and Scientific Computing, University of Campinas (IMECC - Unicamp), Brazil

In computational chemistry, the accurate and efficient computation of interatomic distances plays a key role in deepening our understanding of molecular structures and dynamics. This study explores two alternative representations of 3D space in molecular geometry—the homogeneous and conformal models—comparing them to the conventional Euclidean framework. Our findings indicate that the conformal model holds significant potential as a more effective approach for applications in computational chemistry.

Biography

Carlile Lavor is a Full Professor at the Department of Applied Mathematics in the University of Campinas, Brazil. His main research interests are related to theory and applications of distance geometry and geometric algebra. He is co-author of the books "Introduction to Distance Geometry Applied to Molecular Geometry" and "A Geometric Algebra Invitation to Space-Time Physics, Robotics and Molecular Geometry" (both published by Springer) and invited co-editor of special issues of the journals Advances in Applied Clifford Algebras, Optimization Letters, International Transactions in Operational Research, Discrete Applied Mathematics, Journal of Global Optimization, and Mathematical Methods in the Applied Sciences. In 2018, he was the general chair of the 7th Conference on Applied Geometric Algebras in Computer Science and Engineering (AGACSE 2018). During 2018 and 2019, he was the President of the Brazilian Applied Math Society.

Some Considerations on the Risks to Human Health of Contaminants of Emerging Concern

Amado E. Navarro-Fró Meta

Universidad Tecnológica de Izúcar de Matamoros, México

The emerging contaminants (ECs) or contaminants of emerging concern (CECs), not regulated and not considered in national monitoring plans, include many products of current technological development, used in our daily activities. They are found in practically all environmental compartments. Although most of them degrade, their constant discharge into the environment confers stability to their concentrations and their structural design gives them the ability to cross many barriers of living organisms even at the cellular level. Determining their concentrations in the environment often requires sophisticated and expensive methods and equipment that are not available to many of the laboratories that deal with their presence, especially in less developed countries. There is still insufficient knowledge of their toxicity, secondary consequences, and effects as endocrine disruptors. Many of them have higher estrogenic activity. Some of these effects encompass the development of cancerous tumors, disruption of reproductive systems, disorders in the immune system, and an increased risk of obesity.

Therefore, actions are needed on the following:

Use new methods and techniques for human biomonitoring, modeling and evaluate the impact on the human exposome of these CECs.

Conducting transdisciplinary research to better understand adverse health outcomes and their origins in the environment.

Integrate ecological principles into production processes to eliminate hazardous substances and materials from production and marketing chains.

Apply and develop new environmental management practices for environmental restoration especially with strong community participation.

Carry out an intense dialogue of knowledge to transmit to society the effects of these pollutants and receive initiatives for their detection, mitigation and attenuation.

Biography

Amado Enrique Navarro Frómeta was a Full-time Prof. 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.

His Fields of work: Petroleum chemistry; Petrochemical synthesis; Analytical chemistry; Environmental Chemistry and Technology. Member of the National System of Researchers of Mexico, level 1.

ADV. CHEMISTRY 2025

DAY 02

VIRTUAL EVENT

6th EDITION OF

ADVANCED CHEMISTRY WORLD CONGRESS

MARCH 27-28, 2025

SPEAKER TALKS

Piecewise Taylor Series Enabling Algebraic Molecular Orbital Methods

Jun Yasui

Kwansei Gakuin University, Japan

The molecular orbital equation can be defined as an algebraic equation by approximating the molecular integrals by the Taylor series of the internal parameters. What is more, it is necessary to solve molecular orbital equations with any desired accuracy depending on the purpose of the research. In this talk, we present a detail of the method of piecewise Taylor series which enables the control of the accuracy of molecular integrals, and show results on the two center overlap integrals over Slater-type orbitals.

Biography

The speaker completed his doctoral studies at Kyoto University in 1981. He has been engaged in spectroscopic analysis, molecular design and electronic property analysis related to materials development, both experimentally and theoretically, at a polymer company and a precision machinery company for over 30 years. During this period, he obtained his degree in the doctoral program at Shinshu University. Through this experience, he became acutely aware of the limitations of conventional electronic structure theory and the need to redefine molecular orbital methods in an algebraic way, which led him to construct the algebraic molecular orbital theory.

The Formation of Supramolecular Chiral Materials from Achiral Molecules using a Liquid-Crystallin System: Symmetry Breaking, Amplification and Transfer

A. Yoshizawa

Hirosaki University, Japan

Recently, the formation of chiral materials by self-organization of achiral small molecules has attracted much attention. How can we obtain the chirality without a chiral source? Interesting approaches, for example, mechanical rotation, circularly polarized light, and asymmetric reaction filed, have been performed. I will describe recent research developments in supramolecular chirality in liquid crystals focusing primarily on our group's experimental results. I show the following concepts in this lecture. Spontaneous mirror symmetry breaking in self-assembled achiral trimers induces the supramolecular chirality in the soft crystalline dark chiral conglomerate (DC) phase (Figure 1). Two kinds of domains with opposite handedness exist in non-equal population. The dominant domain is amplified to produce a homochiral state. The chirality is transferred to a polymer film in the course of polymerization of achiral monomers by using the homochiral state as a template. Finally, we discuss how the concepts obtained from this liquid crystal research relate to the origin of homochirality in life.

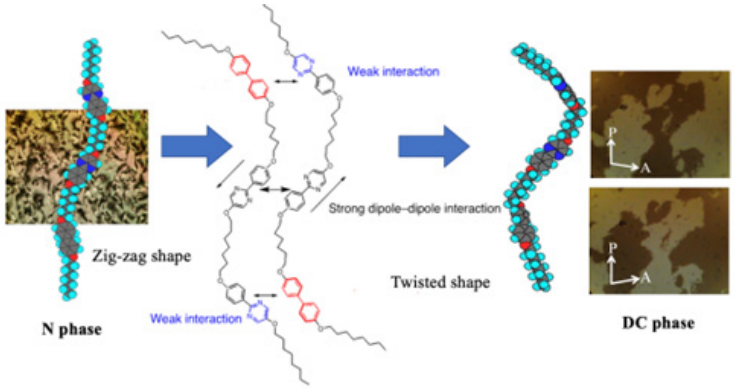


Figure-1: Schematic model for the nematic (N)–DC phase transition of the achiral trimer.

Biography

Atsushi Yoshizawa is a Professor Emeritus at Hirosaki University in Japan. He received his B.S. degree in 1980, his M.S. degree in 1982, and his Dr. Eng. Degree in 1986 in Synthetic Chemistry, from Kyoto University. He joined Central Research Laboratories at Nippon Mining Co., Ltd in 1985. He joined Hirosaki University as a full professor in 2000. He served as the Dean of the Graduate School of Science and Technology (2012–2013) and later as the Executive Director (Planning) and the Vice President (2014–2022), before retiring from Hirosaki University in 2022. His fields of interest are liquid-crystalline supermolecules, blue-phase liquid crystals, ferroelectric liquid crystals, chirality in liquid crystals, and liquid-crystalline medicine. He received the Japanese Liquid Crystal Society Award for Distinguished Achievement and Contributions in 2023.

VIRTUAL EVENT

6th Edition of

Advanced Chemistry World Congress

March 27-28, 2025

An Architecture of Intelligent Tutoring System with Augmented Reality for Learning Chemistry

Trishna Paul[1] and **Mukesh Kumar Rohil**[2]

[1]Department of Computer Science and Information Systems, BITS Pilani, India
[2]LNMIIT International Centre for Artificial Intelligence, LNMIIT, India

Chemistry as the scientific study matter and its properties and behavior, includes study of elementary particles, atoms, molecules, ions, substances, metals, crystals, and other aggregates of matter. Due to the current model of atomic structure studied as the quantum mechanical model, the students face number of problems correlating the properties at macro-level and the micro-level details of elementary particles, atoms, molecules etc. Many of these issues can be attributed to the belief that completing many chemistry courses and passing school leaving examinations in chemistry implies deep knowledge of students in chemistry. Further, given many subdivisions of chemistry like analytical chemistry, biological chemistry, inorganic chemistry etc., given fourteen laws and interdisciplinary areas like agro-chemistry, medicinal chemistry, environmental chemistry etc., the cognitive load on the learners of chemistry has increased due to many terms having precis meaning for chemistry but having confusing meaning from other disciplines and day to day meaning of those terms in the society. In addition to this, in the theoretical chemistry learners must have knowledge from mathematics and physics also. This further implies a leaner in institutes of higher education may not have the pre-requisite knowledge to learn advanced chemistry or a specialized sub-division of chemistry. In this regard it is necessary to have early diagnosis of knowledge deficiency with respect to the learner's chosen area of higher studies in chemistry so that the knowledge gap can be reduced by recommending pre-requisite topics to be studies by the students. We propose here, use of an Intelligent Tutoring System with fast feedback mechanism for early gap analysis and having an Augmented Reality (AR) module to provide students to learn from visuospatial augmentation by the AR module.

The details and functioning of this ITS for chemistry, as shown in Figure-1, will be presented in the paper.

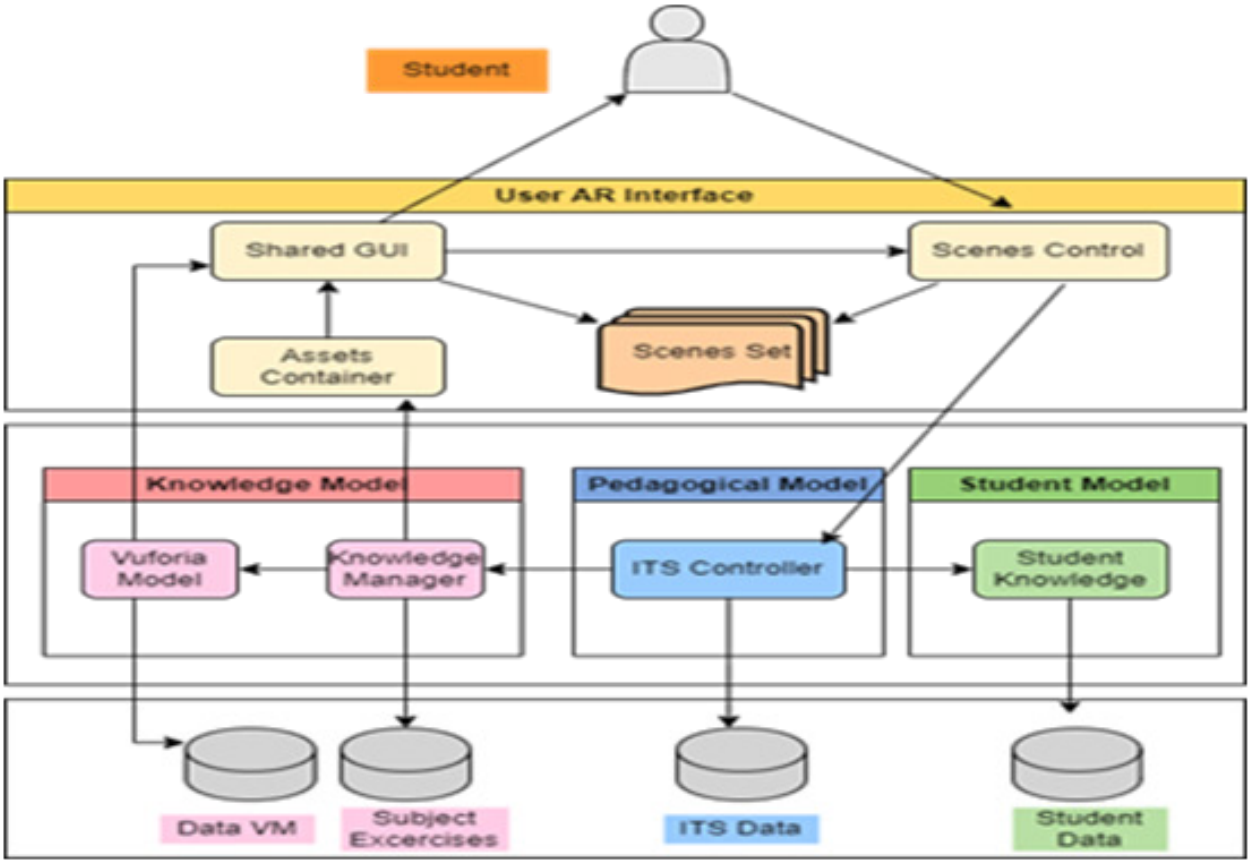


Figure-1: ITS-AR Architecture

Biography

Trishna Paul is a dedicated researcher and scholar in the field of Computer Science and Engineering. Since 2021, Trishna has been pursuing her doctoral research at the Department of Computer Science and Information Systems, Birla Institute of Technology and Science (BITS Pilani), India, under the supervision of Prof. Mukesh Kumar Rohil. Her research interests encompass Augmented Reality, 3D Modeling, Computer Vision, and Higher Education.

Qualitative Analysis of a Novel Numerical Method for Solving Non-Linear Ordinary Differential Equations

Sonali Kaushik

VIT-AP University, India

The dynamics of innumerable real-world phenomena is represented with the help of non-linear ordinary differential equations (NODEs). There is a growing trend of solving these equations using accurate and easy to implement methods. The goal of this research work is to create a numerical method to solve the first-order NODEs (FNODEs) by coupling of the well-known trapezoidal method with a newly developed semi-analytical technique called the Laplace optimized decomposition method (LODM). The novelty of this coupling lies in the improvement of order of accuracy of the scheme when the terms in the series solution are increased. The article discusses the qualitative behaviour of the new method, i.e., consistency, stability and convergence. Several numerical test cases of the non-linear differential equations are considered to validate our findings.

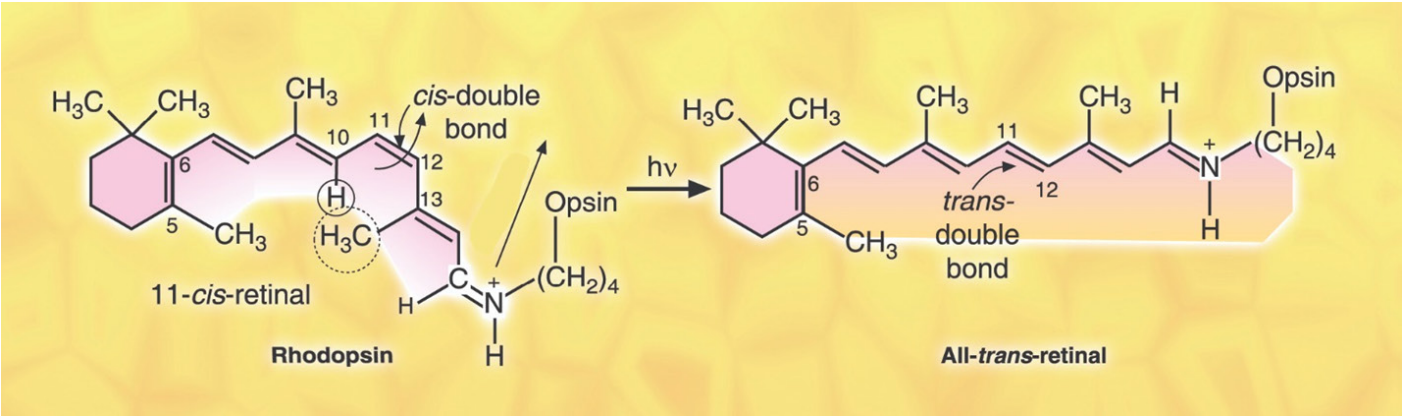
Biography

Dr. Sonali Kaushik is currently working as an assistant professor at VIT-AP university based in Amaravati, Andhra Pradesh, India. She completed her Ph.D. from BITS Pilani, Pilani Campus, Rajasthan, India in the area of applied mathematics with specialization in coagulation-fragmentation equations. She currently has eight publications in Scopus and SCI indexed journals. She has presented in four reputed conferences and attended several conferences. She recently invited and hosted an international guest lecture and is actively involved in the organizing committees of the conferences and workshops related to applied mathematics.

Photochemistry of the Retinal Chromophore in the Process of Seeing (Vision)

Ruhi Das[3], Udita Das[1], Ankita Das[2] and **Asim K. Das[1]**

[1]DST INSPIRE Scholar, PG (Department of Chemistry), Visva Bharati University, India
[2]DST INSPIRE Research Fellow, School of Chemical Sciences, Indian Association of Cultivation for the Science (IACS), India
[3]Department of Chemistry, Burdwan University, India



Vision process is a complex biochemical process that involves the participation of two types of retinal photoreceptor cells: rod cells and cone cells. These visual pigments possess the chromophore, 11-*cis*-retinal, linked through a Schiff base linkage to the opsin protein. Absorption of light by the visual pigment leads to the photoexcitation followed by photoisomerization, 11-*cis*-retinal (*Z*) to all-*trans*-retinal (*E*) for the activation of transducing, a heterotrimeric G-protein, to generate a nerve signal that is transmitted to the brain to produce the sense of vision. The photoisomerized pigment undergoes rapid hydrolysis to produce the opsin protein and all-*trans*-retinal that can be reconverted enzymatically to 11-*cis*-retinal for recharging the opsin protein to regenerate the active visual pigment to

maintain the Wald's visual cycle.

The visual Schiff base pigments rhodopsin and photopsins in rod and cone photoreceptor cells respectively isomerize the chromophore, 11-*cis*-retinal (*Z*) to all-*trans*-retinal (*E*) configuration upon absorption of photons. This isomerization process of the chromophore associated with a conformational change in the tertiary structure of the protein of the visual pigment is responsible for the activation of transducing, a heterotrimeric G-protein, to generate the visual nerve signal transmitted to brain for translation. After photoisomerization responsible for the generation of visual nerve signal, the photoexcited pigment undergoes rapid hydrolysis to produce the opsin protein and all-*trans*-retinal that subsequently isomerizes to 11-*cis*-retinal to regenerate the visual pigments in Wald's visual cycle.

Biography

Ruhi Das is an accomplished academic with impressive qualifications and extensive experience. He holds an MP (1st Division), HS (1st Division), B.Sc. (1st Class), M.Sc. (1st Class), and has successfully cleared CSIR-NET with an all-India rank of 69, along with qualifying GATE and earning a Ph.D. Ruhi has been recognized with the prestigious National Scholarship Award. With over nine years of teaching experience at the undergraduate level at Bolpur College and more than five years as a Guest Faculty for the Integrated M.Sc. program at Visva-Bharati University, he has contributed significantly to academia.

His scholarly work includes nine research publications, three book chapters, and presentations at 11 seminars, conferences, and symposiums. Additionally, Ruhi has actively participated in 24 seminars and webinars. His professional development includes completing three refresher and orientation courses, as well as attending 21 short-term courses, faculty development programs, workshops, winter camps, and add-on courses. With a remarkable record of serving as an internal and external examiner or scrutinizer for 71 assignments, Ruhi has demonstrated strong commitment and efficiency in fulfilling administrative and academic responsibilities. He has also successfully completed a certificate course in Hindi and has played an active role in coordinating and participating in various college activities.

Effect of *Solanum lycopersicum* and *Citrus limon* Derived Exosome-Like Vesicles on Chondrogenic Differentiation of Adipose-Derived Stem Cells

Merve Yıldırım Canpolat, Naz Ünsal, Bilge Kabataş, Olcay Eren and **Fikrettin Şahin**

Yeditepe University, Turkey

Articular cartilage defect treatment is a very important problem because its therapeutic options are not successful enough. Due to the weak self-repairing capacity of the avascular cartilage, even minor damage can progress and cause joint damage leading to osteoarthritis. Although various treatment strategies have been developed to repair damaged cartilage, cell- and exosome-based therapies are promising. Plant extracts have been used for decades, and their effects on cartilage regeneration have been studied. Exosome-like vesicles, which are secreted by all living cells, are involved in cell-to-cell communication and cell homeostasis. The differentiation potential of exosome-like vesicles isolated from *S. lycopersicum* and *C. limon*, which are known to have anti-inflammatory and antioxidant properties, was investigated in the differentiation of human adipose-derived mesenchymal stem cells (hASCs) into chondrocytes. In order to obtain tomato-derived exosome-like vesicles (TELVs) and lemon-derived exosome-like vesicles (LELVs) Aquous Two- Phase system was performed. Characterisation of isolated vesicles based on size, shape were achived *via* Zetasizer, NTA FAME analysis, and SEM techniques. These results showed that TELVs and LELVs increased cell viability and did not show any toxic effects on stem cells. Although TELVs triggered chondrocyte formation, LELVs downregulated. The expression of ACAN, SOX9, and COMP, known as chondrocyte markers, was increased by TELV treatment. In addition, protein expression of the two most important proteins, COL2 and COLXI, found in the extracellular matrix of cartilage, increased. These findings suggest that TELVs can be used for cartilage regeneration, and may be a novel and promising treatment for osteoarthritis.

Biography

An expert in the field of Genetics, Bioengineering and Gene therapy with a particular focus on the use of plant- derived exosomes in the treatment of cancer and osteoarthritis. She is graduated from Biotechnology Program of Yeditepe University. In partnership with MD Anderson Cancer Center, she has conducted clinical studies on cancer treatments and awarded a patent for a cancer drug. Her published work includes the effects of plant- derived exosomes applications for the regeneration of bone, cartilage, muscle and hearth muscle. Recently, she was developed a new treatment for osteoarthritis which is currently undergoing clinical trials. In 2020, she was elected Scientific Chairman of Cancer free Life Association, a non- profit to assist patient and family undergoing cancer treatment. As co-founder of Cellestetix, she sherheads the R&D initiatives to develop a wide range of breakthrough discoveries and novel molecular applications for disease treatments, cellular regeneration and longevity support.

Study on Physicochemical Treatment Measures for the Emerging Contaminants

Leena Singh

Galgotias College of Engineering & Technology, India

Physicochemical treatment methods are commonly used to remove newly identified pollutants, known as emerging contaminants, from water and wastewater. These contaminants include pharmaceuticals, personal care products, endocrine-disrupting chemicals, and other pollutants that may not yet be fully regulated. This abstract summarizes various physicochemical treatment techniques used to tackle these pollutants.

The study explores the sources and pathways of emerging contaminants and discusses effective treatment strategies. It explains key physicochemical methods such as adsorption, oxidation, precipitation, membrane filtration, ion exchange, and electrochemical processes, detailing how they work and their effectiveness in removing these pollutants. The presence of contaminants in water is a growing concern for human health and environmental safety, threatening the integrity of water distribution systems. In recent years, substances like medicines, medical imaging agents, pesticides, and personal care products have been widely detected in surface water, wastewater, and groundwater worldwide. Additionally, the chapter highlights integrated treatment approaches, showing how combining different physicochemical methods can improve efficiency. By including real-world case studies and providing a broad understanding of treatment techniques, this chapter serves as a valuable resource for researchers, professionals, and policymakers working on sustainable solutions to address the challenge of emerging contaminants in water and wastewater.

Biography

Dr. Leena Singh is an Associate Professor of Environmental Sciences at Galgotias College of Engineering and Technology, India. With over 20 years of academic and research experience, she specializes in river ecology, focusing on the health and restoration of the River Ganges. She has mentored students and faculty across India, conducting numerous training programs to enhance environmental education.

Dr. Singh is deeply committed to sustainable development, climate action, and integrating Indigenous

knowledge into biodiversity conservation. Her research on greenhouse gas reduction and carbon footprint assessment has contributed to innovative environmental solutions. She has authored several scholarly articles and is currently working on a book, *Navigating Indian Knowledge System for Vikshit Bharat 2047*.

Recognized for her contributions to academia and environmental advocacy, Dr. Singh continues to inspire change through her research, teaching, and policy engagement. Her expertise makes her a highly regarded speaker in global environmental forums.

Enhancing Fe Grade and Silica Rejection using Corn and Rice Starch as Depressants through Reverse Flotation

V. Mitra Duggirala, Rameshwar Sah and **Dhiren K Panda**

JSW Steel Ltd, India

This study investigates the potential of corn and rice starch as depressants to increase the iron grade and reduce silica content in BHQ beneficiated concentrate. The concentrate, containing 60% Fe and 12% SiO_2, was subjected to reverse flotation tests using corn starch and rice starch as depressants and amines as collector. Reverse flotation tests were conducted on BHQ beneficiated concentrate sample. The samples were characterized by XRF, SEM/EDS, Optical studies, FTIR and Zeta potential analyzer. Corn and Rice starch were used as depressants and amines as collectors. Five depressant dosages and pH levels were tested. Reverse flotation test was, carried out optimized conditions such as RPM-1300, collector conditioning time-3mins, depressant conditioning time -3min and pulp conditioning time-5mins. Fourier transform infrared spectroscopy (FTIR) have been used to understand the starch–hematite interaction. The change of peaks at 750–1500 cm1 region indicate the presence of hydrogen bonding and chemical interaction between hematite and starches. Results showed that corn starch yielded a higher iron grade (65.2% Fe) with 5.8% SiO_2 at pH 10.5, while rice starch achieved 64.5% Fe with 6.2% SiO_2 at pH 10. Compared to the initial concentrate (60% Fe, 12% SiO_2), both starches significantly improved iron recovery and silica rejection. The depressant mechanisms were attributed to starch adsorption onto silica surfaces, increasing hydrophilicity and reducing collector adsorption. The recommended pH range for optimal performance was 10 to 10.5. This study demonstrates the effectiveness of corn starch and rice starch as eco-friendly, cost-effective depressants for enhancing iron grade and silica rejection in BHQ beneficiated concentrate.

Biography

Dr. V. Mitra Duggirala is a budding young researcher in Mineral Processing with expertise in coal and iron ore beneficiation. Currently serving as Deputy Manager at R&D, JSW Steel ltd, INDIA. Holding a Ph.D. in Mineral Process Engineering from Andhra University and has published over 10 peer-reviewed articles. She has hands-on experience in mineral characterization techniques, including XRD, XRF, XRD, FTIR and SEM along with mineral separation process. Research focuses on developing efficient and sustainable reagents for reverse flotation studies on iron ore and coal. Having over 9 years of experience in research and development. A Fellow of Indian Institute of metals and has delivered keynote addresses at international conferences. Committed to advancing mineral processing technologies for a more sustainable future.

Effect of H_2S Gas Flow Rate on the Stoichiometric Ratio of S:Zn and Transparency of ZnS Nanostructure Ceramic in IR Region

Saeed Zahabi[1], Mohammadreza Hesabi[2], Mohammad Reza Loghman Estarki[1], Saeed Hosseinzadeh[1], Hossein Jamali[1], Amin Ashkian[1], Shahram Alirezaee[1] and **Shahab Torkian[1]**

[1]Department of Materials Engineering, Malek Ashtar University of Technology, Iran
[2]Department of Materials Engineering, Semnan University, Iran

So far, extensive research has been performed on multi-crystalline transparent ceramics with infrared (IR) transmission. Zinc sulfide (ZnS) is the most famous semiconductor of groups II–VI within the wavelength range of 8–14 μm, which is a desired option for IR transparent ceramics, and is used in different applications including night vision cameras, airplane, and satellites domes. In this research, zinc sulfide (ZnS) nanostructure powder was successfully synthesized *via* two-stage annealing (Ar + H2S). The annealing under argon medium was responsible for eliminating impurities such as SO_4, SO_3 and SO_2. The annealing under Hydrogen Sulfide (H_2S) medium also led to compensation of sulfur and establishment of Zn to S stoichiometric ratio following sintering. Investigation of different flow rates of H_2S gas indicated that 30 mL/min would contribute to optimal Zn to S stoichiometric ratio. The Zn to S stoichiometric ratio before sintering under H_2S medium was 1.28, which increased to 1.55 after annealing under H_2S medium. The ceramic obtained from ZnS powder annealed under H_2S medium at 30 mL/min had density of 99.98% and IR transmission of 62% within 8–12 μm range (wavenumbers of 1250–850 cm^{-1}.

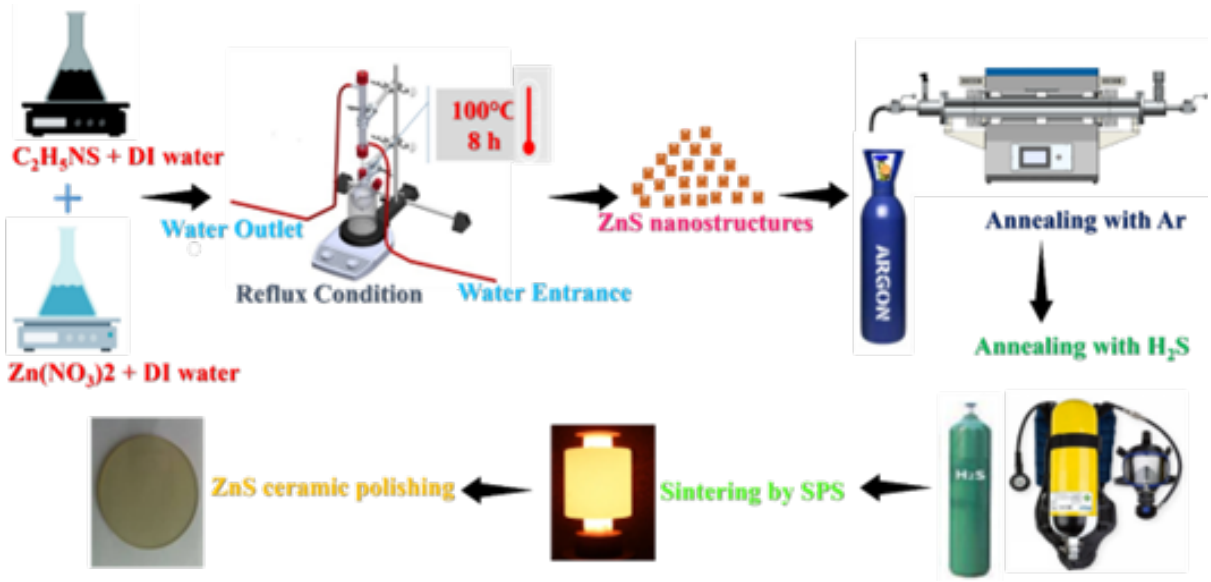


Fig: Schematics of the process of ZnS nanostructure transparent ceramic manufacturing.

Biography

HONORS & AWARDS

- Ranked as the best research assistant in Nanomaterial Engineering department, Malek Ashtar University of Technology,Shahinshahr, Esfahan, Iran, 2020 and 2022
- Ranked as the first top student among 4 students of Nanomaterial Engineering at the end of Master's degree, Malek Ashtar University of Technology, Shahinshahr, Isfahan, Iran, 2020.
- Tuition fully waived for Master's Degree, 2018 – 2020
- Ranked in the top 20% among more than 1000 participants in the Iranian university entrance exam for Master's degree in Nanomaterial Engineering, 2018
- Ranked as the first top student among 36 students of Metallurgy Engineering at the end of Bachelor's degree, Mohajer Technical and Vocational College of Isfahan, Isfahan, Iran, 2018
- Tuition fully waived for Bachelor's Degree, 2014 – 2018
- Accepted as the 20 top researchers in Nano Site, 2015-2017
- Ranked 20th among more than 10000 participants in the Iranian university entrance exam (Technical And Vocational Exam) for Bachelor's degree in Metallurgy Engineering, 2014
- Achieved 175 credits in Khwarizmi Youth Awards, 2012

SELECTED PROJECTS

- Development of Cf-SIC composite for using in brake discs, Malek Ashtar University of Technology, Isfahan, 2023
- Development of magnetically behavior of Mumetal alloy for using in magnetic shielding, Malek Ashtar University of Technology, Isfahan, 2022
- Investigation and fabrication the joining of different non-homogeneous materials by SPS method, Malek Ashtar University of Technology, Isfahan, 2021
- Investigating and fabrication infrared windows with Zinc Sulphide nanostructure by Hot press and SPS

method, Malek Ashtar University of Technology, Isfahan, 2020

- Investigation and fabrication of YSZ heat barrier coating by spray dryer method, Malek Ashtar University of Technology, Isfahan, 2019

WORK EXPERIENCE

- Research Assistant, Malek Ashtar University of Technology, Feb. 2020 – Present
- R & D, Nanofaraz Sepahan Company, Isfahan, Iran, Sep. 2018 – Mar. 2019

CAR-T Cell Therapy – A Potential Treatment Strategy for Pediatric Midline Gliomas

Mainak Sinha[1], Anand Kumar Das[1], Saraj Kumar Singh[1], Anurag Chaudhary[2], Ashim Kumar Boro[3], Manish Agarwal[2] and **Katyayani Kumari[4]**

[1]All India Institute of Medical Sciences, India
[2]SMS Medical College and Hospital, India
[3]Gauhati Medical College, India
[4]Tata Memorial Centre & Homi Bhabha National Institute, India

Pediatric brain tumours are the primary cause of death in children with cancer. Diffuse midline glioma (DMG) and diffuse intrinsic pontine glioma (DIPG) are frequently unresectable due to their difficult access location, and 5-year survival remains less than 20%. Despite significant advances in tumor biology and genetics, treatment options remain limited and ineffective. Immunotherapy using T cells with a chimeric antigen receptor (CAR) that has been genetically engineered is quickly emerging as a new treatment option for these patients. High levels of expression were detected for both disialoganglioside (GD2) and B7-H3 in pediatric DMG/DIPG. Numerous studies have been conducted in recent years employing various generations of GD2-CAR-T cells. The two most prevalent adverse effects found with this therapy are cytokine-release syndrome (CRS), which varies in severity from mild constitutional symptoms to a high-grade disease associated with potentially fatal multiorgan failure, and neurotoxicity, known as CAR-T-cell-related encephalopathy syndrome (CRES). During the acute phase of anticancer action, peri-tumoral neuro-inflammation might cause deadly hydrocephalus. The initial results of clinical trials show that the outcomes are not highly encouraging as B cell malignancies and myelomas. *In-vivo* research on CAR-T cell therapy for DIPG has yielded encouraging results, but in human trials, the early results have shown potentially fatal side effects and very modest but fleeting improvements. Solid tumors present a hindrance to CAR-T cell therapy because of the antigenic dilemma and the strong immune-suppressing tumor microenvironment.

Biography

Mainak Sinha was born in the small town of Malda, West Bengal, he has always aspired to become a neurosurgeon. Mainak pursued his MBBS at the prestigious All India Institute of Medical Sciences (AIIMS), Patna. Currently, he is dedicatedly serving as a general surgery resident at AIIMS, Patna, where he was gaining invaluable experience in patient care and surgical techniques.

Beyond clinical practice, he is deeply passionate about research, aiming to contribute to advancements in neurological sciences. In his spare time, he finds joy in singing, playing football and swimming, which refreshes his mind and energizes him for the challenges ahead.

With a commitment to improving healthcare through both clinical practice and research, he driven by a desire to make meaningful contributions to the field of neurosurgery, aspiring to enhance patient outcomes and advance medical knowledge.

Modulation of Media and Light to Enhance *C-Phycoerythrin* in Phormidium sp. A01 Isolated from the Indian Coast

Rajagopal Ramya[1], Seerappalli Aran Shanmugam[1], Rajagopal Ramila[2] and **Albin Jemila Thangarani[1]**

[1]Tamil Nadu Dr. J. Jayalalithaa Fisheries University, India
[2]Vasundhara College of Pharmacy, India

Objective: C-*phycoerythrin* (C-PE), a high value compound, is used as a molecular tag for diagnostic purposes, as a photosensitizer in cancer drugs, as well as in the nutraceutical, cosmetic, and food industries. This study aims at enhancing C-PE in an Indian strain of the marine cyanobacteria *Phormidium* sp.A01.

Method: *Phormidium* sp.A01 was cultured under mixotrophic conditions using exogenous carbon sources such as glucose, sucrose, and glycerol as well as standardized culture parameters like photoperiod and light intensity. It was cultured in static mode with no aeration and a low medium volume.

Result: Among the various exogenous carbon sources evaluated, *Phormidium* sp.A01 increased biomass productivity by 54% in glucose + peptone compared to control (F/2 medium). COD at 600 mg L^{-1} (526.60 mg L^{-1} of glucose + 0.25 mg L^{-1} of peptone) produced a higher C-PE content (7.36 mg g^{-1} wet biomass). The effect of glycerol on C-PE was studied at various concentrations since C-PE is attached to thylakoid membranes made up of glycerolipids. Compared with control, *Phormidium* sp.A01 produced 11.52 mg C-PE g^{-1} wet biomass at 0.8 g L^{-1} glycerol concentration. *Phormidium* sp.A01 produced significantly ($P < 0.001$) more C-PE at 13.50 µmol photons $m^{-2}s^{-1}$ than at other light intensities. A longer photoperiod (12/12 h light:dark) produced more C-PE than the control.

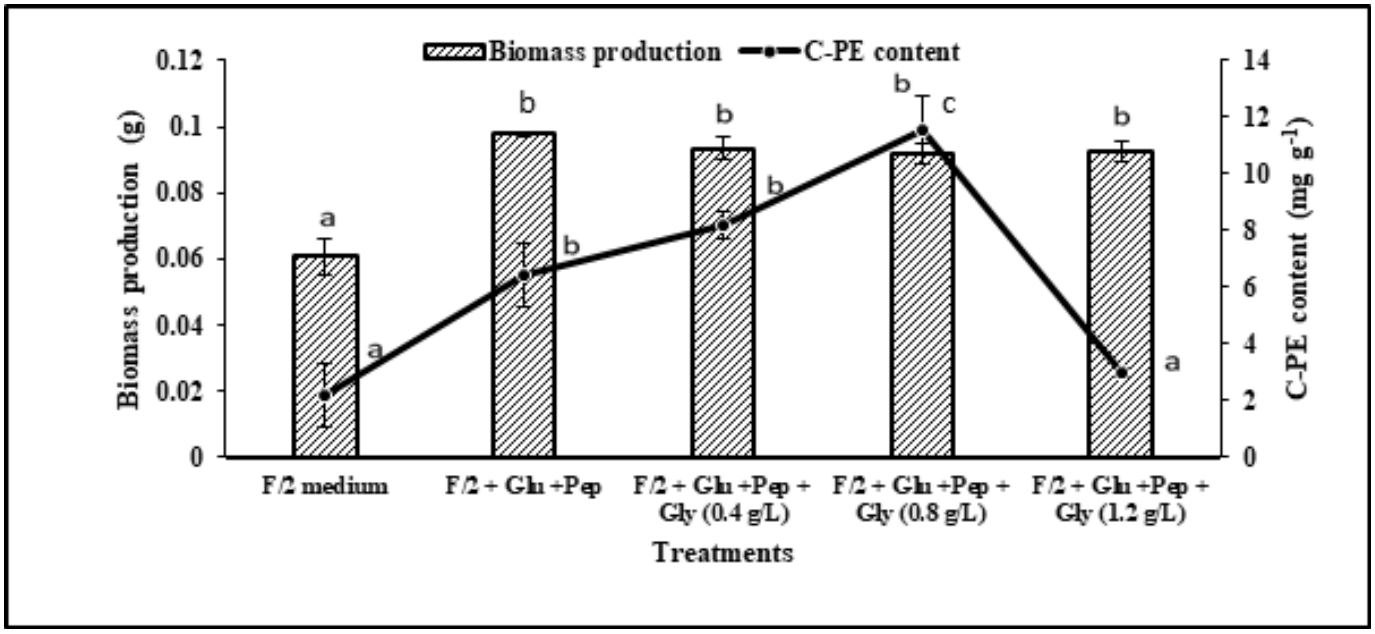


Fig.1 Biomass production (wet) (g) and C-PE content (mg g-1) in *Phormidium* sp.A01 in different glycerol concentration (mean ± SD) (n=3).

Conclusion: C-PE was efficiently produced by *Phormidium* sp.A01 grown mixotrophically in glucose, glycerol, and peptone at 13.50 µmol photons $m\text{-}2s^{-1}$ for 12/12 hours of light/dark. Static mixotrophic culture is an efficient scalable method that eliminates the need for expensive bioreactors. More health benefits like antioxidants, anti-cancer, and anti-microbials will expand the scope of C-PE's application in diagnostic, cancer drugs, nutraceuticals, cosmetics, and food industries.

Biography

Rajagopal Ramya was born in 1982 in Kanyakumari, Tamil Nadu, India. Ramya completed her M.F. Sc in Fisheries Biotechnology in 2008 at 25 at Tamil Nadu Veterinary and Animal Sciences University, Chennai, India. She also completed M.B.A in Biotechnology at Anna University, Chennai, India. It was at the state university, Tamil Nadu Dr. J. Jayalalithaa Fisheries University, Tamil Nadu, India, that she completed her Ph.D. (Fish biotechnology). She was mentored by Dr. Seerappalli Aran Shanmugam. She conducted her research under his guidance and discovered novel techniques such as the enhancement of C-phycoerythrin, C-phycocyanin, and polyunsaturated fatty acids in microalgae. Her research interests include fermentation of seaweeds, C-PE enhancement, Se supplementation in Tilapia as well as a book chapter on RNAseq and Prime Editing. She is currently the Managing Director and Research Head of Cyteck Phycoactives Pvt Ltd, India. The skills and knowledge she acquired during her research in the field have been applied to the creation of a company.

Investigating Novel Natural Polymeric Carrier Linked Prodrugs for IBD Treatment

Shakuntala Chopade, Vaibhavi Jaunjalkar and **Mohini Tehare**

Department of Pharmaceutical Chemistry, Bharati Vidyapeeth University, India

The current work is designed to synthesize, examine the kinetics of, and evaluate the pharmacological properties of chitosan and mycophenolic acid prodrug. further to formulate a prodrug microsphere, and to evaluate its release against prodrug kinetics. By coupling MPA to the herbal macromolecular carrier chitosan *via* the EDCI coupling technique, the MCV prodrug was synthesized. For *in vitro* studies, a variety of biological media that replicate the conditions of the stomach and colon were used. The pharmacological properties of the synthesised prodrug were evaluated in colitis induced by TNBS. *In vitro* studies clearly indicated that negligible drug release 86% release observed in colon homogenates. In TNBS induced rat groups MCV prodrug decreased disease activity score rate remarkably and brought it too normal. Designed colon- targeted prodrug demonstrated a significant outcome, in terms of remarkable protective effect against colitis compared to MCV and MMF, without the incidents of perpetual diarrhoea observed with MMF therapy. Absence of any adverse effects on pancreas and liver make them promising candidates which could be exploited further for the management of IBD patients who are steroid- dependent, refractory or intolerant to conventional therapies.

Biography

Dr. Shakuntala Chopade, an Assistant Professor at Poona College of Pharmacy, Pune, India holds a Ph.D. in Pharmaceutical Chemistry and an M. Pharm in Quality Assurance. With over ten years of academic and seven years of research experience, she has also worked in the pharmaceutical industry as a Quality Assurance Officer at Muralikrishna Pharma Pvt. Ltd. Dr. Chopade has published 21 research papers and a book chapter, and has presented at major conferences like ICT Mumbai and IPC Mysore. She is a GATE qualifier with a 94% score and has received notable grants, including a 21.2 lakh DST grant and a minor grant of 2 lakhs from Bharati Vidyapeeth University. In 2014, she was honored with the "Young Researcher Award" from GRABES Charitable Trust. Her research focuses on analytical method development and validation, Prodrug synthesis and its characterization.

Electrospun Polyurethane as a Novel Support in Heterogeneous Fenton Reaction for Highly Efficient Removal of Pollutants

Nikhi Maria Raju[1], Parvathy Pavithran[1], Riya Mariyam John[1] and **Soney C. George[2]**

[1]Department of Chemical Engineering, Amal Jyothi College of Engineering, India
[2]Center for Nanoscience and Technology, Amal Jyothi College of Engineering, India

Electrospun membranes act as a support so that the iron (III) ions can be immobilized on polymer substrates to create heterogeneous Fenton catalysts with high activity, low leaching and improved stability without sludge generation. In this study, functionalization of electrospun polyurethane (PU) is done using triethanolamine (TEA) and used as a novel support for heterogeneous Fenton catalyst. The fabricated membranes were characterized using Scanning Electron Microscopy (SEM), and Fourier Transform Infrared spectroscopy (FTIR) to analyze the effective doping of Ferric Chloride ($FeCl_3$) and amine compounds properly into the fibrous electrospun PU. The porous nature and increased wettability resulted in improved adsorption and further degradation. The composite microfibrous membrane showed highly efficient degradation of 98% for chromium, 93% for methyl orange and 89% for methylene blue using the Fenton reaction reported for the first time. From the detailed kinetics study, data fitted well in the first order reaction kinetics and also the membranes were successfully reused for five cycles after its regeneration.

Biography

Nikhi Maria Raju, is serving as an Assistant Professor in the Department of Chemical Engineering at Amal Jyothi College of Engineering, Kanjirappally, Kerala, India since 2015. She obtained her undergraduate degree from TKM college of Engineering, Kollam and Master's degree from Govt. Engineering College, Kozhikode. She has research experience at National Chemical Laboratory, Pune working on hydrochlorination of pesticides. She is a passionate researcher and recent works focusses on environmental remediation. Her major scientific contributions include publications in Chemosphere.

Beyond a Single Use: Understanding the Longevity and Reusability of Fire Proximity Suit

Shivangi Dwivedi and **Richa Srivastava**

Department of Chemical Engineering, Delhi Technological University, India

Firefighters frequently wear fire proximity clothing to shield themselves from high heat fluxes, especially radiant heat. The outer layer in these proximity suits is a laminate of aluminised polyethylene terephthalate (PET) film with a flame-resistant fabric, usually belonging to the class of glass or aramids. The role of the outer layer is to reflect the radiant component of the heat flux. A common concern revolves around whether the performance of these suits degrade over time or with repeated use, exposure to flames or other factors. This study investigated the effect of these parameters like abrasion and folding operations, natural weathering, repeated radiant and convective exposures as well as contamination, on the thermal and radiant protective capabilities of these proximity firefighting suits. Our studies clearly indicate that abrasion as well as chemical etching led to significant reduction in the protection level, from a time to second degree burn (t_{2nd}) of 41±1s for unabraded to as low as 14±0.5s after 500 abrasion cycles and 6±0.5s after chemical etching. Although repeated short duration 30s radiant exposures do not have any adverse effect on the protective performance of the suit, however, flame exposure led to significant damages in the aluminised layer and t_{2nd} reduced to 5±0.5s. In addition, operations like folding and contamination with soot significantly contributed to deterioration of the suits' performance. Radiant Protective Performance of soot contaminated samples and folded samples reduced to 7±0.5s and 18±0.5s respectively. Our findings address longstanding enquiries regarding the post usage utility of aluminised suits. Our study reinforces the importance of proper care and the maintenance of these suits in order to improve their service life.

Biography

Shivangi was currently working as a Senior Researcher at Delhi Technological University (DTU), Delhi, India, where she is pursuing Ph.D. in Chemical Engineering with a focus on protective suits and flame-retardant (FR) adhesives. Her academic journey has been fuelled by a deep passion for understanding polymers, fibres and textile technology, particularly its application in specialized fire proximity suits. Throughout her career, she has had the privilege of contributing to research and innovation in the areas of fibre dyeing and textile chemistry.

Studies on Degradatoin of Textile Dyes in Wastewater using Immobalized Photocatalyst in a Continuous Process

Sailu Chintha, Ajit Kumar T and Vijaya Laxmi A

University College of Technology, Osmania University, India

The aim of this study was to review the degradation of different textile dyes along with the combination of dye effluents. The photocatalytic activity of Cobalt doped TiO_2 studied under UV-C light of wavelength 254 nm in a continuous reactor. The cobalt doped Tio_2 film was immobilized on glass beads and characterized through SEM, FTIR and XRD. The rate of dye degradation was estimated using UV-Spectrophotometer from residual concentration. The study included influence of UV for promoting dye degradation. Textile dyes such as Methylene blue, Brown Dye, Congo Red and Effluent from an industry outlet are treated to investigate photocatalytic degradation.

The photocatalytic activity of immobilized cobalt – doped TiO_2 using continuous process on different textile dyes such as methylene blue, direct brown concentration of 50ppm were treated and for methylene blue 87.9%, direct brown 64.2% of degradation was observed. The photocatalytic activity on Textile industry dye effluents with immobilized cobalt-doped TiO_2 using continuous process after 180min observed that the %degradation is 95.2%. The photocatalytic activity of immobilized cobalt-doped TiO_2 on degradation of mixed dyes (MB+BD) is 75%, (MB+BD+CR) 69.2% and (MB+BD +CR+TIE) 79.8% using continuous process after 180min. Kinetic studies show that this reaction follows pseudo-first order kinetics.

Biography

Prof. Sailu Chintha hail from Srimannarayanapur of Raghunathpalli mandal in Warangal district appropriated education to agricultural field works and utilized social welfare hostel to continue his schooling in Jangoan after primary education in his native place. He did his graduation and post-graduation in Chemical Engineering from Osmania University and joined Fertilizer Industry (Paradeep Phosphates Limited, Orissa) for industrial experience in June1988 then chosen teaching as profession. He served at JNTU Anantapur (Oct. 1992 - June 1993), REC Warangal (June 1993 - Sept 1997) preceding to be a part of his graduated institute University College of Technology, Osmania University as associate professor in 1997. He acquired PhD and become Professor of Chemical Engineering in August 2006.

With the academic, research and industrial practice of chemical engineering and its allied technology subjects, Prof. Sailu Chintha, has got good exposure as academic administrator of engineering education particularly the academic planning, implementation of projects and institutional management. He was serving as Principal at University College of Technology of Osmania University while being chosen as member of TSPSC.

He served various Academic and Administrative positions in Osmania University and he was instrumental in getting two star projects of World Bank assisted MHRD Technical Education Quality Improvement Programmes (TEQIP-II, CoE) and other sponsored research projects to the College. He has completed two sponsored research projects on catalytic processes to develop cleaner green systems. He concerned for establishing Centre of excellence with focused research thrust area on the new trend of chemical process intensification. He has demonstrated his passion to work for system improvement to bring changes with bench marking approach during his tenure at the college. He has guided number of research works for M Tech dissertations and PhDs. He had more than thirty international and national research papers of contribution to his credit. He has associated with Industry, Institutions, Professional bodies and represented as expert for various accrediting, monitoring and enforcing organizations. He has got exposure of USA, UK, and Singapore Universities and the global trends of technical education in particular.

Leaching of Elemental Heavy Metals in Deep Eutectic Solvents from Spent Zinc-Carbon Batteries

Jyothi Thati, Abhilash Arakonda and **Sailu Chintha**

University College of Technology, Osmania University, India

The spent zinc-carbon batteries get discarded once utilised and generate tonnes of solid waste annually. The heavy metals in these batteries tend to leach into the land with time and cause pollution. Deep eutectic solvents are mixtures of solid components that contain hydrogen-bond donors (HBD) and hydrogen-bond acceptors (HBA). Upon mixing, these usually form liquids with a lesser melting point when compared with that of individual compounds. These DESs are eco-friendly and provide green-chemistry applications. With the usage of naturally occurring DES, these are termed as NADESs. This research study features the application of Choline Chloride and Menthol based NADES to understand the extraction efficiencies of Zinc and Manganese *via* leaching phenomenon. The Choline Chloride based DES are with glycerol, malonic acid and malic acid respectively and the Menthol based DES are with Thymol and Caprylic Acid respectively. The leaching operation was carried out at different temperatures and showed that the efficiency was the highest in specific DES with over 95% for both Zn and Mn. Additionally, reaction kinetic modelling was done and it made clear that the leaching operation here was being controlled by the boundary layer, following a model where the core of material gradually shrinks over time.

Biography

Dr. Jyothi Thati is working as an UGC-Assistant Professor University College of Technology, Osmania University, Hyderabad performing teaching as well as research activities. Dr. Jyothi Thati has completed B Tech and M Tech from University College of Technology, Osmania University with Chemical Engineering as major. Then she moved to do Ph D in Chemical engineering from Royal Institute of Technology (KTH), Sweden. Then to Netherlands to work as a researcher at ISPT. She has published her work in reputed journals and her work got selected for oral presentations in several international conferences (CGOM, ISIC, BACG), also given several talks to Industry related persons at IKF (Industrial Crystallization Organization). During her Postdoc., she worked on live industrial problem.

She had several research grants from different organizations such as DST, MHRD- GIAN, MSME, UGC etc. for her on- going works. She has been a Reviewer to several reputed Journals. Under her guidance 2 PhD's were awarded and 15 M Tech and 34 B Tech projects.

Life Member of Indian Institute of Chemical Engineers LAM – 61723. Received Vice chancellor award 2023 for research excellence, Osmania University, Hyderabad and Best faculty award, INSO 2022.

Research got many best papers awards in S chemcon, Chemcon, ICONSWM, RACE etc. Selected for the post of Assistant Professor through a national-level competitive UGC Faculty Recharge Programme.

Modeling of the Temperature Dependence of the Diffusion Characteristics of Vacancies in BCC Iron

Madina. Boboqambarova and **Andrei. Nazarov**

National Research Nuclear University MEPhI, Russia

Atomic-scale defects are responsible for the formation and change of structure in materials. Therefore, in order to predict changes in their properties, it is important to know the characteristics of such defects. However, this is not always possible with the help of an experiment. The work is devoted to modeling the change in the structure around the vacancy with increasing temperature and calculating the temperature dependence of the diffusion characteristics of point defects in the bcc iron. In this case, the model of the natural thermostat, which is based on a combination of the modified method of molecular statics (MMMS) [2] and method of molecular dynamics (MD), is used [1]. Many-body interatomic potential of Ackland was chosen for simulation of atomic interactions.

For computation of the characteristics of point defects, it is necessary to know the structure in the vicinity of the vacancy. In the first stage of the work, the temperature dependences of the radii of the first few coordination spheres were determined during modeling. The results showed that starting from the eleventh coordination sphere, the coefficients of temperature dependence of the coordination spheres radii β_i are almost equal to the coefficient of thermal expansion of the crystal without defects. After that, by using these coefficients β_i, the structures around the vacancy at different temperatures, and further, the temperature dependences of the vacancy formation energy and volume (Fig.1), which determines the effect of pressure on the vacancy concentration, were obtained.

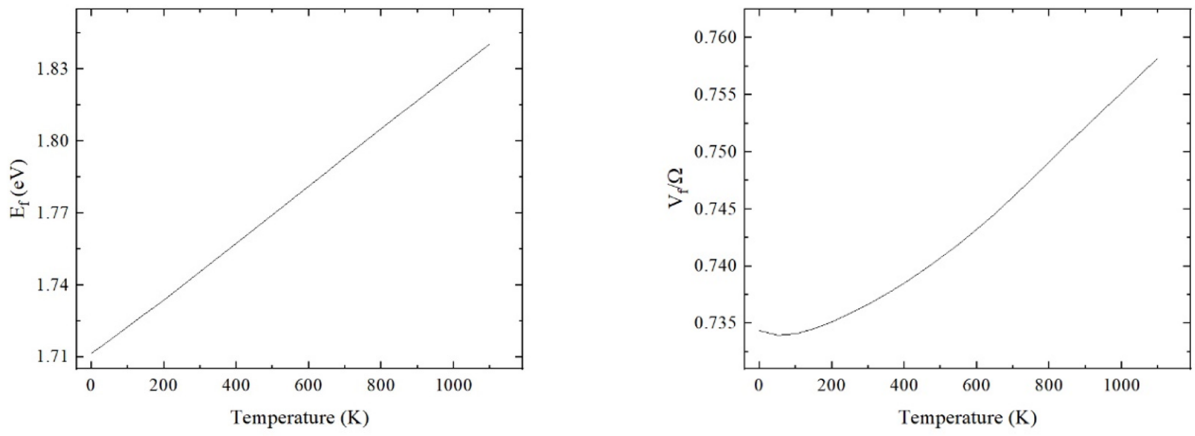


Fig-1: Temperature dependences of vacancy formation energy and volume.

The results revealed that since the vacancy formation energy depends on temperature practically linearly, an additional contribution appears in the formula for vacancy concentration, and this contribution is approximately equal to 0.5.

Biography

Madina is from Uzbekistan. She is graduated in physics faculty of National University of Uzbekistan in 2018. In 2020, she achieved her master in the material science, and now she is studying for PhD at the same Institute, National Research Nuclear University MEPhI.

Kinetics of Vacancies Segregation Formation in Elastic Field of Edge Dislocation in BCC Iron

A.A. Gusev[1] and **A.V. Nazarov**[2]

[1]Institute for Theoretical and Experimental Physics named by A.I. Alikhanov of NRC "Kurchatov Institute", Russia
[2]National Research Nuclear University MEPhI, Russia

We study the redistribution of point defects in the vicinity of a dislocation using a previously developed theoretical approach that takes into account the influence of strain induced by dislocations on diffusion flows. Multiscale modeling involves several stages.

First stage is modeling the atomic structure of the edge dislocation core and its vicinity using a modified molecular statics method (MMMS), which takes into account the anisotropy of the elastic field around the main computational cell. This was previously done in.

At second stage we use MMMS to calculate diffusion characteristics of point defects and the strain influence on diffusion (SID) coefficients. For vacancies it was done earlier in.

The third stage is molecular dynamics simulation of a point defect diffusion. By this calculation we obtain migration energy value and the pre-exponential factor in the Arrhenius equation.

In the fourth stage, we substitute the expressions for the flows into the continuity equation to obtain the diffusion equation. Previously obtained characteristics and coefficients obtained were used. Then, a numerical solution of the diffusion equation is carried out. Diffusion coefficients have nonlinear dependency on strain.

The resulting concentration distribution determines the kinetics of the redistribution of point defects. Calculations show that distributions of vacancies near dislocations are quite complex. After long time, their shape changes little, in contrast to the beginning of the process. Distributions at different temperatures are not similar. We note that distributions shapes are qualitatively different for vacancies and carbon atoms.

Biography

Gusev done his Bachelor of materials science in MEPhI (2016) and Master of materials science in MEPhI (2018). He was a PhD student in NRC «Kurchatov Institute» 2018-2022. Through all these years the main topics of research were diffusion under stress and dislocation core structure by means of computer simulations. He was skilled in molecular statics, molecular dynamics, kinetic monte-carlo simulation and numerical methods.

Modelling of Diffusion Characteristics in Fe-Al Alloys

G. V. Sergeev[1] and **A. V. Nazarov**[1,2]

[1]National Research Nuclear University "MEPhI", Russia
[2]National Research Center "Kurchatov Institute", Kurchatov Complex of Theoretical and Experimental Physics, Russia

We study the dependence of diffusion characteristics on the composition in Fe-Al alloys using a modified molecular statics method (MMSM) that generalize for alloys. In MMSM, the main calculation cell is surrounded by atoms embedded in an elastic medium. The displacements of these atoms find using solutions to the elasticity theory equations for a vacancy, and the positions of the atoms in the main calculation cell are determine using a standard variational procedure. The structure of the main calculation cell and the displacement of atoms in the elastic zone find in a self-consistent manner. This model allows more accurate calculation of diffusion characteristics. During simulation we use the EAM potentials..

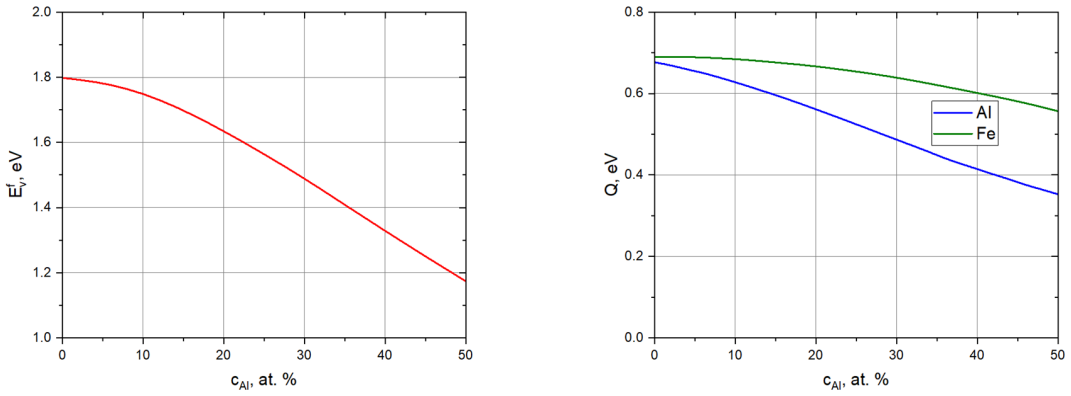


Fig-1: a) Dependence of the energy of vacancy formation on the composition b) Dependence of the activation barriers for Fe and Al on the composition

Migration modeling involves dragging an atom in the direction of a vacancy. The maximum energy value along this path allows us to find the value of the activation barrier. Using this model, we get concentration dependences of the energies of formation and migration of vacancies, which are shown in the figure above. Using these dependences, the coefficients of self-diffusion and chemical diffusion are calculated

Biography

Sergeev is a PhD student at the Department of Physical Problems of Materials Science at the National Research Nuclear University MEPhI (Moscow Engineering Physics Institute). He earned his Bachelor's and Master's degrees from MEPhI, and his current PhD studies are also conducted at this university. His research interests focus on interdiffusion in alloys and the modeling of point defect properties in alloy systems. Through his work, he aims to deepen the understanding of diffusion mechanisms and the behavior of atomic-scale defects, contributing to the development of advanced materials with tailored properties.

The Loss of Biodiversity as a Serious Environmental Threat: The Need for a New Legal Paradigm. The Interconnections between Biodiversity and Public Health

Maria Vittoria Ferroni

Department of Political Sciences, Sapienza University of Rome, Italy

At a global level, there has been the awareness of the emergency linked to the speed of the rate of biodiversity loss (which has increased in recent years) also deriving from a legal approach to the protection of biodiversity which is mainly voluntary and not binding on the States. For the effective protection of biodiversity, a central point seems to be the search for new legal instruments to ensure the effectiveness and efficiency of protection. In December 2022, 'The Kunming-Montreal Global Biodiversity Framework' was adopted, which has the goal of protecting at least 30% of land and marine areas by 2030 and restoring degraded ecosystems. This agreement marks a crucial change for an effective protection of biodiversity on a global level, even if it seems to have introduced only procedural obligations (and therefore does not appear to be a binding global agreement). The Kunming-Montreal International Agreement also acknowledges the interconnections between biodiversity and health, emphasising the importance of implementing the Agreement considering the One Health approach. In particular, it highlights the urgency to reduce pressures on biodiversity and to decrease the environmental degradation, to reduce health risks. After all, the Ebola, Sars, Zika and Sars-Cov2 epidemics have had zoonotic origins and have been associated with significant biodiversity loss, that caused a serious disruption in the balance of wildlife.

At a European level, starting from the Green Deal, awareness has been gained from the emergency linked to the loss of biodiversity (moreover synergistic with the mitigation of climate change) and of the necessity to change the protection paradigm moving from a soft law approach to general rules, binding for all Member States. An important milestone is the very recent 'Nature Restoration Law', that provides binding obligations for all Member States, as well a support for the fight against the loss of biodiversity, not only of the protected areas but also of cities and other areas not protected.

Biography

Maria Vittoria Ferroni is professor in Administrative Law at the Department of Political Sciences, Sapienza University of Rome, where she teaches administrative law and environmental law and biodiversity. Since 2013, member of the Doctoral Board of Public, Comparative and International Law, curriculum in environmental administrative law and public health. Member of the Italian Association of Urban Planning Law (AIDU). She has been co-editor of the books (Springer): Biodiversity law, policies and science in Europe, the United States and China (2024); Environmental law before the Courts (2023); Urban informality. A multidisciplinary perspective (2021).

Attaining Zero Emission *via* Energy Transition: A Myth or Reality

John Bentil[1] and **Anthony Frank Obeng**[2]

[1]Civil Engineering Department, Takoradi Technical University, Ghana
[2]Jubilee Technical Training Center, Takoradi Technical University, Ghana

The necessity of sustainable development and environmental preservation has taken center stage in the current debate due to growing environmental issues. In an era where the use of fossil fuels poses a serious threat to sustainability, the transition to renewable energy sources has been touted as a critical strategy for countries to address climate change, improve economic prosperity, and support global sustainability by fostering economic growth. Our study significantly adds to the current disclosure in this regard by offering an extensive literature review of the impact of achieving zero emissions as a paradigm shift to the use of renewable energy on economic growth, not only in the implementing country but also in neighboring economies in sub-Saharan Africa. To accomplish this goal, our findings indicate that fossil fuels have a detrimental spillover effect that hinders the sustainability initiatives of the neighboring economies in addition to harming the economic development of the host country. Contrary, renewable energy enhances sustainability and has a positive spillover effect in neighboring economies in addition to its domestic benefits. The outcomes emphasize the interconnectivity of environmental policies and the urgent need for collaborative regional initiatives. To conclude, the study's findings, aligned with global agreements like the Sustainable Development Goals and COP28, offer crucial direction for policymakers dealing with the challenges of sustainable growth.

Biography

John Bentil is an Associate Professor with the Department of Civil Engineering in the Faculty of Engineering, Takoradi Technical University (TTU), Ghana. Bentil holds a PhD in Minerals Engineering with focus on Waste Processing and Management from the University of Mines and Technology, Tarkwa, Ghana in 2018. He graduated with a Master of Science in Water and Environmental Management from the University of Hertford-

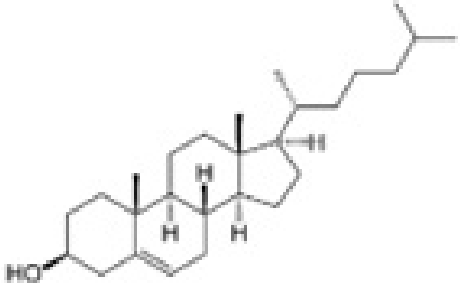
shire, Hatfield, United Kingdom in 2005. He is a Professional Engineer (PE-IET, GH), a member of the International Association of Engineers, a member of the Global Engineering Deans Council, a Chartered Administrator and a Chartered Management Consultant. Currently, he is Ag. Dean for the Faculty of Maritime Engineering and Nautical Studies and the Centre Director of the Jubilee Technical Training Centre, all of Takoradi Technical University, Ghana. His research works focus on Water and Wastewater treatment, Waste Management, Environmental Management, Climate Change and Circular Economy.

Cell Membrane Cholesterol and Regulation of Cellular Processes: New and the Same Old Thing

Antonina Dunina-Barkovskaya

[1]Belozersky Institute of Physicochemical Biology, Moscow Lomonosov State University, Russia
[2]Shemyakin–Ovchinnikov Institute of Bioorganic Chemistry, Russian Academy of Sciences, Russia

Cholesterol, first isolated from gallstones more than two centuries ago, is an amazing molecule that plays a key role in human physiology. Cholesterol serves as the basis for the formation of bile acids and D vitamins, opens the chain of biosynthesis of steroidal sex hormones and corticosteroids, and is one of the most important components of cell membranes. The activity of many membrane proteins depends on their interaction with membrane lipids and, in particular, with cholesterol. Here we review some evidence for the importance of cholesterol for the normal functioning of membrane proteins and the whole cell. This lipid component ensures fine regulation of a range of cellular functions and provides clues to understanding changes in the activity of a number of proteins under various physiological and pathological conditions. The importance of cholesterol is illustrated through examples of some cholesterol-dependent membrane proteins and cellular processes, as well as in some pathologies at the whole organism level. Understanding the mechanisms of cholesterol–protein interactions represent a significant resource for the development of drugs that influence the cholesterol–protein interface.



Biography

Antonina Dunina-Barkovskaya worked at Lomonosov Moscow State University, Russia, from 1975 to 2023; PhD was completed in 1989; currently she is an employee of the Shemyakin–Ovchinnikov Institute of Bioorganic Chemistry, Russian Academy of Sciences. Her field of professional interest includes cell biology, cell membranes, cell–cell communications, gap junctions; membrane fusion, endocytosis, phagocytosis; cholesterol-dependent processes, cholesterol-binding peptides. She has authored/co-authored about 50 publications. Research collaborations: University of Stuttgart, Germany; University of Amsterdam, Holland; NIH, Bethesda, USA; University College London, UK. Since 2006, she has been editor and member of the Editorial Board of the journal Biologicheskie Membrany (English version, Biochemistry (Moscow), Suppl. Series A, Membrane and Cell Biology).

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6th Edition of

Advanced Chemistry World Congress

March 27-28, 2025

A Novel Approach to Weld Flow Analysis of Electric Resistance Welded (ERW) Tubes: Significance and Implications

P. Aravind[1], P. Sampath Kumaran[2] and **T.S Srivatsan[3]**

[1]Vision Research & Innovation Laboratory, India
[2]Department of Mechanical Engineering, Sambhram Institute of Technology, India
[3]The University of AKRON, USA

Background: The Electric Resistance Welding (ERW) tubes produced by High Frequency Induction Welding (HFIW) processes offers substantial cost advantage to the end user compared one on one with seamless pipes and its major applications spanning Oil, Gas and Automobile Industries. But, it's not fully trusted due to occurrence of sudden and catastrophic failure in service. This necessitated the incorporation of important quality inspections in the production process of ERW tubes.

Objective: The main objective of this study is to prevent the catastrophic failure and concurrently ensures healthy synergism of reliability and trust in the industries like Oil, Gas and Automobile. An important quality check examination is to analyze the weld flow lines formed during the ERW tube manufacturing. The profile of Weld flow line and its angle of bend formed signifies the quality of weld joint formed which indicates optimal compressive forces have applied during the tube welding process.

Methods: For this study, 2 good samples and 2 failed samples of ERW tubes were taken and metallurgical prepared for the examination. These tubes were cut into the form of weld nuggets, molded using acrylic resin and polished with silicon carbide emery papers. Then the samples etched using Picral, cleaned with Ethanol to remove the stains. Weld flow lines were examined under metallurgical microscope at magnification of 100x and weld flow angle is measured and analyzed with aid of metallurgical software.

Results: The micro-photographs pertaining to the ERW tubes P1, P2, P3 and P4 were represented in Table 1.0. For each sample, four measurements were made to characterize the weld flow pattern. The weld flow angles obtained for the pipes P1 & P3 were in the range

of 40° to 70° and pipes P2 & P4 were beyond the range of 40° to 70° angle respectively.

Conclusions: To qualify a sound welded joint, acceptable range of weld flow intercept angle should be within the range of 40° to 70°. The important outcome of these study was pipes pertaining to P1 & P3 (Good samples) revealed weld flow angles spanned between the range of 40° to 70° and for pipes P2 & P4 (Failed samples) it was beyond the range of 40° to 70° consequently these samples were failed during the service.

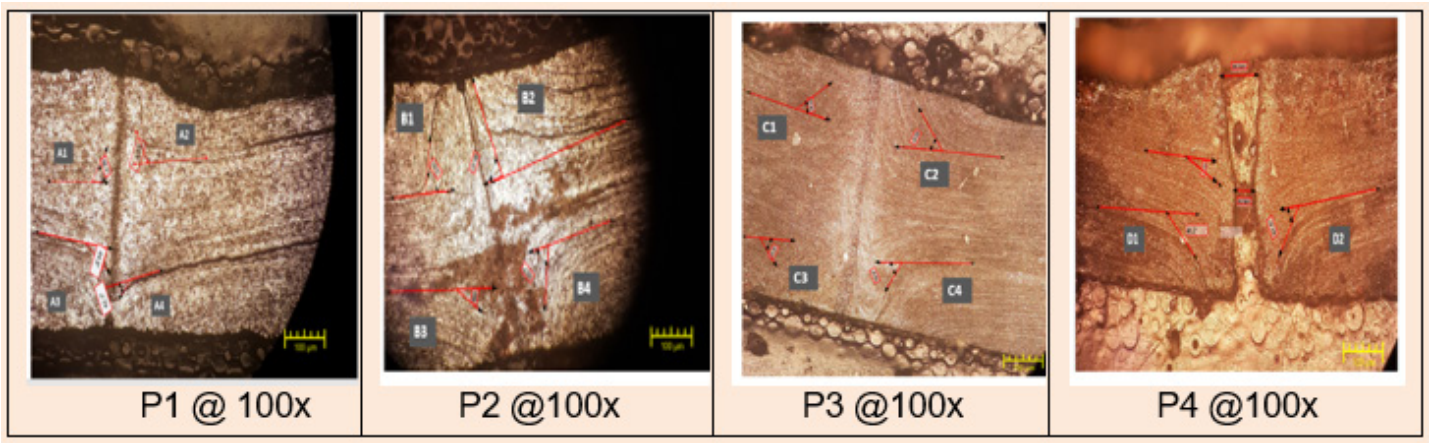

Table 1.0

Biography

Aravind P is currently living in Bangalore, India with a Bachelor's degree (B.E) in Mechanical graduated from Sambhram Institute of Technology, Bangalore affiliated to VTU University. He is Current working as Managing Director and Co-Founder at M/s. Vision Research and Innovation Laboratory, Bangalore, INDIA from 2022. His current organization is an ISO 17025-17 NABL Accredited laboratory primarily into Mechanical, Metallography, Chemical and Environmental Testing of Metals and its alloys. And his previous work experience as Sr. Design Engineer at Medtronic India Pvt. Ltd., basically into New Product Development and also a Test Engineer in M/s. Baxer Innovation & Business Solution Pvt. Ltd., and published 2 International publications which includes

1. "A Novel Approach to Weld Flow Analysis of Electric Resistance Welded (ERW) Tubes: Significance and Implications" in Springer nature Journal.

2. "Analyzing Gear Blank Failure: A Comprehensive Industrial Case Study" in Springer Nature Journal. Involved in 4+ Failure Analysis in the field of Construction, Turbine & Automobile Industries.

His major skillset is Failure Analysis, Material Testing (Mechanical, Metallurgical), Reverse Engineering, New product Development, ISO 17025, ISO 13485, Test Method Validation, Design Verification, Fixtures Development and Six Sigma DMAIC Tool.

VIRTUAL EVENT

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Evaluation of Media Protocols for *in vitro* Propagation of an Improved Variety and Two Landraces of *Dioscorea rotundata*

Nana Ntorinkansah[3], Victor Amankwaah[1,2], Godfred Osei[4], Ruth Prempeh· Hilary Zakpaa[3], David Appiah-Kubi[1], Egnin Marceline[5] and Marian Quain[2]

[1]CSIR – Crops Research Institute, Ghana
[2]CSIR College of Science and Technology, Ghana
[3]Department of Biochemistry and Biotechnology, KNUST, Ghana
[4]Council for Scientific and Industrial Research, Ghana
[5]Plant Biotechnology & Genomics Research Lab, Tuskegee University, USA

The continuous battle of yam (*Dioscorea rotundata* Poir) with pests and diseases as well as other environmental factors has made the crop expensive to produce. Tissue culture offers a substitute for propagating the crop, although more farmers prefer landraces of yam, which perform poorly in tissue culture. To establish an efficient and genotype-independent prolific tissue culture system in yam varieties, several hormonal supplementations in Murashige and Skoog's (MS) complete medium were investigated on the *in vitro* growth of an improved variety and two landraces of Guinea yam. The first objective was tailored to study the effect of hormone-free MS complete medium versus optimized MS medium (supplemented with 0.1 mg L^{-1} of kinetin), while the second objective investigated different levels of 6-benzylaminopurine (BAP) in MS medium on the *in vitro* growth of Guinea yam. The experimental design for the first objective was simple completely randomized (CRD) with three replications. For the second objective, the experimental design was CRD arranged in 3 × 6 factorial treatment structure with three replications. Significant differences ($p < 0.05$) were observed in the growth effects between the various varieties as well the different concentrations of MS medium supplemented with BAP. Dente and Pona (landraces) both performed slightly better on the hormone-free MS medium than they did on the optimized media. On the other hand, the improved variety Kukrupa performed slightly better on the optimized medium than it did on hormone-free MS medium. MS medium supplemented with different concentrations of BAP had a poor effect on the growth performance of all three varieties. The present study has revealed that hormone-free MS medium should

be used in the *in vitro* propagation of Dente and Pona yams, while optimized MS medium supplemented with plant growth regulators should be used in the *in vitro* propagation of Kukrupa improved yam variety.

Biography

Nana Ntorinkansah (MPhil Biotechnology), is a researcher in agricultural biotechnology. A graduate of Kwame Nkrumah University of Science and Technology, she applies biotechnology to improve crop yields and food security while promoting environmental sustainability. Her research focuses on *in vitro* propagation of root crops, developing efficient protocols for mass production of high-quality planting materials resilient to climate change. Nana's work contributes to improving food security and sustainable agriculture in developing countries, reducing the environmental footprint of agricultural practices. She is presenting her research at the World Congress on Advances in Plant Science and Plant Biology, where she hopes to share her findings with the global scientific community and engage in meaningful discussions with fellow researchers on the intersection of biotechnology, agriculture and environmental sustainability.

Breathing Atom

Navin Khaneja

System and Control Engineering, IIT Bombay, India

Here we discuss a subtle point in quantum mechanics. A nuance. Are atomic orbitals, correct? Is hydrogen atom true? We claim almost, but in true, the atom breathes. Electron orbital is a linear combination (superposition) of electron waves (plane waves). The waves scatter of the coulomb potential of the nucleus. Electron wave with wave-vector, has momentum and energy and group velocity. The plane wave, acquires a phase and scatters to another wave with scattering amplitude that depends on Coulomb potential. All in all, the orbital acquires a phase, the energy of the orbital. But there is a problem, the electron waves have group velocity, they are running way from each other, they won't stay together, the orbital will become bigger, the orbital will diffuse away and then come back, the atom will pulsate, it will breathe. The physics is rescued by invoking photon mediated electron coupling to vacuum.

Biography

Navin Khanega did his B. Tech in Electrical Engineering (EE) from IIT Kanpur in 1994 and Masters in EE and Mathematics from Washington University, St Louis in 1997. He received a Ph.D. in applied mathematics from Harvard University in 2000.

He is recipient of NSF career award, Sloan fellowship and Bessel prize of Humboldt foundation, His research is in areas of control and NMR. He is the author of 90 Journal papers.

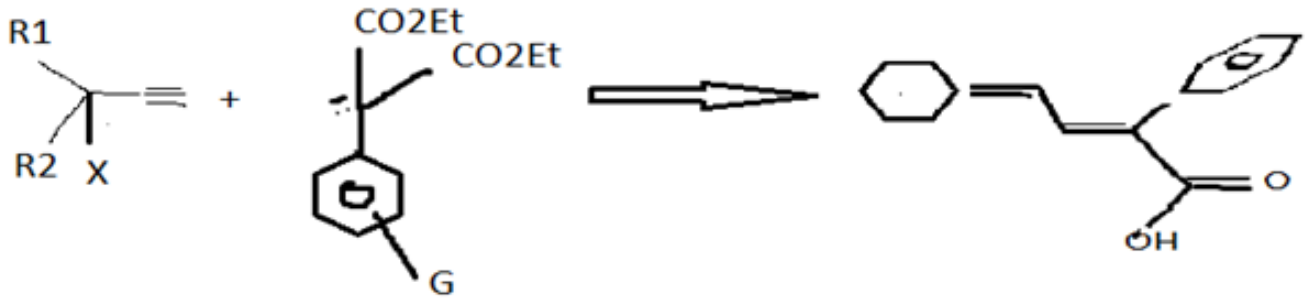
Elucidation a New Mechanism for Synthesis the New Therapeutics Organic Molecules 2,4-Diene-Aryls and Polyphenolics

Mostafa Mahrouz[1], Anas Mahrouz[2] and **Manale Mahrouz[3]**

[1]FSSM Université Cadi Ayyad, Morocco
[2]TBS Toulouse France
[3]EC de Clermont Ferrand, France

As true scientists say in organic synthesis and the discovery of new molecules and drugs, chance and luck contribute to new discoveries.But perseverance is an important factor of success in these discoveries that does nothing gets nothing. Our initial objective was the synthesis of new GABA precursor molecules to fight against convulsive epiliptic attacks due to problems with synaptic release of the neuromediator GABA (gamma butyric acid). The synthesis was made from acetylinic alcohols. Mechanistic competition impacted the performance of this synthesis. we therefore identified the cause by the presence of another competitive synthesis scheme which produced other original molecules, the 2,4-diene and arylated polyphenolics. After having obtained the precursors of multi-functionalized GABA in low yields, we were curious about the identification of this new series of unexpected molecules. Indeed, after isolation purification, they were characterized (CCM, UV, H and C NMR, SM, COST off resonance, microanalysis, etc.).

A mechanism has been proposed to explain their formation and this according to a competition reaction assisted by newly named steric genes: original SN assisted and controlled by steric genes carried out by Pr Mahrouz mostafa named: “SN 1-3 assisted by steric hindrance by rearrangement electronics of the Mahrouz Morocco pi link: SN'2 Mahrouz



A mechanism for the organic synthesis of conjugated dienes from acetelynic substrates similar to a propargilic rearrangement.

Body and Mind in Virtual Dark Tourism Experiences and Artwork Creations: Embodied Cognition Reaction Perspectives

Benjamin Quarshie[2], Halim Budi Santoso[1], Dandison Ukpabi[3] and **Jyun-Cheng Wang[4]**

[1,4]Institute of Service Science, National Tsing Hua University, Taiwan
[1]Information System Department, Universitas Kristen Duta Wacana, Indonesia
[2]Mampong Technical College of Education, Ghana
[3]School of Business, University of Jyväskylä, Finland

Dark tourism experiences visualized in destinations evoke diverse tourist experiences, triggering negative emotions and offering insights into historical events. Embodied cognition reactions prompt distinct expressions, reflections, and artwork creation, which can leverage Virtual Reality in tourism and augment dark experiences for distant tourists. This study examines embodied cognition reactions in virtual dark tourism with 32 participants, investigating their responses to narratives and auditory stimuli while impacting artwork. Results show amplified affective experiences *via* added auditory stimuli and cognitive experiences influenced by narratives. Post-experience, participants manifest their encounters in artworks, reflecting body-mind links. The study contributes to knowledge and practice by highlighting the importance of content and sensory stimuli in designing the virtual experiences and how they influence individuals' reflections and expressions (by creating an abstract clay pottery works).

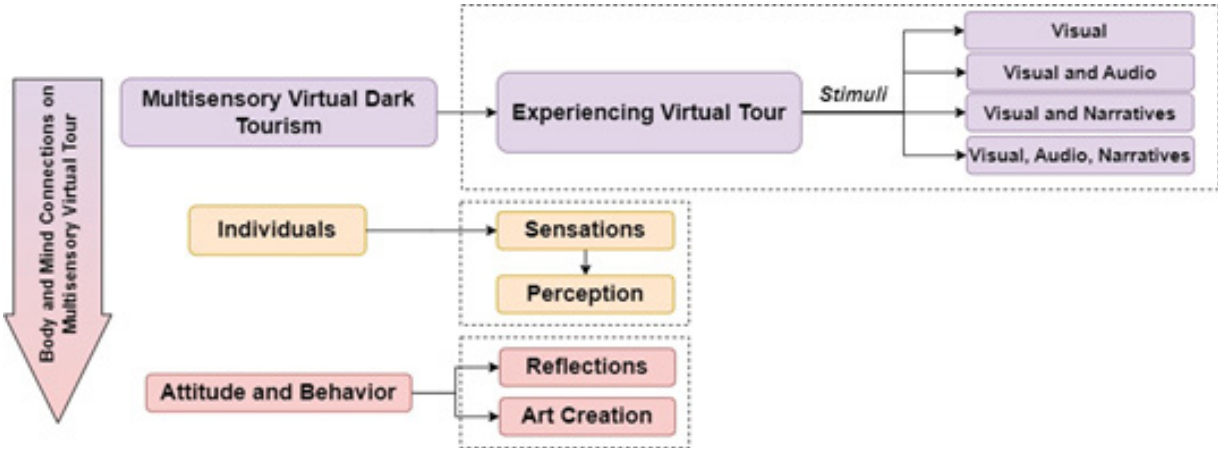


Fig-1: Conceptual Framework

Biography

Benjamin is a teacher educator at Mampong Technical College of Education in Ghana. He currently holds a doctoral research position at the University of Education, Winneba, Ghana and his research interests include destination image branding, teacher education, curriculum implementation, and pedagogies for teaching art. With an MPhil in Arts and Culture from the same university, Benjamin is also a highly respected reviewer for educational organizations and international journals based in Ghana, South Africa, India and the United States. He is a former doctoral fellow at the University of Jyväskylä in Finland and serves as the Ashanti Regional Coordinator for Ghana Society for Educational Technology. In the last two years, he has played key roles in various aspects of the ongoing secondary education reform programe in Ghana contributing to the development of instructional materials for school leadership, teachers and students as well as facilitating several continuous professional development and training for teachers and secondary school leadership teams in various parts of Ghana.

Unraveling the Enigma: Molecular Mechanisms of Berberrubine-Induced Nephrotoxicity Reversed by its Parent form Berberine

Kai Wang[1,2], Jinqiu Rao[1,2,3], Qing Gao[4], Na Li[1,2,3], Yuan Wang[1,2,3], Tianwang Wang[1,2,3] and **Feng Qiu[1,2,3]**

[1]School of Chinese Materia Medica, Tianjin University of Traditional Chinese Medicine, China
[2]Tianjin Key Laboratory of Therapeutic Substance of Traditional Chinese Medicine, Tianjin University of Traditional Chinese Medicine, China
[3]State Key Laboratory of Component-based Chinese Medicine, Tianjin University of Traditional Chinese Medicine, China
[4]School of Integrative Medicine, Tianjin University of Traditional Chinese Medicine, China

Berberine is a quinoline alkaloid that is extensively applied in the clinic due to its potential therapeutic effects on dysentery and infectious diarrhea. Its main metabolite, berberrubine, a promising candidate for ameliorating hyperlipidemia, has garnered more attention than berberine. However, our study revealed that berberrubine induces severe kidney damage, while berberine was proven to be safe. Herein, we explored the opposite biological effects of these two compounds on the kidney and elucidated their underlying mechanisms. First, integrated metabolomic and proteomic analyses were conducted to identify relevant signaling pathways. Second, a click chemistry method combined with a cellular thermal shift assay, a drug affinity responsive target stability assay, and microscale thermophoresis were used to identify the direct target proteins. Moreover, a mutation experiment was performed to study the specific binding sites. Animal studies showed that berberrubine, but not berberine, induced severe chronic, sub chronic, and acute nephrotoxicity. More importantly, berberine reversed the berberrubine-reduced nephrotoxicity. The results indicated that the cPLA2 signaling pathway was highly involved in the nephrotoxicity induced by berberrubine. We further confirmed that the direct target of berberrubine is the BASP1 protein (an upstream factor of cPLA2 signaling). Moreover, berberine alleviated nephrotoxicity by binding cPLA2 and inhibiting cPLA2 activation. This study is the first to revel the opposite biological effects of berberine and its metabolite berberrubine in inducing kidney injury. Berberrubine, but not berberine, shows strong nephrotoxicity. The

cPLA2 signaling pathway can be activated by berberrubine through targeting of BASP1, while berberine inhibits this pathway by directly binding with cPLA2. Our study paves the way for studies on the exact molecular targets of herbal ingredients. We also demonstrated that natural small molecules and their active metabolites can have opposite regulatory roles *in vivo* through the same signaling pathway.

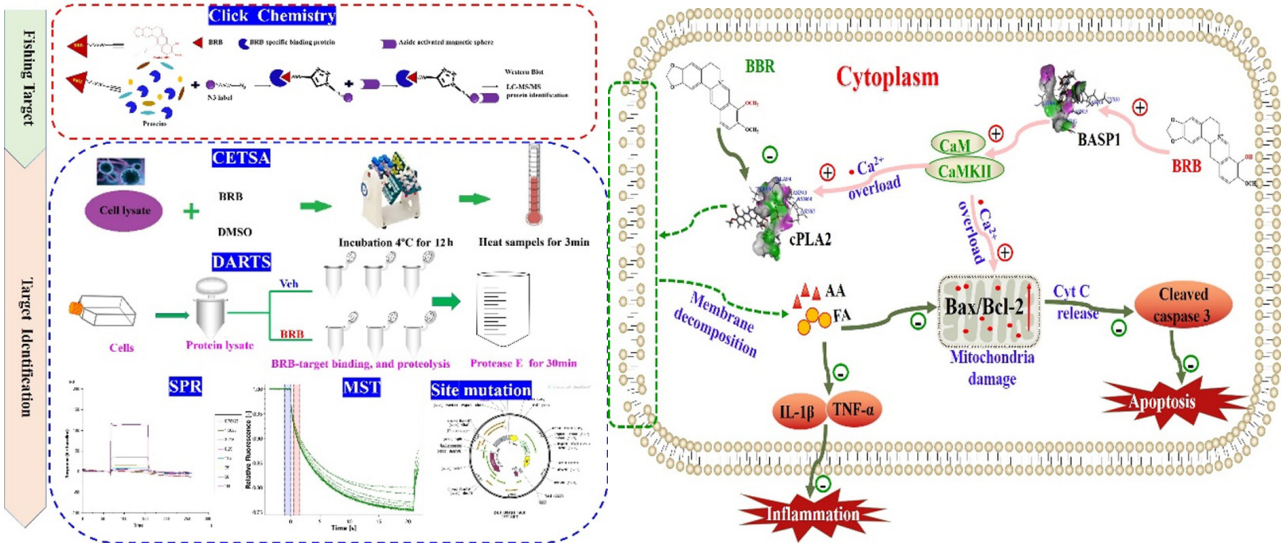


Fig-1: Target fishing and validation of BRB directly binding protein (left figure) and biological mechanism of BBR reversing BRB-induced nephrotoxicity (right figure)

Biography

Dr. Kai Wang is currently an associate professor at Tianjin University of Traditional Chinese Medicine, since December 2022. She has a doctor degree in Shenyang Pharmaceutical University from Shenyang, China. She has dedicated to drug metabolism and toxicology research on natural products for over ten years until now. She has published over 30 SCI papers (e.g. <Analytical Chemistry>, <bioorganic chemistry>, <phytomedicine>) and presided 3 national level projects around this research direction.

Two-Dimensional MOF–Based Materials: Preparations and Applications as Electrodes in Li-ion Batteries

Narges Nobakht[1,2], Seyyed Ahmad Etghani[1], Mohammad Hosseini[1] and **Seyed Hamed Aboutalebi[1]**

[1]Condensed Matter National Laboratory, Institute for Research in Fundamental Sciences, Iran
[2]BattScout Company, UK

Two-dimensional (2D) metal-organic frameworks (MOFs) are rapidly emerging as a unique class of mushrooming family of 2D materials offering distinctive features, such as hierarchical porosity, extensive surface area, easily available active sites, and versatile, adaptable structures. These promising characteristics have positioned them as highly appealing alternatives for a wide range of applications in energy storage technologies, including Lithium batteries. Nevertheless, the poor conductivity and limited stability of 2D MOFs have limited their real applications in electrochemical energy storage. These limitations have therefore warranted ongoing research to enhance the performance of 2D MOFs. Given the significance of 2D MOF-based materials as an emerging class of advanced materials, a multitude of strategies have been devised to address these challenges such as synthesizing 2D conductive MOFs and derivatives along with 2D MOF hybridization. One promising approach involves the use of 2D MOF derivatives, including transition metal oxides, which due to their abundant unsaturated active metal sites and shorter diffusion paths, offer superior electrochemical performance. Additionally, by combining pristine 2D MOFs with other materials, hybrid 2D MOF materials can be created. These hybrids, with their enhanced stability and conductivity, can be directly utilized as active materials in lithium batteries. In the present review, we categorize 2D MOF-based materials into three distinct groups: pristine 2D MOFs, 2D MOF-derived materials, and 2D MOF hybrid materials. The synthesis methods for each group, along with their specific applications as electrode materials in lithium-ion batteries, are discussed in detail. This comprehensive review provides insights into the potential of 2D MOFs while highlighting the opportunities and challenges that are present in this evolving field.

Biography

Narges Nobakht works as an associate prof. in Condensed Matter National Laboratory of Institute for Research in Fundamental Sciences (IPM), with a Doctor of Philosophy (PhD) focused in nano chemistry. She is co-founder of BattScout, an independent battery consulting start-up company specialized in researching and analyzing scientific and patent information in materials science and energy storage. Her current research interests are focused on synthesis and design of metal organic frameworks and new 2D materials for biological and energy applications.

Towards the Understanding of Precipitation Evolution in Two-Phase Steel: Application of a Novel Computational Model to Grain-Oriented Electrical Steel

Vanessa Quaranta[1], Lucas Traina[1], Mikhail Ryazanov[2] and **Denis Saraev[1]**

[1]R&D Department, NLMK Group, Belgium
[2]R&D Department, NLMK Group, Russia

Grain-oriented (GO) electrical steel is an important soft magnetic material used as lamination core in stationary electrical machinery. The superior magnetic properties of this material, namely high magnetic induction and low core losses, mainly depend on the state of secondary recrystallization (SRX). The size, quantity and distribution of precipitates are key factors affecting SRX process and final properties of this material. Despite the development of high performance GO steel has been a scientific focus for several decades, computer models able to predict size distribution and evolution of precipitates in multiple matrix phases are still missing. The lack of a comprehensive computer model mainly originates from the complex phenomena characterizing GO steel, such as partial phase transformation, high temperature deformations, recrystallization, etc. Moreover, the production of this material involves one of the most complex technologies in steel plants in terms of process conditions, control requirements, and metallurgical knowledge. Here a novel computational model able to predict kinetics of precipitates in dual phase steels is presented. The model is applied to a typical industrial GO electrical steel subjected to production steps ranging from continuous casting to coiling after hot rolling. For a straightforward understanding of the proposed method, the abovementioned production steps are represented by a simplified thermo-mechanical profile. We demonstrate that our methodology represents a powerful tool for both qualitative and quantitative assessment of precipitates evolution in dual phase steels. The developed technique allows us to derive relationships between process parameters and microstructure enabling to control microstructure's evolution along the production route of GO electrical steel.

Biography

Vanessa Quaranta is a researcher and project leader at the NLMK Group that is a leading international manufacturer of high-quality steel products. She is employed at the European R&D Center of NLMK that is located in Belgium. Vanessa is a chemist by training specialized in computer simulations combined with a particularly expertise in reactivity, thermodynamics and thermo-kinetics. She gained vast experience in the application of modern tools and development of new techniques to address complex challenges in metallurgy, chemistry and material science. Vanessa strongly believes that research collaborations between academic and industrial partners are essential for the development of new processes and new products as well as the improvement of pre-existing ones.

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The Importance of Financial and Non-Financial Information in Ensure the Financial State of an Economic Entites to Monitorise the Position and Financial Performance

Cristina Mihaela Ionescu (Haralambie)[1] and **George Alin Haralambie**[2]

[1]Doctoral School of Economic Sciences and Humanities, Valahia University of Târgoviște, România
[2]Petroleum Gas University of Ploiești, România

The main elements which describe the financial and non-financial information are based on the components of financial statements which offer a fair-view image of the financial state of an economies entites due the fact that offer important clue to evidence the financial position and the financial performance. The users of financial statements are interested to have access at confidential information especially the investors which are interested to invest and gain or preferred to act at impulsive moments to prove themselves that they are capacity to take decision in fast moments to adopt the best decisions in efficiency and efficient conditions to deliver a high-quality productions and services to maintain of the market. As society attaches increasing importance to sustainable development and business ethics, entities choose for the publication of non-financial reports, even in the presence of costs related to their preparation, insisting on the positive aspects.

This paper aims the main objective to demonstrate that the financial and non-financial indicators are in strong correlation with some variables based on econometric models which due at the originality and novelty of paper. With help of statistic software named SPSS we can make difficult equation using multiple regression, matrice of correlation and test ANOVA to confirm or infirm the hypothesis on which can work.

The results of the present study are in line with other research in this field, with indicators used as a reference to manage specific risks and uncertainties specific to the external environment and industry. The research could continue with the initiation of sustainability actions, the outline of strategies and success factors that help energy companies maintain their market position.

Biography

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Transition Metal-Catalyzed Synthesis of Quinazoline Derivatives

Nitesh K. Nandwana

Virginia Tech University, USA

Transition metal catalysed cross coupling and C-H activation/ functionalization reactions have emerged as powerful tools for the construction of diverse array of useful heterocycles in medicinal chemistry. In recent year remarkable progress has been made for the construction of functionalized heterocycles *via* metal catalyzed reactions. Among them quinazoline derivatives have received significance attention in the field of organic synthesis and medicinal chemistry due to their wide range of biological and pharmacological properties such as anticancer, antimalarial, analgesic, antiulcer, anticonvulsant, antitumor, diuretic and antihypertensive. We have developed an efficient and convenient synthetic protocol for the synthesis of quinazoline derivatives through metal catalyzed C-N coupling reactions. We have developed several protocols for quinazoline derivatives using metal catalyzed reactions. The synthesized compounds were tested for *in vitro* antibacterial activity against Gram negative and Gram-positive bacteria.

Biography

Dr. Nitesh K. Nandwana obtained his M.Sc. from the University of Delhi in 2012 and completed his Ph.D. at BITS Pilani in 2019, where his research centered on the development of novel methods for synthesizing nitrogen-containing heterocycles through metal-catalyzed C-H activation and functionalization.

Following his Ph.D., Dr. Nandwana pursued postdoctoral research at the Icahn School of Medicine at Mount Sinai, New York and subsequently at Long Island University, where he focused on boron-based therapeutic and diagnostic agents. He later held a postdoctoral position at The Wistar Institute, Philadelphia, contributing to the design and synthesis of small molecule PROTACs for cancer therapy.

Currently, Dr. Nandwana serves as a Senior Researcher at Virginia Tech, where his work is focused on Reverse Metabolomics for the treatment of inflammatory bowel disease (IBD).

Statistical Inference of Missing Data Probability for Nonmonotone Missing at Random Data

Yang Zhao

Department of Mathematics and Statistics, University of Regina, Canada

In the literature of statistical analysis with missing data there is a significant gap in statistical inference for missing data probability especially for nonmonotone missing data, which has essentially restricted the use of the estimation methods which require estimating the missing data probabilities. For example, the inverse probability weighting methods, including the augmented inverse probability weighting approach, depend on sufficient models for the missing data probabilities to reduce estimation bias. This research proposes a semiparametric likelihood method for estimating the missing data probability. In addition, it develops practical techniques to deal with the curse of dimensionality in the likelihood-based models. It further introduces a semiparametric estimator of the missing data probability for the partially observed data, which can be used to assess the model fit. The asymptotic variance of the proposed estimator is estimated from the profile score function. An EM algorithm with closed form expressions at each step is used to compute the estimates. The methods are general and robust. Simulation studies in various settings indicate that the performance of the new methods is acceptable for practical implementation. The missing data probability of a case-control study of hip fractures among male veterans is analyzed to illustrate the methods.

Biography

Yang Zhao is a Professor of the Department of Mathematics and Statistics at the University of Regina. Yang's research interests focus on the development of parametric, semiparametric and nonparametric models for statistical analysis with missing data, survival data, and longitudinal data. Yang received her Ph.D. in Statistics from the University of Waterloo in 2005 and then joined the University of Regina as Assistant Professor and received President's office new researcher award the same year. Yang served as a member of the Young Investigators Committee of the Statistics Society of Canada. Yang has been a member of the Steering Committee of Canadian Statistical Science Institute Saskatchewan Health Science Collaborating Centre which established the center in 2018.

Effect of Cathode Surface Area on the Electrodeposition Rate, Composition and Microhardness of Co–W Coatings Deposited from a Citrate Bath

A. V. Gotelyak[1] and **A. I. Dikusar**[2]

[1]Shevchenko Pridnestrovie State University, Moldova
[2]Institute of Applied Physics, Moldova State University, Moldova

Interest to tungsten and its alloys is due its unique properties. Tungsten is the most refractory metal. Tungsten can form alloys with cobalt, iron, nickel, and other metals and react with various chemical elements, thus eliminating negative effects of some of them (sulfur and phosphorus) in alloys, which is very important in production of quality steel. In theory, however, tungsten, which is more negative than hydrogen in the electrochemical series of metals, cannot be obtained from aqueous solutions. Therefore, electrochemical deposition of tungsten from its aqueous and aqueous–organic solutions is quite challenging. It is for this reason that the development of methods for electrochemical deposition of alloys of iron group metals with tungsten, as well as with other refractory metals (Mo, Re), is one considerable problem in expanding the area of its industrial application; it will also lead to cost reduction of deposited coatings. Here, by the example of galvanostatic electrodeposition of Co–W coatings from a citrate bath, we demonstrate experimentally that when using the results on the deposition rate and the composition and properties (microhardness) of resulting coatings observed under laboratory conditions to develop this type of an electrodeposition process on a larger (industrial) scale the bath volume must be scaled in proportion to the increase in the cathode area. In this case, the current loading on the electrolyte, which is quantitatively expressed as the volume current density, does not increase.

Biography

Gotelyak Alexander Vyacheslavovich was born on July 26, 1989 in Ukraine and graduated in 2011 from the Pridnestrovian State University named after T.G. Shevchenko. In 2022, in Ivanovo, Russia, he defended his dissertation on the topic “Induced coprecipitation of alloys from iron group metals with tungsten and the mechanical properties of coatings.” He works in the research laboratory "Electrochemical Technologies". The research results were implemented at an existing enterprise for the production of electric motors. His areas of interest: refractory metals and alloys, induced coprecipitation, production of electrochemical coatings with the possibility of their practical application.

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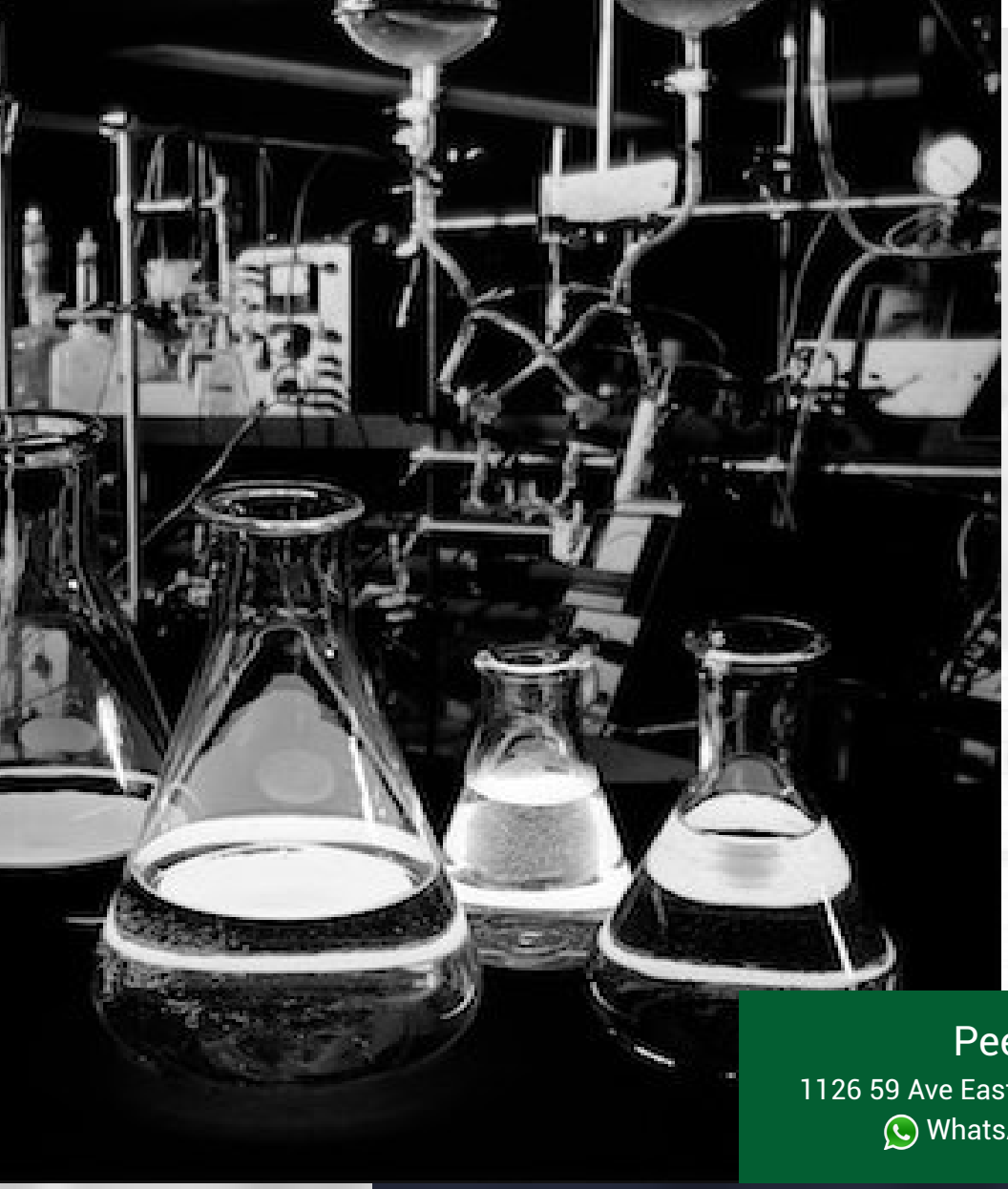

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