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SEPTEMBER 20

2024

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VIRTUAL EVENT

ADVANCED NANOTECHNOLOGY AND NANOMATERIALS

ADVANCED PHYSICS; APPLICATIONS AND SCIENTIFIC INNOVATIONS

PEERS ALLEY MEDIA

PROGRAM-AT-A-GLANCE >>

YOUR FIRST CHOICE FOR RESEARCH INGENUITY

Nano Intellects 2024 & Adv. Physics 2024

2024
SEPTEMBER 20 | FRIDAY

Scientific Program

BST (British Summer Time)

07:45-08:00	**Opening Ceremony**

Topics: Nanoscience and Technology | Nano Medicine | Nano Polymers | Nano Physics | Nano Chemistry | Robotics | Artificial Intelligence | Graphene | Materials Science and Engineering | Physics | Materials Physics | Optics and Photonics | Quantum Materials and Quantum Computing

Distinguished Speaker Talks

08:00-08:20	**Title: Designing and managing advanced, intelligent and ethical health and social care ecosystems** **Bernd Blobel,** University of Regensburg, Germany
08:20-08:40	**Title: Temporal dynamics of Lung-Deposited Surface Area (LDSA) in Central Los Angeles: Diurnal and seasonal patterns** **Constantinos Sioutas,** University of Southern California, USA
08:40-09:00	**Title: Piezo-phototronic effect in multi-layer structured optoelectronic: Bilateral piezoelectric charge modulation** **Wenbo Peng,** Xi'an Jiaotong University, China
09:00-09:20	**Title: Nanotechnology in automated visual machines that aid in quicker and more efficient inspection time in an electronics manufacturing industry** **Ma. Dominique M. Soriano,** De La Salle University | Samsung Electro-Mechanics, Philippines
09:20-09:40	**Title: Navigating complexity: A metaheuristic approach to path planning and optimization problem** **Maneesha,** University of Delhi, India
09:40-10:00	**Title: Stress analysis on Functionally Graded Rotating Cylinders *via* IADM** **Servet MERT KUTSAL,** Kocaeli University, Turkey

Refreshment Break 10:00-10:15

10:15-10:35	**Title: Linear and nonlinear optical interactions in Erythrocine dye doped glasses and crystals** **David Joseph,** Guru Jambheshwer University of Science and Technology, India

10:35-10:55	**Title: Development of Trioctylamine (TOA)-functionalized superparamagnetic nanoadsorbents for metals extraction in hydrometallurgy** **Farzad Firouzi,** Sharif University of Technology, Iran
10:55-11:15	**Title: Recent advancements in information security with optical cryptosystems** **Gaurav Verma,** The LNM Institute of Information Technology, India
11:15-11:35	**Title: Mathematical model of a heat transducer with a cylindrical heat pipeline and with a focused heat source** **Matyakubova Parakhat,** Tashkent State Technical University, Uzbekistan
11:35-11:55	**Title: A review of the effect of magnetic field using nanofluids and ultrasonic amplification technology on water desalination by solar stills** **Kimya Samadi,** Islamic Azad University, Iran
11:55-12:15	**Title: Morphology, particle size and properties of nanostructures obtained using pulsed plasma and interfacial energies** **Murzabekova Elmira Tungatrovna,** National Academy of Sciences of the Kyrgyz Republic, Kyrgyzstan
Lunch Break 12:15-12:50	
12:50-13:10	**Title: Computing local optima in QUBO in RP** **Lunshan Gao,** Wilfrid Laurier University, Canada
13:10-13:30	**Title: *In Vivo* comparison of customized zirconia barriers in guided bone regeneration: An experimental study** **Zeynep Tuncludemir,** Istanbul University, Turkey
13:30-13:50	**Title: Considering the tip radius effect in investigation of observable sensitivity to Van der Waals force under heptamodal-frequency excitation** **Cagri Yilmaz,** Akdeniz University, Turkey
13:50-14:10	**Title: The new era of immunological treatment, last updated and future consideration of CAR T cell-based drugs** **Kaveh Hadiloo,** Zanjan University of Medical Sciences, Iran
14:10-14:30	**Title: Student's research activities in hybrid intellectual environment of mathematics teaching** **Eugeny Smirnov,** Yaroslavl State Pedagogical University named after K.D. Ushinsky, Russia
14:30-14:50	**Title: Gold nanoparticles in silica aerogels** **István Lázár,** University of Debrecen, Hungary

Refreshment Break 14:50-15:05

15:05-15:25	**Title: Advances in Sintering of titanium aluminide: A review** **Mahlatse Mphahlele,** Durban University of Technology, South Africa
15:25-15:45	**Title: Multonutrient phyto-engineered nanofertilizers for sustainable crop production** **Karen Jacqueline Cloete,** University of South Africa, South Africa
15:45-16:05	**Title: MoS_2 coated fabrics for triboelectric nanogenerator as harvesting energy for future clothes** **Narjes Ben Brahim Aouani,** University of Tunis El Manar, Tunisia
16:05-16:25	**Title: A comparative study of cement-based and solvent-based coatings for reinforced concrete protection against corrosion in sulfate solutions** **Ginneth Patricia Millan Ramirez,** Gdansk University of Technology, Poland
16:25-16:45	**Title: An alternative quantum foundation** **Inge S. Helland,** University of Oslo, Norway
16:45-17:05	**Title: Exploring the influence of surface dressing ultrafine magnetic nanoparticles** **Paulo Cesar De Morais,** Catholic University of Brasilia, Brazil
17:05-17:25	**Title: LuGre friction-based hysteresis model of piezoelectric actuation system** **Sabarianand D V,** Detroit Engineered Products Inc, USA
17:25-17:45	**Title: A Statistical Analyses and Theoretical Perspectives of Native American Women Entrepreneurs** **Andrea Smith-Hunter,** Siena College, United States
17:45-18:05	**Title: Fractal properties in electronic spectra of GA sequences of human DNA** **Marcos Paulo Aires Cardoso,** Universidade de Brasília - UNB, Campus Universitário Darcy Ribeiro, Brazil
18:05-18:25	**Title: Characterization and optimization of multiomic single-cell epigenomic profiling** **Leticia Sandoval,** Mayo Clinic, USA
18:25-18:45	**Title: Investigating power loss in a wind turbine using real-time vibration signature** **Kingshuk Banerjee & Vishwaas Narasinh,** Hitachi India Pvt. Ltd, India

Closing Remarks

PEERS ALLEY MEDIA

DISTINGUISHED SPEAKER TALKS

Virtual Event

Advanced Nanotechnology and Nanomaterials

&

Advanced Physics; Applications and Scientific Innovations

September 20, 2024

NANO INTELLECTS 2024 &
ADV. PHYSICS 2024

Designing and managing advanced, intelligent and ethical health and social care ecosystems

Bernd.Blobel

[1]University of Regensburg, Medicyl Faculty, Germany
[2]Charles University Prague, First Medical Faculty, Czech Republic
[3]University of Genoa, Dept. of Informatics, Bioengineering, Robotics and System Engineering Genoa, Italy

For meeting the financial, quality and safety challenges as well as expectations of the patients, health and social care systems around the globe currently undergo a transformation towards personalized, preventive, predictive, participative precision medicine (5PM), supported by technology. It considers individual health status, conditions, genetic and genomic dispositions in personal social, occupational, environmental and behavioral context, understanding the pathology of diseases and turning health and social care from reactive to proactive. The aforementioned transformation is strongly supported by technologies such as micro- and nanotechnologies, advanced computing, artificial intelligence, autonomous systems and robotics, knowledge representation and management, etc. Beside their opportunities, those advanced technologies also bear risks to be managed, requiring the detailed consideration from a humanistic, moral and ethical perspective. For enabling communication and cooperation between all actors from different disciplines involved, using different methodologies, perspectives, intentions, languages, we shall understand and formally and consistently represent the multidisciplinary, highly complex and dynamic 5PM ecosystem. The outcome is a system-theoretical, architecture-centric, ontology-based, policy-driven approach for designing and managing intelligent and ethical 5PM ecosystems. The necessary model and framework has been developed by the author and meanwhile standardized as ISO 23903 Interoperability and Integration Reference Architecture. The formal representation of any ecosystem and its development process including examples of practical deployment of the approach are presented in detail. This includes correct systems and standards integration and interoperability solutions.

Biography

Dr. Bernd Blobel received a multi-disciplinary education, covering mathematics, physics, systems engineering, electronics, medicine, informatics and medical informatics, including habilitations in medicine and informatics. He was Head of the Institute for Biometrics and Medical Informatics at the University of Magdeburg, and thereafter Head of the Health Telematics Project Group at the Fraunhofer IIS in Erlangen. Thereafter, he acted until his retirement as Head of the German National eHealth Competence Center at the University of Regensburg. He was leadingly involved in many countries health digitalization as well as electronic health record strategy. He was and is still engaged in international standardization at ISO, CEN, HL7, OMG, IEEE etc. Furthermore, he still engaged in international higher education. He is Fellow of several international academies.

Temporal dynamics of Lung-Deposited Surface Area (LDSA) in Central Los Angeles: Diurnal and seasonal patterns

Constantinos Sioutas[1], Mohammad Mahdi Badami[1], Yashar Aghaei[1], Mohammad Aldekheel[1,2] and **Ramin Tohidi[1]**

[1]Department of Civil and Environmental Engineering, University of Southern California, USA
[2]Department of Civil Engineering, Kuwait University, Kuwait

In this study, we investigated concentrations of lung-deposited surface area (LDSA), elemental carbon (EC), organic carbon (OC), and particle number concentration (PNC) in Los Angeles. Hourly data were gathered using Discmini and Scanning Mobility Particle Sizer (SMPS) for PNC and LDSA, while OC, OC volatility fractions, and EC concentrations were measured by the Sunset Lab Monitor. Our findings revealed diurnal patterns with early morning peaks in PNC and EC during rush hour, corroborating prior research that associates a significant fraction of EC with ultrafine particles. During high solar radiation periods, PNC increased, likely due to nucleation and new particle formation, whereas EC concentrations did not show a corresponding rise, suggesting a weaker linkage to solar radiation compared to PNC. Evening peaks in PNC, alongside heightened $PM_{2.5}$ levels, were attributed to atmospheric conditions that impede particle dispersion, such as lower mixing heights and cooler temperatures. Additionally, midday peaks in OC levels, particularly OC_4, pointed to secondary photochemical processes occurring with increased solar radiation. Comparing LDSA measurements, we found that Discmini-reported levels were consistently higher than those from SMPS, indicating a significant presence of irregularly shaped ultrafine particles, particularly during morning traffic hours. Also, LDSA levels measured by Discmini were consistently 2.5-3 times higher than those by SMPS in warmer months, a trend likely attributable to the influence of lower relative humidity, which tends to decrease particle water adsorption. The study also noted a strong correlation between EC and PNC across different months, with prominent peaks during weekday mornings, highlighting the influence of vehicular emissions on air quality.

Biography

Prof. Constantinos Sioutas, holding distinguished roles in Civil and Environmental Engineering, was honored as the first Fred Champion Professor at the Department of Civil and Environmental Engineering of the University of Southern California (USC) on July 1, 2007, a title held for five years, backed by the Fred Champion endowment. His academic journey began with a Mechanical Engineering degree from Aristotelean University, followed by master's degrees and a Ph.D. from Harvard. Joining the Viterbi School of Engineering faculty in 1998, he co-directs the SCPC, focusing on particulate matter air pollution. His work, leading to legislative changes and shaping the US EPA's NAAQS, is backed by over 600 publications and 14 patents. Recognitions include the Fulbright Fellowship, the 3M Technical Excellence Award, and the USC Junior Faculty Research Award, reflecting his pivotal role in air quality research and policy.

Piezo-phototronic effect in multi-layer structured optoelectronic: Bilateral piezoelectric charge modulation

Wenbo Peng[1,2] and **Fangpei Li**[1,2]

[1]School of Microelectronics, Xi'an Jiaotong University, China
[2]The Key Lab of Micro-Nano Electronics and System Integration of Xi'an City, China

Piezo-phototronic effect utilizes the strain induced piezoelectric charges inside the piezoelectric semiconductors to modulate the local energy band diagram at the interface of junctions, thus controlling the photo-generated carriers' behaviors and the performance of optoelectronic devices. Since its invention in 2010, piezo-phototronic effect is vastly demonstrated in photodetectors, light-emitting diodes, and solar cells, where only one interface is modulated by piezoelectric charges. In 2018, we first propose to construct multi-layered structure for efficient utilization of piezoelectric charges with both polarities and obtain better performance optimization by piezo-phototronic effect [1], which we recently name as *Bilateral Piezoelectric Charge Modulation* [2]. Here, we summarize the recent progresses of our researches on bilateral piezoelectric charge modulation, including both experimental results and analytical theories.

An n-ZnO/p-Si/n-ZnO double heterojunction bipolar phototransistor is designed, and the regulation of bilateral piezoelectric charges on bipolar phototransistor's performances is studied from the perspectives of theoretical derivation and experimental research simultaneously. A theoretical model of n-ZnO/p-Si/n-ZnO double heterojunction bipolar phototransistor is established, and the influence of four polar combinations of piezoelectric charges induced by different strains formed at the interface of two heterojunctions on the characteristics of phototransistor is carefully studied. The theoretical calculation results show that, when positive piezoelectric charges are generated at both two interfaces, the regulation of strain on the phototransistor is a superposition of two positive effects, which can significantly improve the performances of phototransistor. Then an n-ZnO/p-Si/n-ZnO double heterojunction bipolar phototransistor is experimentally prepared. By rationally designing the device structure, positive piezoelectric charges could be simultaneously generated at the two heterojunction interfaces when an external compressive strain is applied. The saturation current of phototransistor is significantly improved, and the

photoresponsivity is also improved to a certain extent by the applied compressive strain. To further optimize the performances, the effects of interdigitated electrode's size, substrate and ZnO layer on the strain regulation of device performance are carefully studied. The experimental results show that when the p-Si substrate is used, the size of interdigitated electrodes is chosen as channel width W_0 = 80 μm, the channel length L = 5 μm, and the number of electrodes N = 14, and the ZnO nanowires layer prepared by low temperature hydrothermal growth method is used as both emitter and collector, the strain induced bilateral piezoelectric charges regulation of the obtained bipolar phototransistor is the best. At a compressive strain of -1.37%, the photoresponsivity is enhanced about 2000%, indicating the significant modulation of applied strain on the performances of heterojunction bipolar phototransistor.

Biography

Dr. Wenbo Peng is now an Associate Professor at School of Microelectronics, Xi'an Jiaotong University. He received his PhD degree in major of Electronic Science and Technology at 2016 and bachelor degree in major of Microelectronics at 2010, from Xi'an Jiaotong University. He has been a visiting scholar in School of Materials Science and Engineering, Georgia Institute of Technology from Aug 2014 to Jul 2016, working on the research fields of piezotronics and piezo-phototronics under the supervision of Prof. Zhong Lin Wang.

His research interests mainly focus on advanced low dimensional piezoelectric semiconductor materials, devices and physics, and novel intelligent sensing integrated chips. He has received several fundings from NSFC, Shaanxi Province and companies. He has authored and co-authored over 50 peer-reviewed journal publications in related research fields, parts of which are published on high quality international journals, including Advanced Materials, Advanced Functional Materials, Advanced Energy Materials, Nano Energy, ACS Nano, Nano Letters, etc. His publications have been cited over 2400 times, as documented at Google Scholar (h-index: 26). He has given several Keynote/Distinguished/Invited Talks in renowned international conferences. He is the Fellow of International Association of Advanced Materials.

Nanotechnology in automated visual machines that aid in quicker and more efficient inspection time in an electronics manufacturing industry

Soriano, Ma. Dominique M

De La Salle University | Samsung Electro-Mechanics, Philippines

The application of Nanotechnology reaches far wide into various industries and fields of engineering. One manifestation is its contribution to the industry of electronics manufacturing. In an Industrial Engineering perspective, the main priority in terms of manufacturing is being able meet high production quantity in the shortest and most reasonable time span, without compromising the quality of the product. Processing time and inspection periods for quality control can be made quicker and more efficient with the use of machines developed and enhanced with Nanotechnology.

One of the most extensively used nano-electronic products is a multi-layer ceramic capacitor, or the MLCC. This dielectric capacitor stacked with alternating layers of ceramic insulations and metal conductors can be seen in almost all electronic products ranging from smartphones, gadgets, appliances, and even in automotives. As critical and intricate as it seems, quality control is very important in the overall production process of MLCCs.

Physical defects of MLCCs, when not properly detected, will cause several nonconformities that will affect the electrical characteristics performance of the capacitors. Some physical defects can be seen by the naked eye, with the help of specialized magnifying lenses and microscopes, while some cannot. Now, with the help of Nanotechnology, More Efficient visual machines have aided in upgrading the visual inspection process. Automated visual machines inspect all six (6) sides of the MLCC chip with the use of varied lighting settings. This machine uses cameras with red, blue, and white lights, under the mechanism of altering lumens depending on the type of visual defect to detect. Adjustment of lights, powered by Nanotechnology, enables the detection of visual defects instantly. Transitioning from manual inspection performed by skilled personnel to the usage of automated visual machines contributes highly to the lessening of turnaround time and lead time by about 60% in production. This enables an increase in yield, which then magnifies Nanotechnology's relationship and impact on Industrial Engineering goals and

perspectives. With Nanotechnology, the manufacturing industry can meet its objectives in increasing production quantity, speeding up processing time, and meeting high product quality.

Biography

Ma. Dominique “Nikka” Mungcal Soriano is a graduating Industrial Engineering student from De La Salle University – Manila, Philippines. She grew up as an only child with the guidance of her father, a Mechanical Engineer, and her mother, an Accountant. Nikka became immensely exposed to the fields of Sciences and Engineering spending 4 years in a science high school and 2 years of taking the Science, Technology, Engineering, and Mathematics (STEM) strand for senior high school. In college, Nikka worked solo on her academic thesis and was able to have her paper qualify to an international Industrial Engineering conference.

The electronics manufacturing industry became her immediate home in her professional life, spending her internship at Toshiba Information Equipment, Phils., Inc., and now, in her current job designated as a Production Engineer at Samsung Electro-Mechanics Philippines, Corp. Learning and practicing Industrial Engineering did not just bring in these kinds of opportunities, but have also become a significant part of her lifestyle.

Navigating complexity: A metaheuristic approach to path planning and optimization problem

Maneesha[1], Praveen Kant Pandey[1], Prachi Bhanaria[2] and **Rakesh Kumar[2]**

[1]Maharaja Agrasen College, University of Delhi, India
[2]Department of Electronic Science, University of Delhi, India

The study addresses the complex problem of path planning and optimization by employing the Firefly Algorithm (FA), a bio-inspired metaheuristic approach. The primary objectives are to develop an algorithm that efficiently navigates complex environments, optimizing paths based on multiple criteria, including path length, safety, and smoothness. The scope of the research encompasses both static and dynamic environments, with applications in robotics, autonomous vehicles, and logistics.

The methodology involves representing potential solutions as fireflies, where each firefly corresponds to a possible path. The attractiveness of each firefly is determined by a fitness function that evaluates the path's quality based on the aforementioned criteria. The algorithm iteratively updates the fireflies' positions, guiding them toward more optimal paths. The key parameters of the FA, such as light absorption coefficient, attractiveness, and random movement, are tuned to enhance the algorithm's performance in different scenarios.

The simulated results demonstrate that the Firefly Algorithm effectively navigates complex environments, consistently finding paths that are shorter, safer, and smoother compared to traditional pathfinding algorithms. The FA outperformed conventional methods in terms of path optimality and computational efficiency. The graphical results, including visualizations of the paths generated by the algorithm, clearly illustrate the superiority of FA in producing optimized paths across different scenarios.

In conclusion, the Firefly Algorithm provides a robust and versatile solution for path planning and optimization in complex environments. The graphical results underscore its effectiveness, offering valuable insights into its potential for real-world applications in navigation and autonomous systems.

Biography

Dr. Maneesha, a Professor of Electronics at Maharaja Agrasen College, University of Delhi, India, is a distinguished academic with over 26 years of teaching experience. She holds a doctorate in Microelectronics and has an extensive record of research publications in prestigious international and national journals. Currently, her research focuses on Robotics and Artificial Intelligence, specifically in the areas of Simultaneous Localization and Mapping and Robot Navigation in Dynamic Environments using bio-inspired metaheuristics algorithms. Dr. Maneesha has successfully completed more than six research projects and is actively guiding PhD students in these cutting-edge areas.

Stress analysis on Functionally Graded Rotating Cylinders *via* IADM

Servet MERT KUTSAL and **Safa Bozkurt COŞKUN**

Kocaeli University, Turkey

Functionally graded materials (FGM) are the materials that are developed for special performance or function. In this material, some of the material properties like elasticity modulus, density, etc are chosen as a special function. This may lead to encountering differential equations that are difficult to solve. Analytical approximation methods help overcome the difficulties of solving governing equations using classical analytical approaches. In this study, stress analysis for FG rotating long cylinders is conducted using the Improved Adomian Decomposition Method (IADM). The material properties are assumed to vary according to the power law function. The study is repeated for different gradation parameters and the effect of this parameter on the stresses is also investigated. IADM gives an excellent result in obtaining the stresses on the cylinder.

Biography

Servet MERT KUTSAL is a Researcher Assistant at Kocaeli University in the Civil Engineering Department. She received a bachelor's degree in this department at Yıldız Technical University, a master's in Earthquake Engineering at İstanbul Technical University, and a PhD at Kocaeli University. Her current field is applied mechanics. She is interested in mathematical applications in engineering problems.

The second author Safa Bozkurt COŞKUN is a Professor at Kocaeli University. She has many scientific publications in the fields of applied mechanics, solid and fluid mechanics, mathematical applications in engineering.

Linear and nonlinear optical interactions in Erythrocine dye doped glasses and crystals

David Joseph, Sharvan Ahlawat and **Rimple Saini**

Guru Jambheshwer University of Science and Technology, Department of Physics, India

Erythrocine doped glasses (Boric acid glass) and Erythrosine doped sulphamic acid crystals have been grown by rapid cooling method and slow evaporation methods respectively. Crystals grown of sulphamic acid were orthorhombic. Laser Raman spectra were recorded at 532nm. FTIR, fluorescence and UV absorption studies were carried out and spectroscopic analysis done. Nonlinear saturation optical studies were carried out using resonant laser transitions and were found to be saturable absorbers or optical limiting materials.

Biography

Dr. David Joseph did his MSc and PhD from Banaras Hindu University, Varanasi (India) in physics. His PhD work was on static laser light scattering from biological cells (1996). In 1997, he joined post-doctoral research work at center of laser Technology (CELT), Indian institute of Technology, Kanpur. From 2005 to 2006 he worked on 'Femtosecond laser matter interaction' at CELT. In 2006 may he joined as senior scientist at Manipal Academy of higher education (MAHE) in the topic 'laser induced fluorescence in tissues' working in Philipps project. From 2006 October he is working at Guru Jambheshwer University of Science and technology, Hisar as faculty in physics.

Development of Trioctylamine (TOA)-functionalized superparamagnetic nanoadsorbents for metals extraction in hydrometallurgy

Farzad Firouzi and **Sayed Khatiboleslam Sadrnezhaad**

Department of Materials Science & Engineering, Sharif University of Technology, Iran

Superparamagnetic nanoadsorbents functionalized with organic extractants are a novel generation of advanced functional materials with potential applications for separating and purifying metal ions in hydrometallurgy. They can repeatedly disperse through aqueous solutions and undergo immediate magnetic separation. Trioctylamine (TOA), a widely used anionic extractant, was employed in this study to explore the preparation of TOA-functionalized iron oxide-based nanoadsorbents. For this purpose, the magnetite (Fe_3O_4) nanoparticles were synthesized *via* the chemical co-precipitation method, then surface-modified with stearic acid surfactant, and finally, functionalized with various concentrations of TOA at different temperatures. The results of various physical characterizations disclose that the spherical single-domain magnetite nanoparticles of 15.3 ± 1.7 nm size are in the superparamagnetic state. Accordingly, the high value of magnetic saturation (62 $emu.g^{-1}$) and lack of coercivity and retentivity ensure their practical applicability. Chemical investigations indicate that the stearate coating not only protects the magnetic core towards oxidation or digestion in high-acidity solutions (with *pH* values as low as 1.0), but also acts as an intermediate layer for hosting the hydrocarbon chains of the organic extractant. Indeed, a single layer TOA is physically adsorbed via Van der Waals forces on the surface of stearate-modified nanoparticles. The resultant nanoadsorbents are positively charged and can interact with anionic metal complexes at *pH* values of up to 8.5. Statistical analyses infer that TOA physisorption follows the Langmuir isotherm model, with the corresponding constant of K_L = 9.853 $L.mol^{-1}$ and maximum adsorption capacity of q_m = 522.3 $mg.g^{-1}$ at the optimal temperature of 25 °C. Thus, the desired surface coverage of nanoadsorbents can be tuned simply by adjusting the TOA concentration during the preparation process. Thermodynamic investigations imply that the process is exothermic (ΔH°_{ads} = -25.7 $kJ.mol^{-1}$), lowers the system's randomness (ΔS°_{ads} = -67.2 $J.mol^{-1}.K^{-1}$), and proceeds favorably.

Biography

Dr. Farzad Firouzi is a 30-year-old scientific researcher in Materials and Metallurgical Engineering. He has just completed his merit-based-admitted PhD program at Sharif University of Technology, Iran. He previously received his MSc (2018) and BSc degrees (2016), as the 1st-ranked graduate from Amirkabir University of Technology, Iran. As a distinguished researcher, Dr. Firouzi has made significant scientific contributions to academic societies and scholarly events. His research interests and activities cover a wide range of topics in materials engineering, from the synthesis and application of advanced nanomaterials to extractive metallurgy. Aiming to take advantage of nanotechnology in extractive metallurgy, he is currently working on developing and applying functionalized superparamagnetic nanoadsorbents for the selective separation of metals in hydrometallurgy.

Recent advancements in information security with optical cryptosystems

Gaurav Verma

Department of CCE, The LNM Institute of Information Technology, India

As more and more things in our modern society are connected through the Internet, security and authentication provide significant obstacles to information access in real-world applications. In daily use, this has led to a rise in the rate of data transmissions and reception over the communication network. Exponential increases in the application of security methods for data protection are necessary for this reason. The rapid adoption of optical technology-based data security measures in recent years has sparked strong interest in this field of study. In the application of the optical system in imaging, authentication, encryption, and security, the unique characteristics of optical features have been extensively reported. Additionally, adding various optical transformations and parameters improves system security. Furthermore, user biometrics in conjunction with optical encryption methods have introduced new capabilities to the system's authentication process. A new level of security to encryption that improves resilience to assaults and leads to a solution for key distribution is provided by the theory of phase retrieval algorithm for the PTFT and the DRPE. In this paper, we provide an overview of an optical system for picture encryption that uses biometric authentication. This optical system-related article also focuses on computer simulations, the experimental use of optoelectronics, and the biometric elements incorporated to various encryption systems. Our study's goals are to review current optical image encryption methods, go over their benefits and drawbacks, and indicate a promising path for future study in this quickly developing topic. In addition, we will talk about potential ways to break into optical encryption schemes, emphasizing that readers should be given a comparative overview.

Biography

Gaurav Verma received his M. Tech in optoelectronics with an emphasis on optical communication from Shri G S Institute of Technology and Science, Indore, India, in 2011 and his Ph.D. in optical information security and authentication from Indian Institute of Technology Delhi (IITD), New Delhi, India, in 2017. In addition, from

2018 to 2020, he worked as a Postdoctoral Researcher at Shenzhen University in China's College of Applied Physics and Optoelectronics Engineering. He is currently an Assistant Professor at the B K Birla Institute of Engineering and Technology in Pilani, Rajasthan, India. Among his research interests include biometrics, optical imaging methods, optical information processing, optical security, and picture encryption and decryption.

Mathematical model of a heat transducer with a cylindrical heat pipeline and with a focused heat source

Matyakubova Parakhat, N.I. Avezova, P.R. Ismatullaev and **Sh.A. Kodirova**

Tashkent State Technical University named after I. Karimov, Uzbekistan

The mathematical model of heat converters with a homogeneous extended cylindrical heat pipe is considered. Based on the developed mathematical models, the main characteristics of thermal converters are analyzed.

Introduction: Currently, heat converters are widely used in various systems to control and control the speed and flow rate of gas flows. According to the principle of construction, thermal converters are divided into converters of calorimetric, thermal boundary layer and hot-wire type. At the present time, monitoring and control systems place high demands on the measuring transducer of gas flow parameters for accuracy, sensitivity, reliability, cost and ease of manufacture. In addition, a number of control and management systems require that the gas flow parameter converters be multifunctional and allow receiving output signals both about the speed and flow rate, and about the flow temperature, direction, and also in some cases about the presence of a gas flow.

The basic physical model of this converter for analysis can be represented in the form shown in Fig. 1.

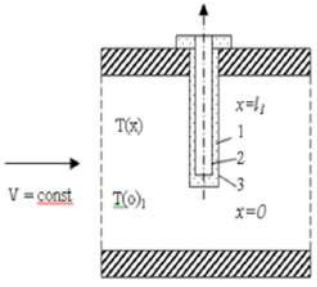

Fig. 1. Physical model of a heat converter with a cylindrical heat pipe 1 and with a concentrated heat source 2: 1 - heat pipe; 2 - thermosensitive element; 3 - heating element

For the considered thermal converter of humidity of liquid materials, the main conditions for the design are:

- the heating element should be low inertia, provide a sufficient heat flow, which propagates along the heat conduit and enters heat exchange with the flow of liquid material.

- the heating element must be suitable for stationary and non-stationary modes of operation of the heat converter.

- the thermosensitive element should also be low inertia, or small in size and high sensitivity.

- a cylindrical electric wire must also have small geometric dimensions and must be made of a material with high heat conductivity and low heat capacity.

A feature of the considered heat converters is that the temperature is distributed along the heat conduit and depends both on the type of heating element (heat source) and on the controlled humidity of the liquid material, which in the form of a flow describes the heat conduit of the transducer during heat transfer at a constant flow rate (V = const). The above is required to analyze the thermal system of the conversion under consideration for such a research method that takes into account the calculation of the temperature T (x) of the heat flux Φ (x). Existing methods in the field of heat conduction theory, which make it possible to solve these problems. According to this principle, the distribution of T (x) and F (x) of the thermal system of detuned converters is advisable to study on the basis of the theory of thermal converters with distributed variables, while it is most effective for analyzing the basic characteristics of thermal converters of humidity of liquid materials using the matrix method on theory and thermal stability.

The matrix equations for determining T (x) and Φ (x) along the heat pipe are

$$\begin{vmatrix} T(x,p) \\ \Phi(x,p) \end{vmatrix} = \begin{vmatrix} A(x,p)B(x,p) \\ C(x,p)D(x,p) \end{vmatrix} \begin{vmatrix} T(0,p) \\ \Phi(0,p) \end{vmatrix}, \qquad (1)$$

A(x, p) = chɣ[(p)x]; B(x, p) = Z(p)sh[ɣ(p)x]; C(x,p) = 1⁄z(p) [sh[ɣ(p)x]:

$$D(x,p) = ch[\gamma(p)x].$$

$$\gamma(p) = \sqrt{r(cp+g)}; Z(p) = \sqrt{\frac{r}{(cp+g)}}.$$

Thermal parameters per unit length:

1) Conductivity:

g = απd, (2)

where: α – heat transfer coefficient from heat conduit to flow; π = 3,14;

d– diameter of cylindrical heat conduit;

1) Heat Resistance:

$r = 1/\lambda$ тпFтп ; (3)

where: λтп– thermal conductivity of the heat transfer material; Fтп – area of material heat conduit;

Heat capacity:

$c = \rho CpF$, (4)

where: ρ – heat conduit material density:

Cp– enhanced heat capacity of the material of the heat conduit; F – cross-sectional area of the heat conduit.

T(0,p), T(x,p), Φ(0,p), Φ(x,p) - operator values:

T(0,T), T(x,T), Φ(0,T), Φ(x,T).

Based on the equations for determining T (x) and Φ (0) will receive

$T(x, p) = T(0, p)ch[\sqrt{r(cp + g)x}] - \Phi(0, p)\sqrt{r (cp+g)}\, sh[\sqrt{r(cp + g)x}]$ (5)

and

$\Phi(x, p) = - T(0,p) \sqrt{r (cp+g)}\, sh[r(cp + g)x] + \Phi(0, p)ch[r(cp + g)x]$. (6)

Because

T(0, p) = Zc(p)Φ(0, p).

And in the thermal circuit the attenuation is large, you can equate the thermal resistance Zc(p) in which the resistance Zвх(p)

Z вх(p) = $Zc(p) \sqrt{r\, cp+g}$ (7)

Based on the foregoing, you can write

T(x, p) = Φ(0, x)$\sqrt{r\, cp + g} \cdot ch\, [\sqrt{r(cp + g)x}] - sh\, [\sqrt{r(cp + g)x}]$ =

= Φ(0, x)$\sqrt{r\, cp+g} \cdot \exp[-\sqrt{r(cp + g)x}]$ (8)

The transition from the image according to Laplace (2.10) to the original, you can get a formula for assessing the dynamics of measuring the distribution of temperature over time.

T(x, τ) - T(0) = PH$\sqrt{gr}$ [e-$\sqrt{grxertc}$ ($x2\ \sqrt{cr}\ \tau$ - $\sqrt{gc}\ \tau$) - e$\sqrt{grxertc}$ ($x2\ \sqrt{cr}\ \tau$ + $\sqrt{gc}\ \tau$)] (9)

For the stationary mode, the distributed T (x) has the form as $\tau \to \infty$

T(x) - T(0) = PH$\sqrt{gr}$ exp(-$\sqrt{grx}$) (10)

Studies of the moisture content of various liquid materials show that most of them (such as aqueous solutions of glycerol, acetone and others) have an almost linear dependence of the thermal conductivity coefficient of the liquid material λжм on the degree of moisture content. The increase in the thermal conductivity of a liquid material can be expressed through the following linear formula:

λ жм = λ0(1 + KwW), (11)

where: λ0- thermal conductivity of a liquid material without moisture [W · m / deg]

Kw - the coefficient reflecting the increase in the coefficient of thermal conductivity of the liquid material with increasing degree of moisture,%;

W- moisture (or moisture content) of the liquid material,%.

Given the above values, the values of the values and the parameter of their input and in the formulas for calculating the increase in thermal conductivity g. It is known that the Nussert number (*N*u) is determined from the expression

*N*u = α · *λ*жм *d* (12)

The foundation

α = *λ*жм *N* u *d*(13)

then

g = *λ*жм · *N*u · π (14)

The heat transfer criterion *N* ufor the operation mode of the considered heat conversion with a cylindrical heat conduit across the flow can be determined by the following criteria formula: for Reynold numbers (Re) less than 103, calculations by the formula are recommended

*N*u = 0,56*Re*0,5*Pr*0.36(*Prж*/*Prc*) (15)

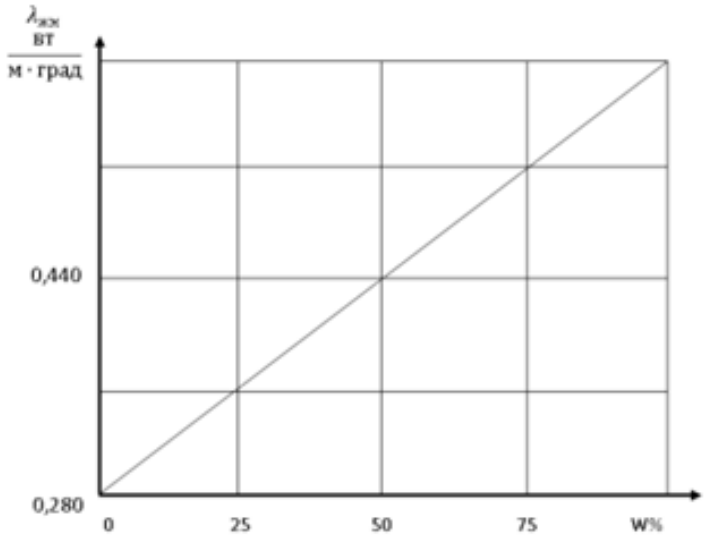

Fig. 2. The dependence of the thermal conductivity of an aqueous solution of glycerin *λ*жм from the moisture content of W,%.

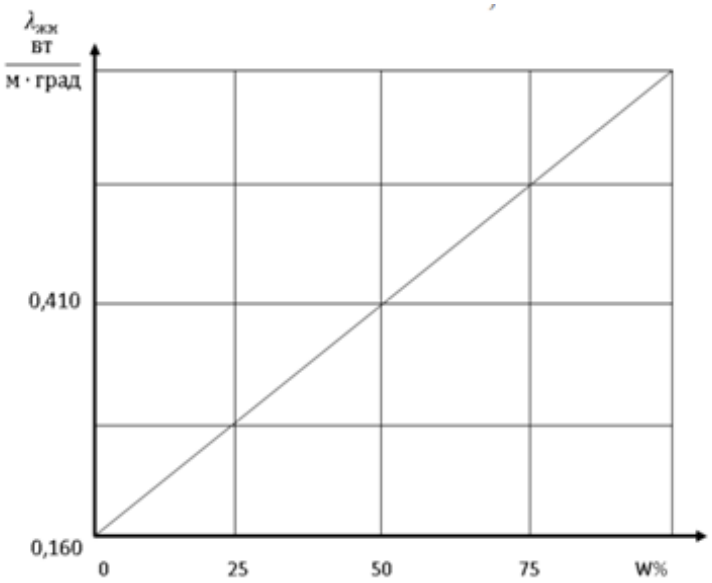

Fig. 3. The dependence of the thermal conductivity of an aqueous solution of acetone λжмfrom the moisture content of W,%.

Taking into account formula (12), (15) at the flow rate of liquid material V = 0.05 m / s, the values of the dependence α = t (W) were determined for the liquid material in the form of an aqueous solution of glycerol

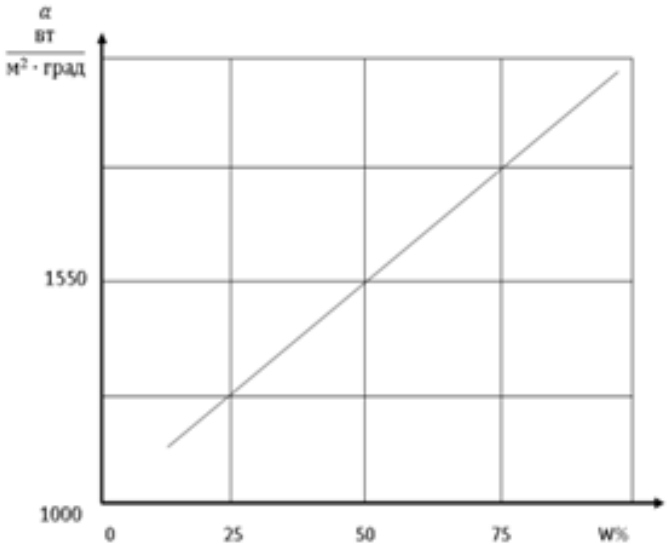

Fig. 4. The dependence of the heat transfer coefficient α on the heat conduit, where the transducer is cd=4·10-3 of the moisture content of the aqueous glycerol solution.Changes in the distributed thermal conductivity g with a copper heat conductor with cd=4·10-3m gave the following value.

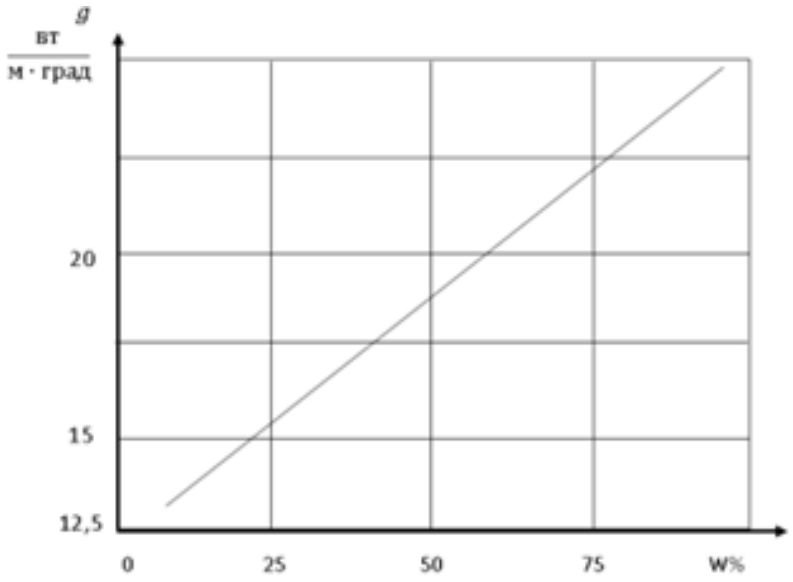

Fig. 5. Change in the distributed thermal conductivity g of the thermal moisture converter of the aqueous glycerol solution W,%.

Based on formula (14), the temperature distribution was determined for the smallest mode for a physical model with concentrated mesh bodies with a thermal conductor diameter d=4·10-3, rt = 206.5 deg / W · m for various heating powers

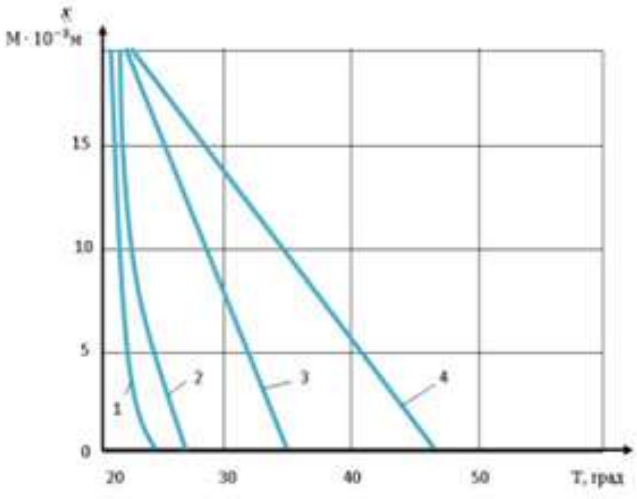

Fig. 6. Distribution graph temperature T (x) along a cylindrical copper heat conductor with a diameter of d = 4 * 10-3m with heat sources concentrated at the lower points of the heat conduit at power: 1- 1.6W; 2-3w; 3-5w and 4-10w. And when controlling the humidity of a mixture of glycerol with water at W = 20% water.

According to expression (9) in dynamic mode, the process of heat flux transfer f (x, *τ*) and distribution, the temperature T (x, *τ*) in the heat conductor is determined by guineas erfc(2 √*cr π x*) and erfc*(x*2 √*gc τ*).

For a heat pipe from a copper pipe with diameters d=4*10-3m, the heat rate at = 0.5 * 10-3m, the time constant Tвр was estimated by rejecting the distributed thermal parameters C and g *τ* вр= *Cg*

The value of the parameters is: C=18,3[*Bm·c m°C*]; g=12.2[*Bm m°C*].

With humidity W = 10%, the time constant is equal. *τ*вр1=1,5 *sec* The experimental value of the time constant is *τ*вр1*ecs*=1,8 *sec*.

In this paper, the principle of constructing thermal converters is analyzed and it is shown that thermal converters are the most promising for monitoring various parameters of fluids of liquids and gases. The mathematical models of heat converters with a homogeneous extended cylindrical heat pipe are considered in detail. Based on the developed mathematical models, the main characteristics of thermal converters are analyzed.

Biography

She has since February 18, 2013:
Head of the Department of Metrology, standardization and certification atTashkent State Technical University
Date of Birth: 14.05.1961
Place of Birth: Khorezm region, Urgench city
Nationality: Uzbek
Partiality: No
Education: Higher
Completed: 1983, Tashkent Institute of Electrical Engineering, Communication
Specialty in education: electrical engineer
Academic degree,: doctor of technical sciences (2009)
Academic title,: professor (2016)
What foreign languages does she know?:
Russian (fluent), English and German (using dictionary)
Has he been awarded the State Awards (which):
1) Rewarded with the state order “Dustlik”
2) Badge of the 30 th anniversary of independence

A review of the effect of magnetic field using nanofluids and ultrasonic amplification technology on water desalination by solar stills

K. Samadi[1], H. R. Goshayeshi[1] and **I. Chaer[2]**

[1]Department of Mechanical Engineering, Mashhad Branch, Islamic Azad University, Iran
[2]The School of Built Environment and Architecture, London South Bank University, UK

Technological advancements such as high-speed microelectronic devices, high-power motors, etc. increase heat load, emphasizing the need for improved cooling. Conventional methods for increasing heat transfer involve rising surface area to allow for more heat exchange. Thus, the size of heat transfer systems increases unfavorably. Therefore, there is an urgent need for a new operating fluid that improves the thermal performance of heat transfer systems. The term “nanofluid” is introduced by describing the dispersion of nano-sized particles (>100 nm) in primary working fluids such as water and ethylene glycol. Compared to the base fluid, nanofluids perform better in terms of convective heat transfer and thermal conductivity. Consequently, numerous studies have been conducted on nanofluids with prospective applications in sensitive areas. The addition of nanoparticles to the base fluid alters its thermophysical properties. In recent years, the rapid development of engineering technologies has contributed significantly to improving heat transfer. (Table1.)

Some of the presented methods include increasing the thermal surface area of the blades, increasing the turbulent flow, vibrating the heating surfaces, or using electric and magnetic fields. Research shows that the thermal performance of heat transfer systems increases with increasing magnetic field strength. The magnetic nanoparticles used produce specific properties compared to other metal nanoparticles in the proximity of the magnetic field. (Fig.1) Depending on the desired application, different chemical syntheses of magnetic nanofluid have been developed for various applications. Solar stills can be an idea solution to compensate for the lack of potable water in warm and arid areas. reviewed researches conducted by others have shown that the use of sonicated water with Fe_3O_4 Ferrofluid, which exhibits a strong response to magnetic fields, under magnetic field effect has led to a significant increase in the device efficiency.

Table 1. Particle sizes and magnetic parameters of Fe_3O_4 nanoparticles prepared at different temperatures [113]

Temperature T, °C	Size interval D, nm	Average size D_m, nm	Magnetization M_S, emu/g	Coercivity H_C, Oe
18	60–190	118.7	81.7	112.1
35	40–110	69.9	89.8	114.3
45	20–70	49.3	94.9	96.4
60	10–50	24.6	82.8	126.9
80	10–40	20.1	71.0	80.0

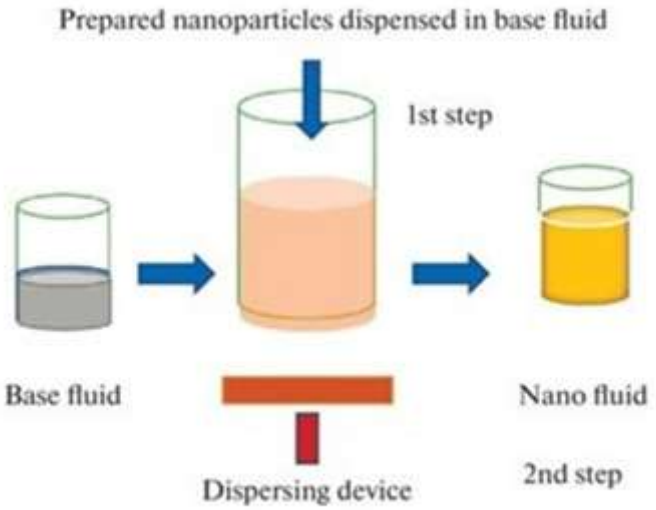

Figure Formation of nanofluids from nanoparticles using the one-step method [97].

Biography

Kimya Samadi a PhD student in Energy transformation at the Islamic Azad University of Mashhad. Her field of interest is renewable energy and the Lattice Boltzmann method. Her articles are listed below:

- Simulation of Mixing Flow in Wavy Channels using Lattice Boltzmann Method (The fifth international conference of new horizons in electrical, computer and mechanical engineering)
- A Review of the Effect of Magnetic Field Using Nanofluid and Ultrasonic Amplification Technology on Water Desalination by Solar Stills (Applied Solar Energy Journal)
- Computational Fluid Dynamics-Based Analysis of Magnetic Field Effect on Improvement the performance of stepped Solar Still (Experimental Technique Journal)
- Experimental Investigation of the Magnetic Field Effect Using Fe_3O_4 Ferrofluid and the Study of the Ultrasonic Phenomenon in Solar Water Desalination Efficiency (Renewable Energy and Smart Systems

Morphology, particle size and properties of nanostructures obtained using pulsed plasma and interfacial energies

E.T. Murzabekova, S.K. Sulaymankulova, Z.K. Kelgenbaeva and **E.M. Aliyasova**

Institute of Chemistry and Phytotechnology, National Academy of Sciences of the Kyrgyz Republic, Kyrgyzstan

Synthesis in heterophase liquid systems, which involves the occurrence of chemical processes at the interface between liquids, is of great interest, which is currently called interfacial synthesis. “The reaction can occur on a flat surface separating immiscible liquids or on a non-planar surface in microemulsions. Surface energy is concentrated at the interphase surface (phase boundary) and is excess compared to the energy in the volume. There are quite a few chemical methods for obtaining nanostructures on the interfacial surface, but due to the existing advantages, each method also has a number of disadvantages. First of all, this requires a lot of time, energy, reagents, and expensive equipment. The proposed method for obtaining nanostructures using the total energy of the interfacial surface and the energy of pulsed plasma can be an alternative method for obtaining nanostructures on the interfacial surface. Water-benzene or water-toluene liquids, which are immiscible under normal conditions, are capable of forming microemulsions with intense stirring. We have synthesized nanostructures of copper, zinc, cadmium, aluminum, and indium at the interface of two immiscible liquids, water-benzene and water-toluene, using pulsed plasma energy. A phase and electron microscopic analysis of the resulting nanostructures was carried out. The photoactivity of ZnO nanorods and indium nanostructures has been studied. The specific surface area and pore size of aluminum and aluminum oxide nanoparticles from microemulsion (water-benzene) were determined.

Biography

Murzabekova Elmira Tungatrovna, born in 1965, graduated from the Faculty of Chemistry of KSU in 1989. Since graduating from university, she has worked at the Institute of Technology and Technology of the National Academy of Sciences of the Kyrgyz Republic. In 1996, she successfully defended her PhD thesis in inorganic chemistry. She has worked at the Institute of Chemistry and Chemical Technology of the National Academy of Sciences of the Kyrgyz Republic of the National Academy of Sciences of the Kyrgyz Republic since 1989. to 1998 as a senior laboratory assistant, junior researcher. Since 1998 to 2009 worked at the Kyrgyz

Academy of Cooperation in the department of natural sciences as an associate professor. Since 2009, as a leading researcher, I have been independently directing the scientific direction “Synthesis of nanostructures at the interface” in the Nanotechnology Laboratory of the Institute of Chemistry and Phytotechnologies of the National Academy of Sciences of the Kyrgyz Republic. Scientific activity is related to the study of nanostructures obtained at the interface using pulsed plasma energy. She took part in international scientific conferences and seminars, constantly studying the problems and achievements of domestic and foreign science in the field of nanotechnology. I have more than 40 scientific publications. Currently, Associate Professor of the Department of Chemistry and Chemical Technology, Faculty of Technology, KSTU. I. Razzakova part-time.

Computing local optima in QUBO in RP

Lunshan Gao

Department of Physics and Computer Science, Wilfrid Laurier University, Canada

Quadratic unconstrained binary optimization (QUBO) problems are well-known NP-hard problems. We propose a novel randomized algorithm for computing lo- cal optima in QUBO problems. The new algorithm consists of three steps: (1) it takes the advantage of fuzzy logic and randomized algorithms, converts QUBO problems into continuous quadratic optimization problems by using fuzzification technique; (2) it solves the continuous quadratic optimization problems by using first-order and second-order derivative methods; (3) it converts a real number solution vector to a binary number vector by using defuzzification technique. We prove that the computational complexity of the new algorithm is in randomized polynomial time (RP). We also prove that the transformation from QUBO to continuous quadratic optimization problems is polynomial time reduction. Ex- amples and numerical experiments are given. Numerical experiments show that the new algorithm outperforms IBM CPLEX solvers for solving Max-Cut and maximum clique problems in graph theory.

Biography

Lunshan Gao received the Master of Engineering and Ph.D. degree from Yoko- hama National University, Chiba University, Japan, in 1989 and 1995, respec- tively. He is a license holder of Professional Engineers Ontario in Canada. He is an instructor at the department of Physics and Computer Science, Wilfrid Laurier University since 2020. He teaches computer security and applied cryp- tography for both undergraduate and graduate students and teaches software engineering, database, internet computing, and microprocessors for undergrad- uate students. His research interests include fuzzy logic and its applications, computational complexity, new algorithm design and development.

In Vivo comparison of customized zirconia barriers in guided bone regeneration: An experimental study

Zeynep Tuncludemir[1] and **Serdar Yalcin**[2]

[1]Institute of Graduate Studies in Health Sciences, Oral Implantology Program, Istanbul University, Turkiye,
[2]Department of Oral Implantology, Faculty of Dentistry, Istanbul University, Turkiye

Objective: This study aims to evaluate the effects of customized zirconia barrier membranes produced for guided bone regeneration (GBR) approaches on bone healing researched with histological and histomorphometric methods.

Methods: The digital modeling was used to create zirconia barrier membranes suitable for the defect on the tibia bone. The membranes were designed using a 3D software system and transferred to the CAD/CAM software system in stl. Afterward, zirconia discs (1400 Mpa) (Aconia BSM- D98x16, HT+, Germany) were milled and sintered. Titanium mesh, titanium reinforced d-PTFE, and zirconia barrier membranes were used to cover the defects. As a control group, one defect was left empty. 3 and 6 weeks of the healing term, preparates were obtained from each group after animals were sacrificed. New bone formation, amount of the remaining grafts and tissue response parameters were analyzed histomorphometrically and histologically.

Results: The highest percentage of newly formed bone in the early period was observed in the titanium mesh membrane group (26.39 ± 5.38); In the late period, this rate was highest in the zirconia group (64.42 ± 9.95). However, no statistically significant difference was found in both periods between the groups. The amount of residual graft progressed at a low level in both periods without any difference in the other groups except the control group. In the 3rd and 6th weeks, the amount of new bone formation was the lowest in the control group. No foreign body reaction or necrosis was observed in any of the defects.

Conclusion: With the limitation of the study, it has been concluded that effective results can be obtained with customized zirconia barrier membranes in GBR procedures.

Biography

Zeynep Tuncludemir was born in 1992 and graduated from Istanbul University Faculty of Dentistry. She completed her specialization in Oral Implantology with a PhD. Zeynep Tunçludemir is married and has one child and continues her work in Kocaeli.

Considering the tip radius effect in investigation of observable sensitivity to Van der Waals force under heptamodal-frequency excitation

Cagri Yilmaz

Akdeniz University, Vocational School of Technical Sciences, Mechatronics Department, Türkiye

Micro-cantilever flexural modes exhibit quite different deflection sensitivities to tip-sample interaction forces near sample surfaces in Atomic Force Microscopy (AFM) operations. Van der Waals forces act on the tips of AFM micro-cantilevers externally driven under single- and multi-frequency excitations at the separation distances below 20 nm. In numerical studies, the tip-sample interaction force sensitivity significantly depends on multiple factors such as excitation schemes, mechanical properties, and geometries of micro-cantilevers. More interestingly, the tip radius significantly affects the observable oscillation sensitivity to nonlinear Van der Waals forces. Considering the tip radius effect, nonlinear dynamic models can be robustly used to predict the behaviors of the micro-cantilever under heptamodal operations. The numerical results indicate that the influence of tip radius on amplitude sensitivity at the first flexural mode is quite larger for single-frequency excitations rather than heptamodal-frequency excitations. As the tip radius increases, higher phase shift responses ranging between 0 and 180 degrees are obtained on a wider domain of separation distance. It is also worth mentioning that notable phase shift sensitivity does not exist for heptamodal operations. Larger driving forces at multiple eigenmode frequencies hinder variations in phase shift responses. Additionally, the AFM micro-cantilever with the tip radius of 80 nm exhibits much more frequency shift sensitivities for the lower separation distances. Based on theoretical calculations, selecting a proper tip radius can bring notable improvements in observable sensitivity to Van der Waals forces under heptamodal-frequency experiments.

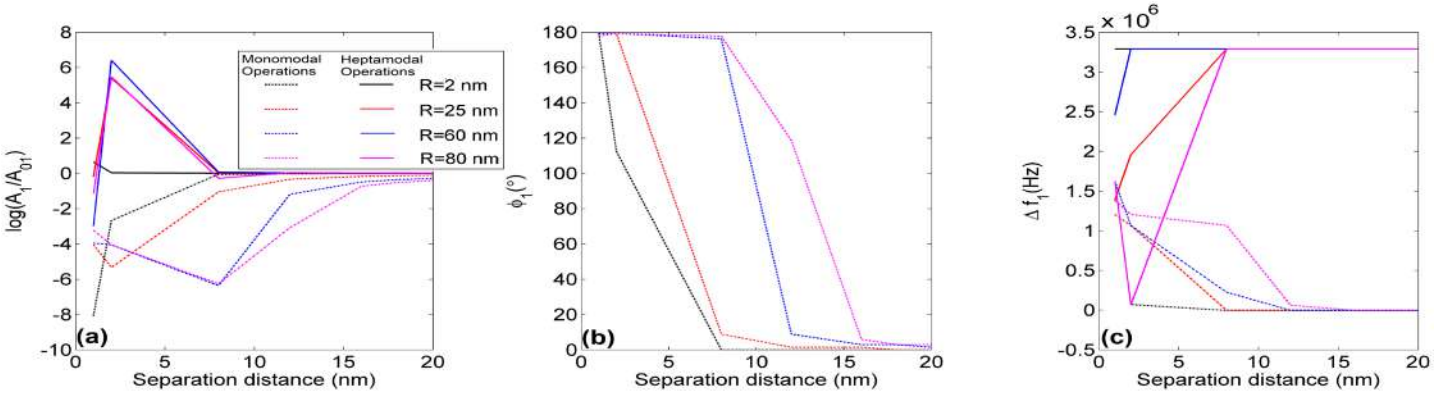

Figure 1: Observable sensitivities to Van der Waals forces for varying tip radiuses under monomodal- and heptamodal-frequency excitations. (a) Amplitude response. (b) Phase shift. (c) Frequency shift.

Biography

Cagri Yilmaz received his undergraduate degree in mechanical engineering from Middle East Technical University (METU) in 2007. He went on to complete his master's degree in mechanical engineering at Duisburg-Essen University in Germany in 2010. He worked as an intern in the manufacturing department at ThyssenKrupp MillServices & Systems in Duisburg. In 2010, he successfully completed his master's thesis at Trützchler Spinning firm in Mönchengladbach, Germany, as part of the T-Data project. Subsequently, he worked as a research assistant in the Distributed Artificial Intelligence Laboratory (Dai-Labor) at the Technical University of Berlin from 2011 to 2014, focusing on robot systems and smart grids. He completed his doctoral studies in the field of acoustics and vibration at Akdeniz University's mechanical engineering department in May 2022. Currently, he is engaged in theoretical studies on the sensitivities of micro-cantilevers to external forces under multi-frequency operations.

The new era of immunological treatment, last updated and future consideration of CAR T cell-based drugs

Kaveh Hadiloo[1], Siavash Taremi[2] and **Abdolreza Esmaeilzadeh[3]**

[1]Department of immunology, Zanjan University of Medical Sciences, the Islamic Republic of Iran
[2]School of Medicine, Zanjan University of Medical Sciences, the Islamic Republic of Iran
[3]Department of Immunology, Zanjan University of Medical Sciences, the Islamic Republic of Iran

Cancer therapy is a big challenge and requires better treatment options with attention to increasing the incidence of relapse/refractory cancer types. The treatment of intelligent diseases like cancer needs an intelligent way. Immunotherapy in combination with new genetic modifications changed the game and introduced novel treatment way like Chimeric Antigen Receptor (CAR)-based treatment. When the CAR structure is given to the immune cells as a weapon, these cells can work more accurately, especially against tumor cells. The CAR T cell as a pioneer in this field could reveal an appreciable result in the first clinical studies and introduced six FDA-approved drugs and two non FDA-approved the worldwide. These drugs are designed for various types of hematological cancer treatment. The CAR T cell is created based on the patient's characteristics and completely works on personalized medicine. The high complete response rate and single dose treatment are the most attentional benefits of them, especially after the long time of the various treatments. Although the CAR T cell-based treatment had wonderful results in cancer treatment, the other immune cells like natural killer cells, natural killer T cells, and macrophage cells can achieve the same or in some cases better results in tumor elimination with minimum adverse fetal effect.

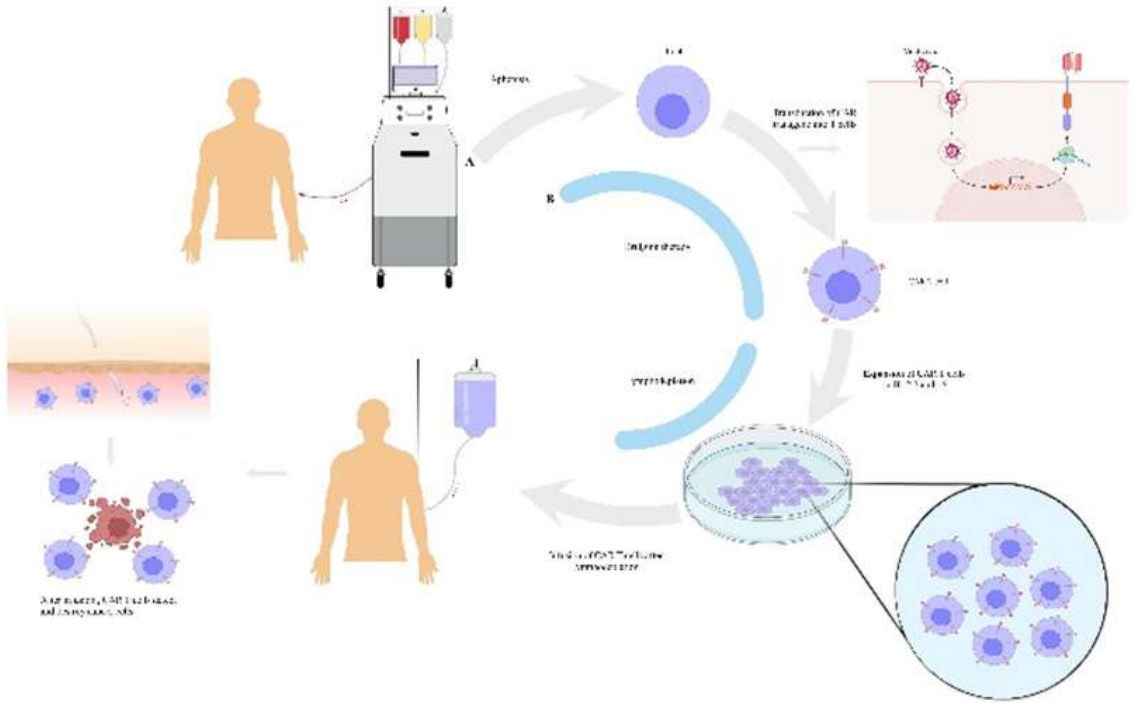

Fig 1. The production pathway and action of CAR T cell-based drug.

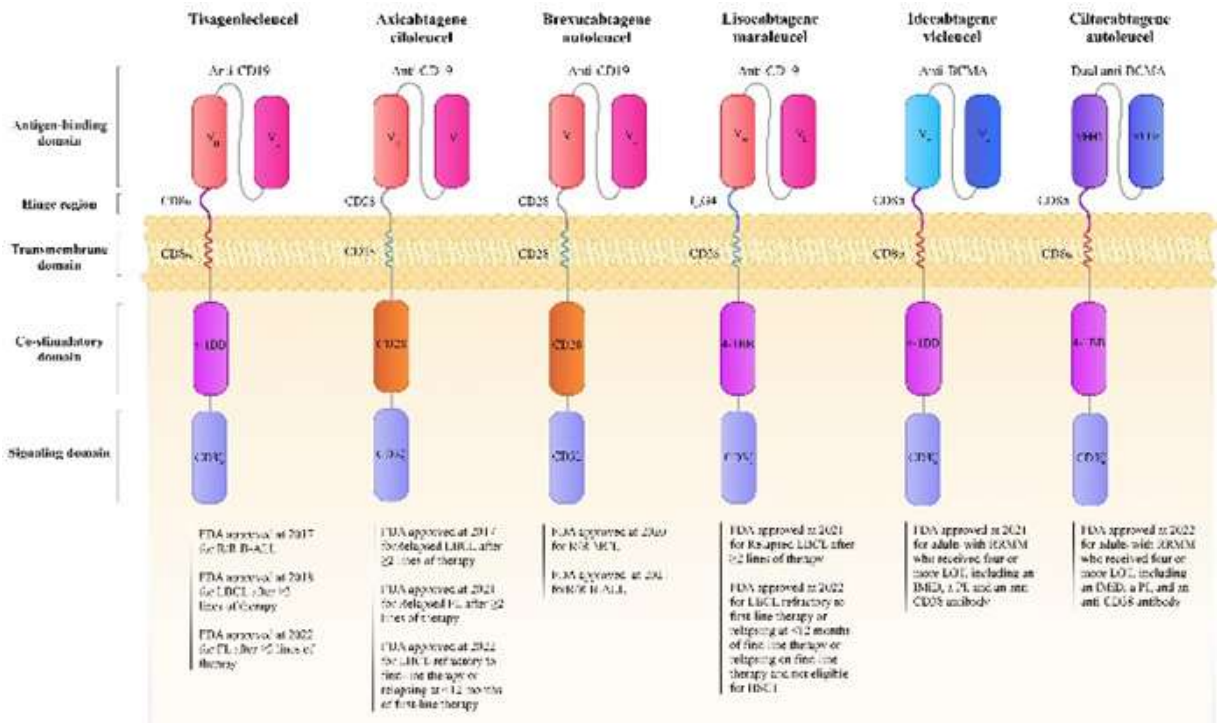

Fig 2. The CAR T-based designed drugs. The basic architecture and generation of the CAR structure are the same in all medicines. The structures had little differences in the hinge, transmembrane, and co-stimulatory domain.

In our presentation, we introduce all CAR T cell-approved drugs based on their last data and investigate them from all aspects of pharmacology, side effects, and compressional. Also, the efficacy of drugs, pre-and post-treatment steps, and expected side effects are introduced, and the challenges and new solutions in CAR T cell therapy are in the last speech. The CAR-based treatment will create a real revolution in the field of cancer treatment in the near future and will save the lives of many patients due to its many basic advantages and high flexibility of treatment.

Biography

Dr. Kaveh Hadiloo is a graduate of M.D in the field of medicine, and until now, in addition to studying in this field, he is doing research on cancer cell therapy. He has been working as a mentor in the Perch research team and is also the head of the student research center of Zanjan University of Medical Sciences. Dr. Hadiloo is currently undergoing a specialization course. Dr. Taremi also graduated in the same field and is doing research on the same topic and is part of the laboratory. Prof. Esmaeilzadeh, as the head of the immunology department of Zanjan University of Medical Sciences, is the founder of the Perch team and guides students in the field of modern immunotherapy technology.

Student's research activities in hybrid intellectual environment of mathematics teaching

Eugeny Smirnov

Yaroslavl State Pedagogical University named after K.D. Ushinsky, Russia

The main prospective of the modern society is to manage and develop the project-based and research activities of students. Neural networks, as effective tools for solving complex, multi-component, multifunctional problems, created an opportunity to develop the content and assessment of the quality of project-based and research activities and personal achievements of each student. The purpose of this study is to define and develop the concept of hybrid intelligent system supporting of student's project-based and research activities by mathematical and computer modeling resources. Applied intellectual technology should to support and classify the growth of each student's scientific potential with different opportunities. The paper considers the development of pedagogical, algorithmic and information organization of ontological engineering and model support of student's project-based and research activities and scientific potential growth based on the construction of an artificial neural network with a teacher and an array of training samples using expert systems and the decision theory. It also defines the selection criteria, hierarchies and content of generalized constructs of complex knowledge (modern achievements in science) and parameters of student's scientific potential dynamics by neural network. The study made it possible to create an applied intelligent technology for supporting and displaying the dynamic profiles of each student's project-based and research activities and the growth classifier of their scientific potential. Individual educational support with hybrid intellectual environment will allow the developing of each student's scientific potential and their dynamic profiles, will support to master the student's project-based and research activities and will realize the adapting potential of modern achievements in science to school mathematics, will create the conditions for educational programs modernization in developing digital environment.

Biography

Professor Eugeny Smirnov has been the head of the Department of Mathematical Analysis at Yaroslavl Pedagogical University since 1982. He holds the degree of Doctor of Pedagogical Sciences and Candidate of Physical and Mathematical Sciences in Russia. He published a monograph on functional analysis and developed the theory of Hausdorff spectra in category theory. Professor Smirnov was a visiting professor at Johns Hopkins University in 1994 and at the International Congresses on Mathematics 2006 in Spain and 2014 in South Korea. Under the supervising of E.I. Smirnov, 23 dissertations were defended. He has developed a pedagogical theory: founding of personal experience, visual modeling in teaching mathematics, theory of mathematical education synergy, technology of intelligent systems using in students' research activities.

Gold nanoparticles in silica aerogels

I. Lázár[1], H. J. Csupász-Szabó[1], L. Daróczi[2], B. Döncző[3] and **M. Szarka[3]**

[1]Department of Inorganic and Analytical Chemistry, University of Debrecen, Hungary
[2]Department of Solid State Physics, University of Debrecen, Hungary
[3]Laboratory for Heritage Science, Hungary

Gold nanoparticles (AuNPs) combine beauty with functionality, exhibiting unique properties due to their size and shape, and displaying vibrant colors in red and purple hues. Their exceptional stability and biocompatibility make them ideal for medical imaging, targeted drug delivery, fuel cells, or chemical catalysis.

Nitrophenols are increasingly contaminating surface and ground water due to the extensive use of dyes, pesticides and pharmaceuticals. On short-term contact, p-nitrophenol (PNP) may cause eye and skin irritation, longer exposure may result in methemoglobinemia, cyanosis, genotoxicity, and chromosome aberrations. The decontamination of PNP may be performed by several methods including reduction to p-aminophenol with sodium borohydride in the presence of metallic nanoparticles, for example iron, silver, or gold nanoparticles. The recovery of high-cost AuNPs is a crucial step that cannot be performed efficiently. [1]

Aerogels are extremely porous and lightweight solids made of a large variety of inorganic, organic or natural materials. Silica aerogels are the most widely studied and used ones exhibiting special tunable surface properties, good mechanical strength, transparency and inertness in chemical reactions.[2]

Immobilization of AuNPs in a very porous matrix can preserve their activity and provide easy access to the catalytically active particles without letting them leach in the solution, and facilitate their recovery by traditional filtration/sedimentation and centrifugation methods. [3]

The purpose of our research was to make catalytically active silica aerogels with embedded gold nanoparticles in order to decontaminate PNP solutions with a manageable and

scalable process. In the lecture, we shall present the direct and the reverse-engineered synthesis of gold nanoparticle-containing silica aerogels, characterization of the particles with SEM, TEM, optical microscopy, UV-vis spectroscopy, and demonstrate their catalytic efficiencies, recovery and life cycles in batch reactions, as well as in a newly developed continuous-flow reactor.

Biography

István Lázár received his M.Sc. in Chemistry in 1984 and his Ph.D. in biologically active boron analogs of amino acids in 1988, both at Lajos Kossuth University (Debrecen, Hungary). He spent two periods as a postdoctoral research associate at The University of Texas at Dallas, USA (1989-91 and 1994). He received a C.Sc degree in the synthesis of new MRI contrast agents in 1994 (Hungarian Academy of Science, Budapest). His research interest shifted to materials science, and he initiated and established the aerogel research at the University of Debrecen in 2006. Currently, he works at the Department of Inorganic and Analytical Chemistry as an Associate Professor of Chemistry. For his contribution to the education and research of inorganic and analytical chemistry, he was awarded the Hungarian Order of Merit, Knight's Cross in 2020. His actual research focuses on two major fields: biomedical applications of new aerogel-based composite materials and the synthesis and study of catalytically or photocatalytically active aerogels.

Advances in sintering of titanium aluminide: A review

Mahlatse R. Mphahlele[1], Peter A. Olubambi[2] and **Eugene A. Olevsky[3]**

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Titanium aluminides (TiAl) are prominent advanced materials for aerospace and automobile industries owing to their great engineering properties conferred by ordered structures and partial covalent bonding. Of all the TiAl phases, Ti_3Al and TiAl are considered to have great engineering significance and, thus, are extensively examined and developed for elevated temperature conditions. Nevertheless, one of the impediments to the wider application of TiAl and Ti_3Al alloys is the deficit in the malleability at room temperature, creating difficulties during fabrication as it is sensitive to microcracks and highly susceptible to superficial defects. Sintering technologies such as cold pressing, cold isostatic pressing, hot pressing, hot isostatic pressing, combustion synthesis, and microwave sintering for producing advanced TiAl are presented. However, these processes have restrictions on the control of the microstructural properties and phase evolution, which inevitably affect the quality of the TiAl products. The novel spark plasma sintering (SPS) offers opportunities to circumvent challenges existing in the production of TiAl. An innovative hybrid spark plasma sintering technology with great potential for large-scale fabrication of operational materials with improved microstructural characteristics yielding exceptional product value and enhanced design autonomy is also presented as a robust alternative for sintering TiAl alloys.

Biography

Dr. Mahlatse Mphahlele has been a lecturer in the Department of Mechanical Engineering at Durban University of Technology (DUT), South Africa, since July 2020. She received her PhD in Metallurgical Engineering in 2024 and a Master's degree in Chemical Engineering (Cum Laude) in 2018, both from the University of Johannesburg (UJ), South Africa. She previously worked for a year and a half at the Department of Metallurgical Engineering at UJ as an Assistant Lecturer. She also previously worked as a Laboratory Specialist

in the Centre of Nanoengineering and Advanced Materials at UJ. She is a registered engineering professional with the Engineering Council of South Africa. Her research interests include powder technology processing techniques, alloy design and development, nanocomposites, microstructural analysis, nanotechnology, and tribology. She has particularly focused on the thermomechanical processing of titanium-based alloys and associated microstructural evolution and their nanoindentation and wear properties for aerospace and automotive applications.

Multonutrient phyto-engineered nanofertilizers for sustainable crop production

Karen J. Cloete[1,2], Gabriel Kaningini[1,2], Thobo Motlhalamme[1,2], Nandipha L. Botha[1,2], Žiga Šmit[3,4], Primoz Vavpetic[4], Paul Wilson[5], Jay Warnett[5], Mahmood Akbari[1,2], Razieh Morad[1,2], Primoz Pelicon[4] and **Malik Maaza[1,2]**

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[2]Nanosciences African Network (NANOAFNET), iThemba LABS-National Research Foundation, South Africa
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[5]International Manufacturing Centre, WMG, University of Warwick, UK

Crop production to feed a growing population is currently facing a multitude of challenges brought about by climate change, low nutrient-use efficient fertilizers, and the high cost of procuring fertilizers. In a bid to circumvent these challenges, the application of novel technologies in the agricultural sector has been promoted. One of these revolutionary new technologies developed to promote agricultural productivity is nanofertilizers. Nanofertilizers represent a novel approach to nutrient management, offering precise and efficient delivery mechanisms for essential plant nutrients. More specifically, nanofertilizers can be effectively designed to have unique physico-chemical properties that mediate nutrient uptake and increase plant nutrient use to ultimately boost crop performance. Compared to traditional fertilizers, smaller amounts can be applied either to the soil, leaves, or roots. A more environmentally safe approach that has been suggested, also include seed imbibition. Recently, to promote biocompatibility and the introduction of less reactive nanomaterials into the agricultural environment, developing nanofertilizers using green chemistry approaches have been receiving increased interest. This talk will primarily focus on the development of multinutrient nanofertilizers using phytoengineering and computational modelling, their characterization and physico-chemical characteristics, their interaction with the seed ionome and metabolome, and effect on seed morphological parameters

such as porosity using benchtop and advanced ion beam methodologies. Bean and tomato seeds was used as the model plant. The discussion will address the results obtained from diverse nanofertilizer studies, challenges in the field, and future considerations including safety aspects. Through this exploration, the presentation aims to underscore the potential significant role nanofertilizers may play in advancing sustainable agricultural practices to improve future food security and environmental stewardship.

Biography

Karen is currently a senior researcher affiliated to the UNESCO-UNISA Africa Chair in Nanosciences and Nanotechnology Laboratories - University of South Africa and the Nanosciences African Network - iThemba Laboratory for Accelerator Based Science - National Research Foundation as well as a member of Nanoenergy for Sustainable Development in Africa. She is a member of the Global Young Academy, World Association of Young Scientists, past South African Young Academy of Science co-chair, and alumnus of the World Economic Forum Young Scientist Community.

MoS_2 coated fabrics for triboelectric nanogenerator as harvesting energy for future clothes

N. Ben Brahim Aouani[1], Mehrez Manai[1], Walid Ouerghi[1] and **Afrah Bardaoui[2]**

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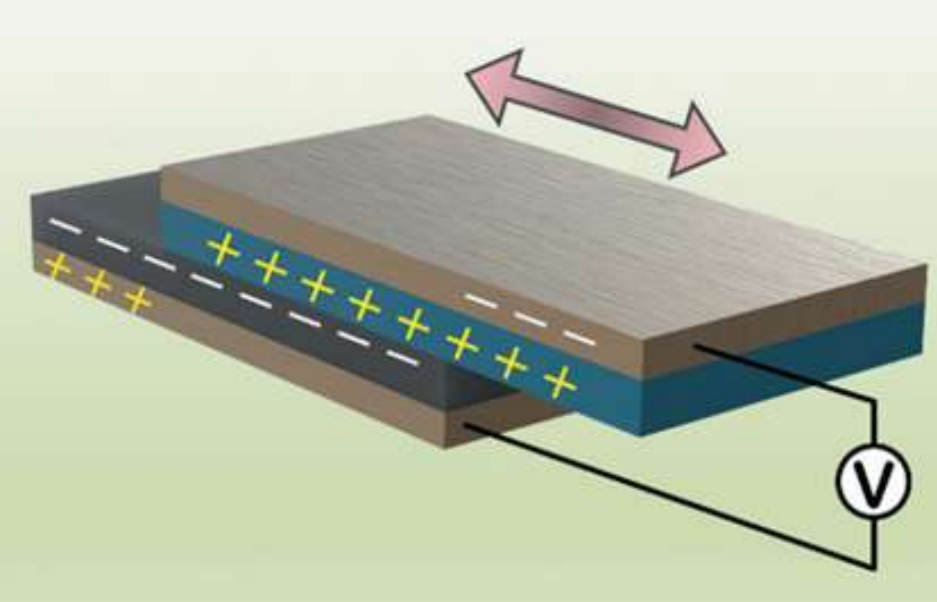
[2]Laboratory of Nanomaterials and Systems for Renewable Energies (LaNSER), Research and Technology Centre of Energy (CRTEn) Borj Cedria Science and Technology Park, Tunisia

Two-dimensional (2D) materials composed of single or multiple chemical elements have garnered significant attention due to their unique properties and potential applications. Among these materials, transition metal dichalcogenide molybdenum disulfide (MoS_2) stands out as a promising candidate for a wide range of applications, including triboelectric nanogenerators to harvesting energy devices.

In this study, MoS_2 was synthesized using a hydrothermal method subjected to elevated, pressure and temperature, followed by liquid phase exfoliation (LPE) to facilitate the separation of the Van der Waals sheets. The liquid phase exfoliation method was employed to obtain monolayer or few-layer flakes from the synthesized MoS_2 nanoparticles. 30mg of MoS_2 was immersed in 2-propanol and deionized water. Characterization techniques including optical microscopy, X-ray diffraction (XRD), photoluminescence, UV-visible spectroscopy, and Raman spectroscopy were employed to analyze the structural and optical properties of the 2D MoS_2 material.

Furthermore, 2D MoS_2 deposited onto cotton substrates was utilized in a triboelectric nanogenerator (TENG) for energy harvesting applications. The nanogenerator play a role in converting mechanical energy into electrical energy primarily through the triboelectric mechanism.



The Sliding Mode TENG comprises two primary elements: the slider and the stator as shown in figure. The stator in our work is based on cotton The Cotton, which typically ranks poorly in the triboelectric series and does not generate significant triboelectric charges through friction alone, exhibited considerable improvement in TENG performance upon deposition of 2D MoS_2. The efficiency of the TENG based on cotton fabrics was found to vary depending on the number of layers of deposited 2D MoS_2.

The TENGs for energy harvesting applications, particularly in the realm of wearable electronics and smart textiles.

Biography

Dr. Narjes Ben Brahim Aouani is an accomplished physicist with a distinguished career spanning over several decades. Born on February 1, 1964, in Tunis, Tunisia, she has dedicated her life to the pursuit of knowledge and excellence in the field of physics.

She holds the position of assistant professor at Tunis El Manar University, where she has been actively involved in teaching and research. her academic journey began with a bachelor's degree in Electronics, followed by a Master's degree in Solid State Physics, and culminating in a Ph.D. in Physics, at Tunis El Manar University.

Throughout her career, she has been passionate about semiconductor physics, nanomaterials, and renewable energy. she has had the privilege of teaching a wide range of physics courses.

Her research endeavors have focused on the synthesis and characterization of novel materials, with a particular emphasis on their electrical and optical properties.

A comparative study of cement-based and solvent-based coatings for reinforced concrete protection against corrosion in sulfate solutions

Ginneth Patricia Millan Ramirez

Gdansk University of Technology, Poland

This research investigates the efficacy of cement-based and solvent-based coating materials in protecting reinforced concrete against corrosion and examines their durability when exposed to a sulfate solution (3% Na_2SO_4 + 3% $MgSO_4$ + 3% K_2SO_4 + 3% $CaSO_4$). Initial assessment involved evaluating the water absorption rate of the protected concrete samples. The corrosion rate and potential corrosion were analyzed using the linear polarization resistance technique on carbon steel and AISI 304 steel bars, with a stainless-steel counter electrode as reference.

Results reveal that the solvent-based coating material exhibits superior performance in reducing both corrosion rate and water absorption compared to the cement-based counterpart. Moreover, the formation of a sulfate-induced superficial layer over the concrete initially impedes water penetration but ultimately leads to internal concrete damage. This study sheds light on the significance of coating selection for enhanced durability and corrosion resistance in reinforced concrete structures exposed to sulfate environments.

Biography

Ginneth Millan is a PhD candidate at the Gdansk University of Science and Technology, Poland. Currently, she is in the final year of her doctoral studies in the Faculty of Civil Engineering, Department of Engineering Structures.

An alternative quantum foundation

Inge S. Helland

Department of Mathematics, University of Oslo, Norway

In the literature, quantum mechanics is founded by a very abstract set of postulates. For several reasons I propose that this set should be replaced by straightforward postulates based on the notion of theoretical variables, a notion generalizing the statisticians' parameters: In his mind, any observer/ actor in each given situation may have several theoretical variables. Some of these are accessible, can in some future be given precise numerical values by measurements or experiments. The notion of a maximal accessible theoretical variable is crucial. All this can be motivated by an assumption to the effect that all physical variables in the actor's context have parallels in his mind. Examples are given. Under weak conditions, the basic postulates of quantum mechanics can be shown to be implied by a postulate assuming that the actor in his mind has two related maximal accessible variables, and that there is an inaccessible variable such that all the accessible ones are functions of this variable. The notion of being related has a precise definition. A parallel development can be based on theoretical variables shared by a group of communicating observers. The Born formula, giving probabilities, follows from some explicit additional assumptions. The technical details around all this are given in two books and in a number of articles. The most recent version will be discussed here.

Biography

Inge S. Helland

Education:

- Cand. real. in Mathematical Statistics at the University of Bergen 1973.
- Dr. Philos. at the University of Oslo 1980.

Work Experience:

- University Fellow, University of Bergen, 1974-78.
- Lecturer/ Associate Professor, Agricultural University of Norway, 1978-83.
- Professor, Agricultural University of Norway, 1983-1996.
- Professor, University of Oslo, 1996-2012.

Research:

- 4 books and around 100 articles in a variety of subfields of statistics and physics. In the last
- 10 years, most of the research has been related to the foundation of quantum theory

Exploring the influence of surface dressing ultrafine magnetic nanoparticles

Paulo C. Morais[1,2]

[1]Catholic University of Brasilia, Brazil
[2]University of Brasilia, Brazil

This talk will focus on the description of surface functionalized ultrafine $CoFe_2O_4$ nanoparticles (NPs), with mean diameter ~ 5 nm. The investigated properties include DC magnetization and AC susceptibility measurements over the temperature range of 4 – 400 K. All evaluated NPs present the same $CoFe_2O_4$ core, with different molecular surface coatings, increasing gradually the number of carbon atoms in the coating layer, in the following list: glycine ($C_2H_5NO_2$), alanine ($C_3H_7NO_2$), aminobutanoic acid ($C_4H_9NO_2$), aminohexanoic acid ($C_6H_{13}NO_2$), and aminododecanoic acid ($C_{12}H_{25}NO_2$). Importantly, samples were intentionally fabricated in order to modulate the core-core magnetic dipolar interaction, as the thickness of the coating layer increases with the number of carbon atoms in the coating molecule. The magnetic data of the uncoated $CoFe_2O_4$ NPs it is also presented for comparison. All investigated $CoFe_2O_4$ NPs (coated and uncoated) are in magnetically blocked state at room temperature as evidenced by ZFC/FC measurements and the presence of hysteresis with ~700 Oe coercivity. Low temperature magnetization scans show slightly constricted hysteresis loops with coercivity decreasing systematically while the number of carbon atoms in the coating molecule decreases, possibly resulting from differences in magnetic dipole coupling between NPs. Large thermomagnetic irreversibility, slow monotonic increase in the FC magnetization and non-saturation of the magnetization give evidence for the cluster glass (CG) nature in the $CoFe_2O_4$ NPs. The out of phase part ('') of AC susceptibility for all samples shows a clear frequency dependent hump which is analyzed to distinguish superparamagnetic (SPM), cluster glass (CG) and spin glass (SG) behavior by using Néel-Arrhennius, Vogel-Fulcher, and power law fittings.

Biography

Professor Paulo César De Morais, PhD, was full Professor of Physics at the University of Brasilia (UnB) – Brazil up to 2013. Appointed as UnB's (Brazil) Emeritus Professor (2014); Visiting Professor at the Huazhong University of Science and Technology (HUST) – China (2012-2015); Distinguished Professor at the Anhui University (AHU) – China (2016-2019); Full Professor at the Catholic University of Brasília (CUB) – Brazil (2018); CNPq-1A Research Fellow since 2010; 2007 Master Research Prize from UnB. He held two-years (1987-1988) post-doc position with Bell Communications Research, New Jersey – USA and received his Doctoral degree in Solid State Physics (1986) from the Federal University of Minas Gerais (UFMG) – Brazil. With more than 12,000 citations, He has published about 500 papers (Web of Science) and more than 15 patents.

LuGre friction-based hysteresis model of piezoelectric actuation system

Sabarinand D V[1,2] and **Karthikeyan P**[2]

[1]Detroit Engineered Products Inc, USA
[2]Department of Product Technology, Madras Institute of Technology, Anna University India

This paper presents a novel friction-based model tailored for elastoplastic materials in piezoelectric actuators, with a focus on hysteresis. Theoretical derivations of the Dhal model and calculations of LuGre friction-based hysteretic characteristics for these materials are provided, enhancing our understanding of their complex behavior. Rigorous simulations, encompassing steady-state and dynamic scenarios, validate the model's performance under different operational conditions. By subjecting the model to controlled friction forces at approximately 0.002 m/s, its accuracy and applicability across various regimes are thoroughly examined. Moreover, the study investigates hysteresis intricacies across different velocities, enriching our comprehension of the model's behavior through systematic analysis. Utilizing computational software for simulations allows for a thorough evaluation of the model's effectiveness, revealing insights into its strengths, weaknesses, and areas requiring improvement. Overall, this work contributes to advancing modeling techniques for elastoplastic materials in piezoelectric actuators, promising enhanced performance and efficiency in diverse engineering applications.

Biography

D.V. Sabarianand attained his Bachelor of Engineering in Mechatronics with First Class honors and earned his Master's Degree in Engineering Design with Distinction from Anna University in 2014 and 2016 respectively. Subsequently, he pursued his Ph.D. in Mechanical Engineering at Madras Institute of Technology (Campus), Anna University, completing it over the past three years. Presently, he serves as a Senior Project Engineer within the product development team at Detroit Engineered Products Inc, USA. His professional interests encompass system modeling, identification, parameter estimation, and control optimization methods, particularly in high precision motion systems utilizing smart actuators. He actively participated in both national and international conferences and authored scientific research papers focusing on hysteresis modeling, control system design, and system modeling and parameter estimation for high precision systems. Additionally, he contributes as a reviewer for esteemed journals in the field.

A Statistical Analyses and Theoretical Perspectives of Native American Women Entrepreneurs

Andrea Smith-Hunter[1] and **Jared Hunter**[2]

[1]Professor of Management, Siena College
[2]Harvard University Student

The story of Native American entrepreneurship and definitely Native American women entrepreneurship is a long and complicated tale. It begins with a look at the types of industries they are engaged in and the geographic locations and the sustainability of the Native American women entrepreneurs. Oftentimes these businesses are central to the activities of their communities, their nation and have vaulted themselves in the last several years to the international market. Research into Native American women entrepreneurs is extremely sparse and when discovered it is often shown that the research is anecdotal in nature or focused on a particular geographic area or industry. In essence, limited in focus on perspective and limited in perspective and what is offer in a pedagogical area. The purpose of this paper is to explore the personal profile and entrepreneurial activities of Native American women and to provide updated research to raise awareness about the significant impact of the Native American women entrepreneurs.

Biography

Dr. Andrea E. Smith-Hunter is a Professor of Management and Sociology at Siena College. She formerly worked as a Financial and then Marketing Analyst at Exxon Corporation.

She holds a Ph.D. in Organizational Studies from The University at Albany – State University of New York. Her research interests include women entrepreneurship across racial, ethnic, and economic lines. Dr. Smith-Hunter has published over forty-five journal articles in *The Journal of Business and Entrepreneurship, The Journal of International Business and Entrepreneurship, Women in Management Review* and *The Journal of Business and Economic Research*, among others.

Her first book, Diversity and Entrepreneurship: Analyzing Successful Women Entrepreneurs, was published in 2003 and her second book, Women Entrepreneurship Across Racial Lines: Issues of Human Capital, Financial Capital and Network Structures was published in 2006. Her second book has been well reviewed by many academic outlets and has been endorsed by the Center for Women's Business Research as a roadmap and a "must read for women entrepreneurs everywhere." Her third book, Women Entrepreneurs in the Global Marketplace, looks at women entrepreneurs from a worldwide perspective, and was published in 2013.

She is a past holder of *Th e Hickey Chair of Business* at Siena College, an endowed faculty position. She was appointed in 2009 as an Advisory Board Member to The White House Council for Women and Girls, contributing her expertise regarding minority women entrepreneurs.

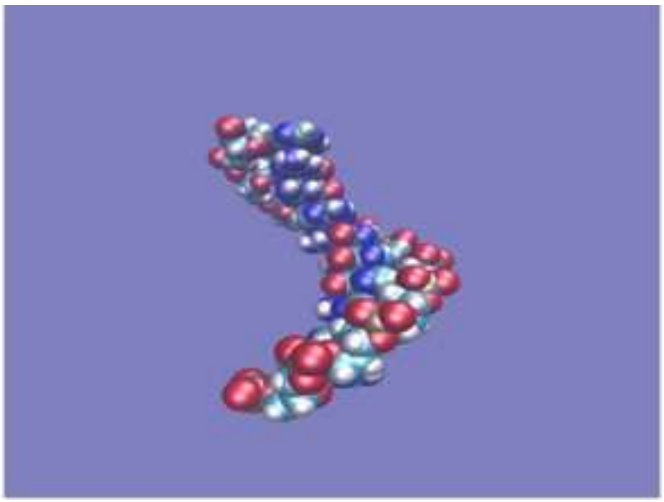
She recently launched the first ever EDGE (Educating Dynamic Girl Entrepreneurs) Program. The program teaches young ladies ages 13-18 about Entrepreneurship through the Development of a Business Plan and mentorship with women entrepreneurs in their local community.

Fractal properties in electronic spectra of GA sequences of human DNA

Marcos P. A. Cardoso[1], M. S. Vasconcelos[2], A. S. Martins[1] and **David L. Azevedo[3]**

[1]Instituto de Física, Universidade de Brasília - UNB, Campus Universitário Darcy Ribeiro, Brazil
[2]Departamento de Física, Universidade Federal do Rio Grande do Norte - UFRN, Brazil
[3]Departamento de Física - ICEx, Universidade Federal Fluminense – UFF, Brazil

In this work, we report the eigenenergies spectra for GA sequences present on human chromosome 7, obtained from an entirely atomistic Extended Huckel single-strand DNA model. For GA sequences ranging from 10 to 330 nucleotides (10,739 atoms) in steps of 10 nucleotides cumulatively, the density of states presented a beautiful and clear trend in the form of larger conductance in the region of [−20,−10] eV, like a digital signature, while the sequence length is increased. From a fractal analysis point of view, both level spacing and cumulative level spacing distribution of the energy spectra presented one kind of random Cantor set fractal behavior, including a devil's staircase for their energy spectra. Besides this, a more accurate f(α) analysis has confirmed that these spectra are multifractal.



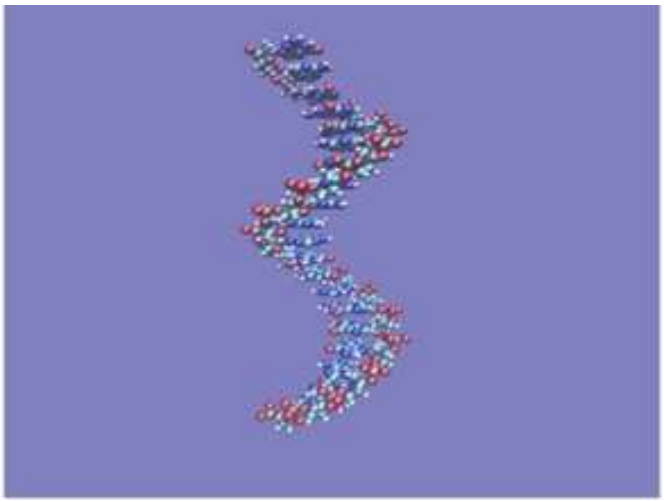


Fig.1 3D rendered illustrationof the first two stretches of GA sequences in human DNA with 10 (left panel) and 20 (right panel) nucleotides, respectively. Following the pattern, each atom is represented by a uniquehue: Blue represents nitrogen,cyan carbon, red oxygen, tanphosphorus, and white hydrogen.

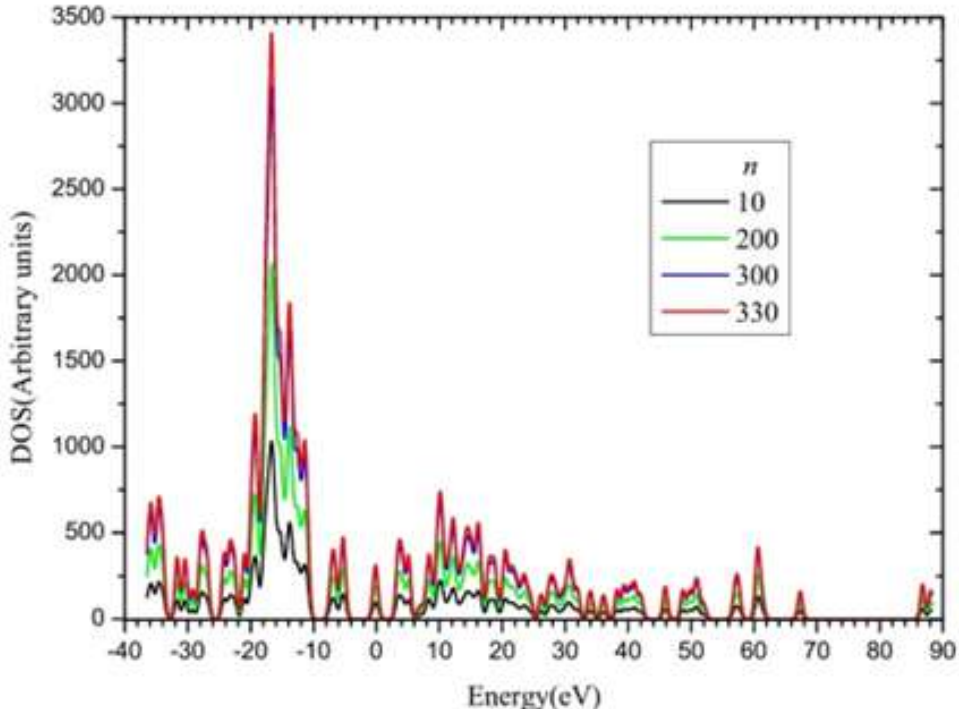


Fig.2 Density of states of GA segments of some selected lengths: 10, 100, 200, and 300 nucleotides

Table 1 Numerical results for α values

n	α_{min}	α_{max}	$\Delta\alpha$
30	0.85215	3.61365	2.7615
40	0.84763	3.54084	2.69321
50	0.86448	3.30743	2.44295
150	0.90153	3.29059	2.38906
200	0.88935	3.25066	2.36131
300	0.82553	3.36277	2.53724

Biography

Graduated in physics from the Federal University of Brasilia (2022), currently finishing a master's program (2023 - currently). Researcher in the field of nano-structure.

Characterization and optimization of multiomic single-cell epigenomic profiling

Leticia Sandoval[1,2], Wazim Mohammed Ismail[1,2], Amelia Mazzone[1,2], Mihai Dumbrava[1,2,3], Jenna Fernandez[4], Amik Munankarmy[1,2], Terra Lasho[4], Moritz Binder[2,4], Vernadette Simon[5], Kwan Hyun Kim[2], Nicholas Chia[6], Jeong-Heon Lee[1,2], S. John Weroha[7], Mrinal Patnaik[2,4] and **Alexandre Gaspar-Maia[1,2]**

[1]Division of Experimental Pathology, Department of Laboratory Medicine and Pathology, Mayo Clinic, USA
[2]Epigenomics Program, Center for Individualized Medicine, Mayo Clinic, USA
[3]Mayo Clinic Medical Scientist Training Program, Mayo Clinic Alix School of Medicine and Mayo Clinic Graduate School of Biomedical Sciences, Mayo Clinic, USA
[4]Division of Hematology, Department of Internal Medicine, Mayo Clinic, USA
[5]Medical Genome Facility, Genome Analysis Core, Mayo Clinic, USA
[6]Microbiome Program, Center for Individualized Medicine, Mayo Clinic, USA
[7]Department of Medical Oncology, Mayo Clinic, USA

The snATAC + snRNA platform allows epigenomic profiling of open chromatin and gene expression with single-cell resolution. The most critical assay step is to isolate high-quality nuclei to proceed with droplet-base single nuclei isolation and barcoding. With the increasing popularity of multiomic profiling in various fields, there is a need for optimized and reliable nuclei isolation methods, mainly for human tissue samples. Herein we compared different nuclei isolation methods for cell suspensions, such as peripheral blood mononuclear cells (PBMC, *n* = 18) and a solid tumor type, ovarian cancer (OC, *n* = 18), derived from debulking surgery. Nuclei morphology and sequencing output parameters were used to evaluate the quality of preparation. Our results show that NP-40 detergent-based nuclei isolation yields better sequencing results than collagenase tissue dissociation for OC, significantly impacting cell type identification and analysis. Given the utility of applying such techniques to frozen samples, we also tested frozen preparation and digestion (*n* = 6). A paired comparison between frozen and fresh samples validated the quality of both specimens. Finally, we demonstrate the reproducibility of scRNA and snATAC + snRNA platform, by

comparing the gene expression profiling of PBMC. Our results highlight how the choice of nuclei isolation methods is critical for obtaining quality data in multiomic assays. It also shows that the measurement of expression between scRNA and snRNA is comparable and effective for cell type identification.

Investigating power loss in a wind turbine using real-time vibration signature

Kingshuk Banerjee[1], Vishwaas Narasinh[1], Prateek Mital[1], Nilanjan Chakravortty[1], Swayam Mittal[1], Nikhil Kulkarni[1], Chandrasekar Venkatraman[2] and **Anjana Geetha Rajakumar[1]**

[1]Research and Development Center, Hitachi India Pvt. Ltd., India
[2]Research and Development Center, Hitachi America Ltd., USA

Objective: Wind energy's rapid growth underscores the importance of understanding the environmental and mechanical factors affecting wind turbine power output. Despite the significance of vibration as an indicator of turbine health, its relationship with power loss remains largely unexplored.

Scope: This study aims to introduce a novel approach, utilizing a vibration index derived from turbine vibration data, to investigate power loss in wind turbines. Specifically, it focuses on modeling gearbox health, considering the loss of generator speed, and examines the impact of vibration on power loss.

Methods Used: The methodology involves a data-driven approach to model gearbox health, using the vibration index as an input. This includes analyzing vibration data from different parts of the turbine hub to understand its effect on generator speed and subsequent power loss. Linear mapping techniques are employed to correlate generator speed with power loss, based on the observed vibration data.

Results: The analysis reveals a significant correlation between turbine vibration and generator speed, with vibration explaining approximately 57% of the speed loss. Furthermore, the study demonstrates an 85% accuracy in predicting power loss based on generator speed, with a 55% accuracy in predicting actual power loss in the turbine.

Conclusion: The proposed methodology, applied to real-world data from an onshore wind farm in the western coast of India, offers a data-driven and efficient approach to enhance understanding of wind turbine operations. By considering vibration as a crucial factor in power loss, this study contributes valuable insights for optimizing turbine performance and maintenance strategies.

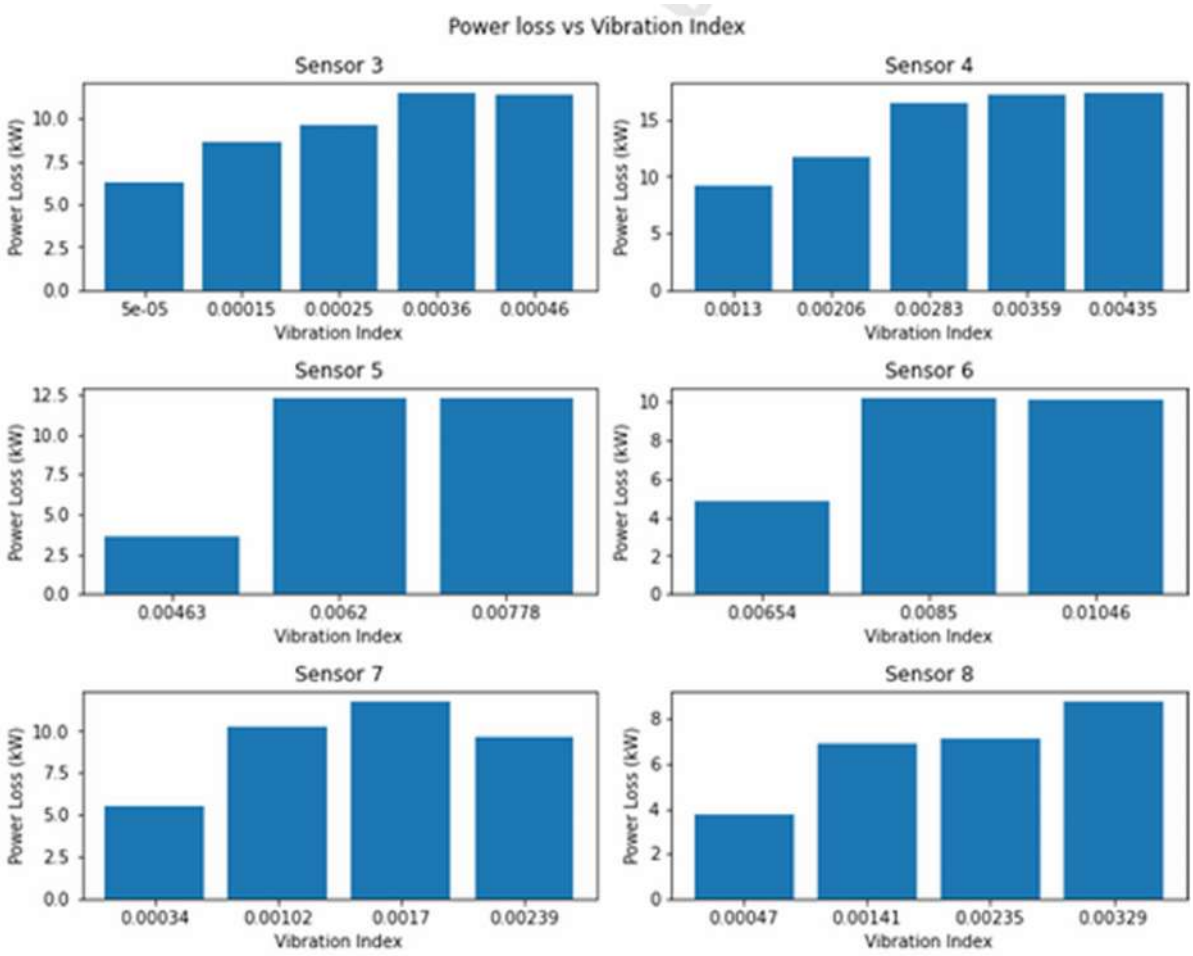


Fig. 16. Variation of power loss with respect to vibration index.

Biography

Kingshuk Banerjee is currently the Head of Hitachi Research and Development Centre, India.

Kingshuk is a specialist in the development and deployment of Artificial Intelligence systems. Prior to his current role, he was a Partner in IBM Services where he led the delivery of Cognitive-Business-Decision-Support (CBDS) services worldwide. A computer science graduate by training, he earned his Doctorate in Engineering Management from George Washington University, USA.

Kingshuk is certified by Cornell and Harvard University in Executive Leadership and Change Management. He loves traveling, Net-surfing and meeting the "new" that includes people, culture and technology.

Vishwaas has 8.5 years of overall experience with 7 years of experience in Data Science, particularly in NLP, Sequence models, Signal processing, and predictive diagnostics.

He has authored several papers and patents. Additionally, he is a musician with a focus on flute and is particularly keen on AI tech + Music.

He has a Masters from Great Lakes University on Data Science and a Bachelors from PES University.

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Advanced Nanotechnology and Nanomaterials & Advanced Physics; Applications and Scientific Innovations

September 20, 2024

NANO INTELLECTS 2024 &
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CE-LIF analysis of fluorescent dyes for detection of nanoplastics among metal oxide nanoparticles

Edward P.C. Lai and **Amos Onomhante**

Ottawa-Carleton Chemistry Institute, Department of Chemistry, Carleton University, Canada

Capillary electrophoresis (CE) was set up with laser-induced fluorescence (LIF) detection for the analysis of fluorescent dyes ranging from coumarin to rhodamine B and rhodamine 6G. These aromatic dyes interacted with transition metal oxide nanoparticles (TMONPs) and polystyrene nanoplastics present in a water sample, prior to CE-LIF analysis. Their concentrations were determined with high sensitivity based on efficient binding that caused a decrease of CE peak height. Fused silica capillaries, albeit unconditioned, produced repeatable peak heights despite small variations in the migration times. Selectivity was improved by choosing more dyes such as 4-dicyanomethylene-2-methyl-6-4-dimethyl-aminostyryl-4H-pyran (DCM) for the binding test. Sensitivity was maximized by conducting the binding tests at an optimal pH level. This method was further validated by high-performance liquid chromatography (HPLC) with fluorescence detection (FLD), which is commonly accessible, for the versatile control of water quality in public health and safety regulations.

Biography

Edward Lai obtained his Ph.D. degree from the University of Florida, U.S.A. under the supervision of Prof. Jim Winefordner. At Carleton University, his research interests cover instrumental analysis of biochemical and environmental samples using capillary electrophoresis, dynamic light scattering, electrochemistry, fluorescence spectroscopy, liquid chromatography, and mass spectrometry. New binding, catalytic, photochemical and redox phenomena are explored in the development of methods for the detection and removal of metal oxide nanoparticles and nanoplastic materials in soil or water.

Entanglement renormalization of the class of continuous matrix product states

Niloofar Vardian
SISSA, Italy

Continuous tensor networks give a variational ansatz for the ground state of the quantum field theories (QFTs). Notable examples are the continuous matrix product state (cMPS) and the continuous multiscale entanglement renormalization ansatz (cMERA). While cMPS is just adapted to the nonrelativistic QFTs, only the Gaussian cMERA is well understood, which we cannot use to approximate the ground state of the interacting relativistic QFTs. But, instead, cMERA also corresponds to a real-space renormalization group flow in the context of the wave functions. In this paper, we investigate the backward Gaussian cMERA renormalization group flow of the class of cMPS by putting the standard cMPS at the IR scale. At the UV scale, for the bosonic systems in the thermodynamic limit, we achieve the variational class of states that has been proposed recently, as the relativistic cMPS (RCMPS) is adapted to the relativistic QFTs without requiring one to introduce of any additional IR or UV cutoff. We also extend the RCMPS to fermionic systems and theories on a finite circle.

Biography

Niloofar Vardian, a PhD student in theoretical physics from SISSA, Italy. Her research area is the intersection of the quantum information and the high energy physics, especially black hole physics and holography.

A robust environmental chamber for testing the durability of outdoor pumps and coatings

Tarek Mohammad, Kyle Kirkpatrick, Mason Hoffer and **Ryan Ashley**
Department of Civil and Mechanical Engineering, Purdue University Fort Wayne, United States

This work presents an improved and robust water spray chamber used for testing the outer wear-resistance of outdoor pumps. The existing water spray chambers have multiple design flaws such as its two-piece construction and unstable connections creating an unreliable and inefficient system. The proposed chamber prototype would simulate rain and other environmental factors at an accelerated pace to observe the product's ability to withstand those environmental effects over long periods of time. Along with an increase in reliability and compatibility with the existing heating unit, a digital control of the system was implemented. This paper outlines the conceptual and detailed design process used to analyze each concept created for the subsystems. Three subsystems of the chamber were utilized: the floor of the chamber, the opening mechanism for the chamber, and the controller programming. Using the sub-system designs, a conceptual design parameter matrix was created. The FEA were conducted to confirm the structural rigidity of the system.

The chamber prototype utilized 3 tests: Wet – Dry Cycle Test, Hydrogen Embrittlement Test, and the Water Ingress Test. The Wet – Dry Cycle Test examined for bleeding or leaching of colors or cracking, peeling, and failure of the paints. This test included a 3-hour period of spraying water followed by a 1.5-hour 'dry off' period in which air at 90 psi will be blown onto the products. This cycle was then repeated up to 42 times. The Hydrogen Embrittlement utilized the same Wet – Dry Cycle however, this test left the products uncoated and examined for any hydrogen build up or rusting within the fasteners. The Water Ingress Test exposed products to thermal and rain/weather effects. The pumps were placed within the chamber and, using an external heating unit, the products will be heated to 60 degrees Celsius. Once that temperature was reached, water will be sprayed onto the pumps for 1 hour and the cycle was then repeated until corrosion occurs.

Impact of earth variability and implementation processes on hydromechanical and microstructure properties of sustainable construction materials

Ansaa-Asare Rhoda Julia[1], Andry Razakamanantsoa[1], Erwan Hamard[2], Myriam Duc[3], Bogdan Cazacliu[2] and **Loris Verron[2]**

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The use of earth in the building industry offers the opportunity to reuse soil while also meeting the challenges of circular economy. The hydrothermal properties of earth provide low embodied and operational energy, as well as indoor comfort for inhabitants. The reversibility of earth allows for complete and low-energy reuse at the end of its life. Despite these benefits, the development of earthen construction is slow due to the lack of an appropriate classification system for the soils used. The suitability criteria for soils used in earth construction is investigated. Four soils collected from earth heritage buildings sites were studied. Cylindrical fibred and non-fibred specimens were produced using cob and adobe techniques. An experiment campaign was carried out after drying and conditioning the specimens to study the implementation process effect, geotechnical properties and mineralogical composition influence on the hydromechanical and microstructural behavior of the specimens. The hydromechanical parameters like dry bulk density, unconfined compressive strength (UCS), Young's modulus (E) and suction of the specimen produced were studied. The pore volume and specific surface area were also determined using the BET technique. The collective impact of implementation process, geotechnical properties and mineralogical composition of the soils on the hydromechanical strength (UCS and Suction) and microstructure (pore volume, Specific surface area (SSA)) of the laboratory produced cob and adobe specimens was studied. A statistical analysis was conducted using the principal component analysis to analyse the complexity of the interactions among the parameters. The analysis showed that the suitability of a soil is a continuous value that depends on the implementation process, the soil composition and the final material desired performance. This shows that, the implementation process, geotechnical properties and mineralogical composition all play a role on the hydromechanical behaviour and microstructure evolution of cob and adobe specimens.

Biography

With a doctorate in civil engineering from Nantes University and a master's degree in Geomechanics, Civil Engineering, and Risks from Université Grenoble Alpes, Dr. Rhoda Julia Ansaa-Asare marked her career in geotechnical engineering and its application in sustainability through innovative approaches.

Through her research with the Institute of Research for Development (IRD) in Paris, she developed a low cost sensor to measure the matric potential of agricultural soils in Senegal. Additionally, she has been an integral part of the Geomaterials and Interactions with the Environment (GIE) Lab at Université Gustave Eiffel, where her research focused on developing suitable criteria for soils used in earth construction by coupling geotechnical properties and geology through mineralogy to understand the implementation process effect on hydromechanical and microstructure of earth construction.

Her research has made substantial impacts on both academic and practical applications in civil engineering, earth construction and environmental sustainability.

Five-body central configurations with different masses in 3 and 2 dimensions

Eduardo Piña

Departamento de Física, Universidad Autónoma Metropolitana Iztapalapa, Mexico

Central configurations of five different, finite, positive masses are presented from the astronomical perspective. We remark the essential different possible motions according we have two (planar) or three-dimensional motion, simpler in the last case. Starting from the definition we present several mathematical constraints, geometrical and algebraic, that give the requirements for the existence of geometrical configurations depending on the values of the masses, which modify deeply the possible central configurations when we lost the symmetries allowed whenever we have two or more equal values of the masses, that are generally different in the astronomical context.

The study for reliable pattern mining and its possible help in physics studies

Tongyuan Wang
TechEngine Plus Com, Canada

The classic pattern mining is a fundamental topic in data mining and has been studied extensively for over 30 years but left with no reliable mining approach yet. This report will first present why the case is, and then what the author's study has found and what progress has made toward the reliable mining. It includes the appropriate pattern frequentness measure, the pattern generation mode, the adaptation and application of the equilibrium condition, and pattern frequency distribution theory. All the findings are well formed with no exogenous input but rigorous mathematic proofs. Furthermore, the findings extend some new conceptions and rethinking as deep as on set theory and combinatorics, such that the study is not restricted in pattern mining but stretches to data science in general or even broader, for instance, in Physics. It is because, compared with a pattern consisting of singleton elements, the substances of our world comprise quantum particles in modern physics. Then, the reliable solution for pattern mining may help us in physics study.

Biography

Tongyuan Wang, Ph. D, M. Sc., M. E., M. A., has studied and worked in multi fields. He got his first degree in civil engineering, then a Master in engineering management, both at Chongqing University of China in 1980s. He then worked in that university as a lecturer. Upon becoming a vice professor, he moved to Canada, where he obtained a M. A. in economics, and then he switched to computer science from Graduate Diploma to Master and Ph. D degrees, all at Concordia University by 2010. After graduation, he did not continue teaching career due to a convention there that a new Ph. D holder may starts as assistant profession without a care of previous work experience. He then works for startup company to date. During the course, he still keeps academic and industrial research. His main research interests include pattern mining and ecological smart city.

Effective model for sodium insertion in hard carbon

H. S. Nguyen[1,2] and **A. Latz**[1,2,3]

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[2]*German Aerospace Center (DLR), Germany*
[3]*Helmholtz Institute Ulm (HIU), Germany*

Sodium ion batteries (NIB) are a potential alternatively for Lithium ion batteries (LIB) because of lower cost and more abundance. As anodes, Hard Carbon (HC) seems to be the most promising candidate for NIB with advantages: stable cycling, large specific capacity, and low-cost precursors. Previous theoretical researches studied general conditions for Na insertion in HC; while experimental studies proved that the properties of Na insertion in HC depend strongly on specific properties material of HC. Our target is building an effective model which can link theoretical researches in general conditions and experimental phenomena for specific materials of HC. In our effective model, HC are treated implicitly; while Na are modelled in the confined space, created by HC. To describe the complexity of Na behaviour in HC, different types of Na with different energy level are introduced. The results consist with experimental data; and clarify the contribution of types of Na in open circuit voltage, as well as capacity loss of Na in HC.

Biography

2015 – 2019: PhD student in UNSW @ Canberra, Australia. Research topic: model colloidal particles in polymer solution.

2022 – now: Postdoc in University of Ulm, Germany. Research topic: model Hard Carbon anode for Sodium ion batteries.

Nemesis formation around black holes with evidence

Yang I. Cao
Founder, Scientifique Global Limited, Hong Kong

I briefly present the evidence on extragalactic planets equivalent to the proposed counterpart Nemesis in the solar system. I theorize that the phenomenon is common for black holes and they aid star cluster formation. The observational evidence for these objects is presented with the instances of the Triffid Nebula M20 with ground-based telescope and M87 with the NASA space-based telescope data. I deem that an alternative formation of parallaxes should be in place for the calculations of their absolute magnitude and lensing for white hole observations. Further, I discuss the value of Pluto to an evidence-driven approach to cosmology.

Introduction

Nemesis was initially theorized for the periodical catastrophic extinctions of lifeforms in the solar system with comet showers. While the catastrophic scenarios are causally excluded from Nemesis, the sun's mysterious companion planet is not wiped out of existence in scientific literature (Melott & Bambach 2010). In the framework of Modified Newtonian Dynamics (MOND) studies with the galactic center, Nemesis was proposed to explain the perihelion precession of Saturn in the solar system (Iorio 2010).

Nemesis is thought to be cold and dark, and follow a highly elliptical orbit as a brown-dwarf-like companion to the sun between 0.07 and 0.0002 solar masses (Iorio 2010, Chobanu & Philippov 2016). The estimation of the mass ratio, however, is highly uncertain with the modification of general gravity supplemented by dark energy and antigravity in the cosmological mix (Tripathy & Mishra 2020). Nevertheless, either in the archeological or the contemporary theoretical models there is the room for the phantom planet of empirical and theoretical significance (Chimento et al. 2006, Cunningham 2016).

In the research, I report the findings on the Nemesis-equivalent planet in M87 with the NASA multispectral data, and further the solar Nemesis theory on the basis of its cosmological causal formation. When I first researched on the M87 data from the NASA Data Challenge in 2021, I proposed the possible and probable existence of the type of planets near black holes contributed by oscillation with ionization and electron pulsation (Pachankis 2022a). The interests for research, however, grow out of the stable detection of white holes through Nemesis with the

mathematical principles of Shannon entropy with the infinite product form of tidal parameter K (GM_X)/(r_X^3) of the still undiscovered body X (Shannon 1948, Iorio 2010).

Figure 1 Luminosity calibration of the Triffid Nebula M20 appears the source with absolute luminosity higher than the target observation.

Methods

It is not a rare experience in extragalactic source observations that a peculiar diamond-shaped highlight appears in the image just like that in Figure 1. The phenomenon has largely been neglected and overlooked, but there is indeed substance in the materials when I attempted to calibrate the cold dark matter representations of the observations seen in Figure 2 (Pachankis 2022b).

The nature of the phenomenon was only further analyzed with my data processing with the multi-wavelength NASA mission data on M87 with the black hole jet tail's influence on star formation seen in Figure 3 (Pachankis 2022a). The black hole jet tails, theoretically formed by the centrifugal force of ejected materials from white holes, fuels the Nemesis-equivalent stars and oscillates their polarity, demonstrated in Figure 4.

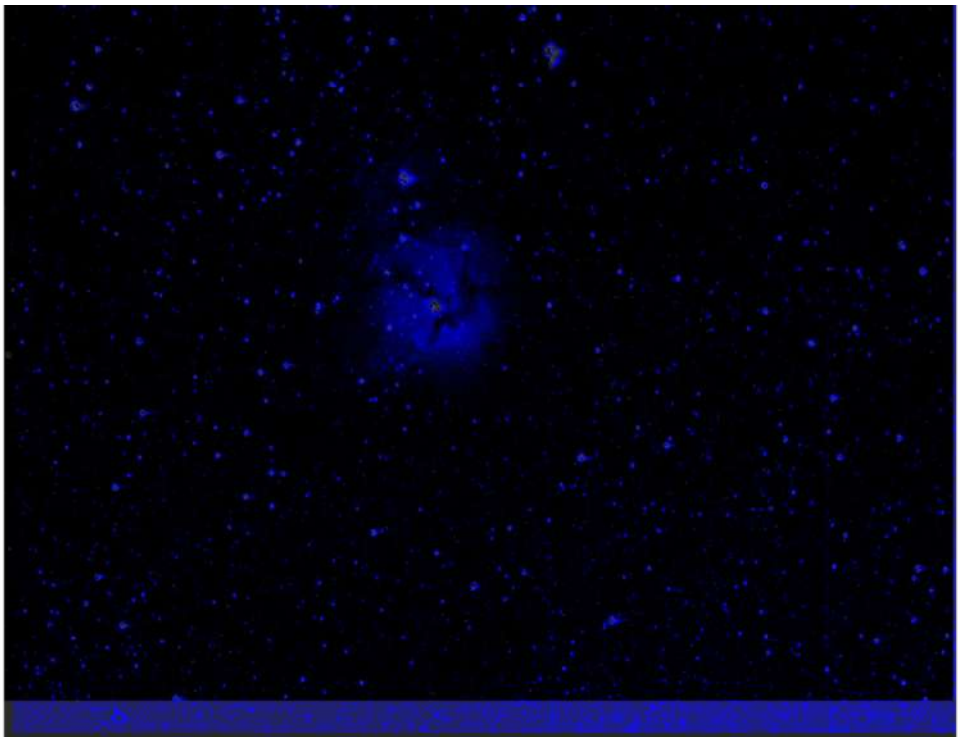

Figure 2 The cold dark matter representation of the Triffid Nebula M20 observation made on April 27, 2021.

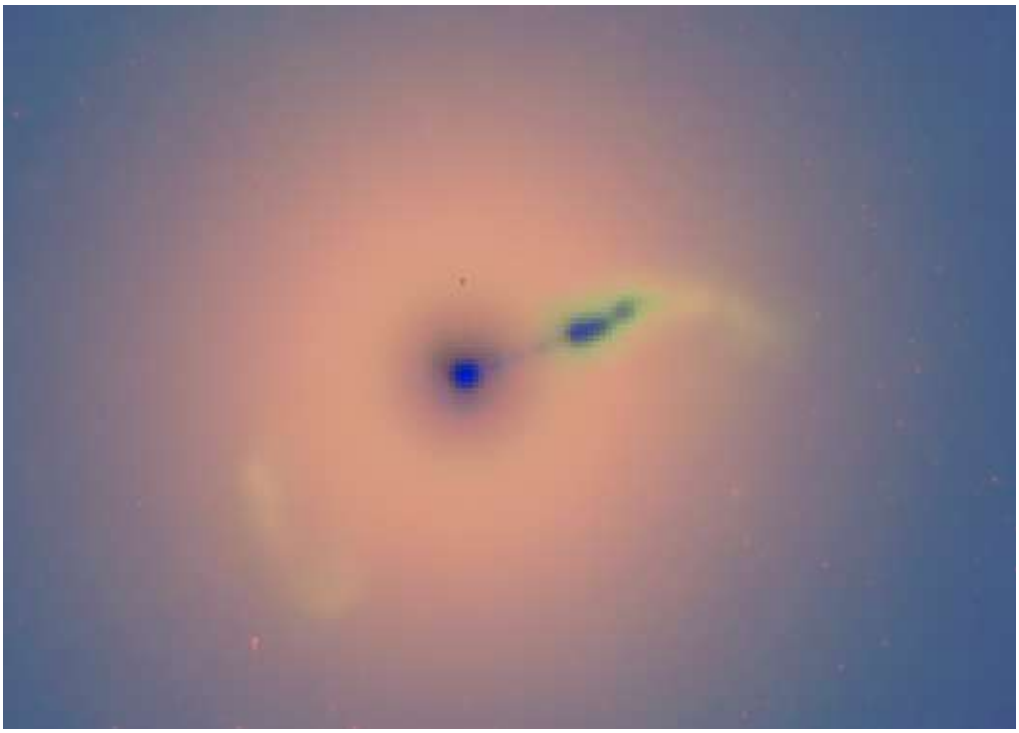

Figure 3 The companion Nemesis of M87 seen in red.

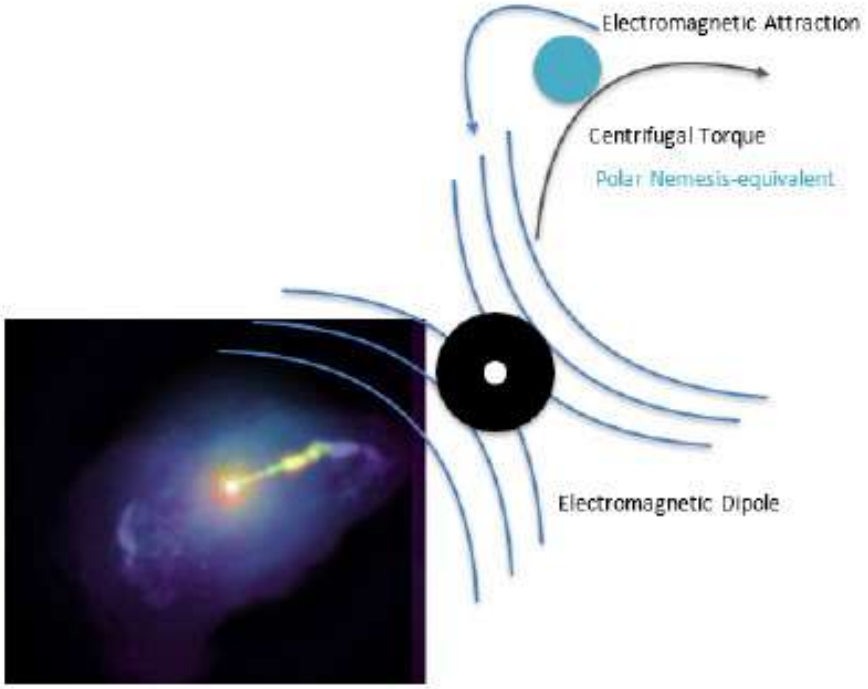

Figure 4 Demonstration of the nuclear oscillation and macroforce analysis with M87 data as an example.

Result

The analyses suggest the visibility of Nemesis observation would be flashing with electronic devices, and their elliptical orbital phase follows a two-force model instead of Newtonian or MOND gravitational expectations.

The polarity interpretations of Nemesis explain the causality of solar wind, and "big rip" phenomena in observations with electronic devices in instances. The absolute magnitude of Nemesis is expected to deviate from the current formula, and its correct formulation may need to involve the black hole singularity.

Nemesis' role in star formation with macroscopic spatial oscillation may imply that the phantom planet can be a new category of celestial object. In theory, their orbital phase is not primarily influenced by the companion stars, nor are they stars in themselves.

In observational astronomy and observational cosmology, it is theorized that lensing through Nemesis' absolute magnitude is the probable way in observing white holes. For that, an alternative solution for parallaxes need to be proposed.

Discussions

Pluto was once categorized as a planet for its near recent trajectories orbiting the sun. It has been noted, however, that energetic phenomena exist on the dwarf, contradicting the Big Bang model's explanations on dwarfs being remnants of energy-exhausted stars (Ksanfomality 2016).

The discovery, or re-discovery, of Pluto proceeded the death of Percival Lowell, who gave the

theoretical insights of Planet X / Nemesis (Science Reference Section 2019). No records of extensive analyses from the discovery to P. Lowell's original propositions (Iorio 2009) have been located in the research, with the impossibilities of verifying the discovery with the original author, but the post hoc evidence of the partly celestial and partly terrestrial components of Pluto suggests it the possible match, if not small systematic errors by an underestimate of the mass of Neptune (Iorio 2009), from P. Lowell's reasoning from a celestial mechanic methodological perspective.

What triggered my interests in the research, apart from the relevance of the Nemesis hypothesis to my previous theorization, was the macroscopic nuclear patterns of the planets from celestial to terrestrial planets. The Big Bang cosmology's explanatory offers on the thermodynamic patterns of the solar system's planets followed a linear construct of time progression, while Conformal Cyclic Cosmology (CCC) considered for the alternative possibilities on the originations of the ready-made solar system objects (Gurzadyan & Penrose 2016). If Pluto is purely a planet, then the possible explanation exists with the CCC framework that its formation was caught between one aeon and another; if it was not, my proposition would be that the oscillation between the Milky Way's black hole and white hole gave birth with the original materials to Pluto just as how they did to that of the sun (Pachankis 2022a), and more dense-energy-cored stellar objects from the like exist within our galaxy with strong energy resistance in the atmospheric mass density, formed from the collision momenta of the black hole seed and the white hole seed (Ricarte & Natarajan 2018).

Conclusions

The acceleration of the barycenter of the solar system (Iorio 2009) is not only the concern in celestial mechanics, but also in an evidence-driven approach in cosmology. The incorporation of quantum gravity theories into celestial mechanics will be a critical step for the evidence-driven cosmological implications, such as with the quantification of the ground state of the graviton (Marongwe 2024).

A pragmatic mutual ground has been reached from the opposite ends between the search for Nemesis and the quest for an evidence-driven approach to cosmology with black hole and white hole thermonuclear binding (Iorio 2010, Pachankis 2023). Defamiliarization of the solar system started with the search for Planet X / Nemesis and the evidential values of Pluto to cosmology is still an under-explored field.

If the atom can tell about the universe, then there is one question, if answered, that can shed further insights into the phenomenon of the planetary formation in the solar system: why the electron's path dependency differs from the positron in the nuclei?

A Silicon-Based PDMS-PEG copolymer microfluidic chip for Real-time polymerase chain reaction diagnosis

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[3]Thrust of Advanced Materials, The Hong Kong University of Science and Technology (Guangzhou), China

Polydimethylsiloxane (PDMS) has been widely used to make lab-on-a-chip devices, such as reactors and sensors, for biological research. Real-time nucleic acid testing is one of the main applications of PDMS microfluidic chips due to their high biocompatibility and transparency. However, the inherent hydrophobicity and excessive gas permeability of PDMS hinder its applications in many fields. This study developed a silicon-based polydimethylsiloxane-polyethylene-glycol (PDMS-PEG) copolymer microfluidic chip, the PDMS-PEG copolymer silicon chip (PPc-Si chip), for biomolecular diagnosis. By adjusting the modifier formula for PDMS, the hydrophilic switch occurred within 15 s after contact with water, resulting in only a 0.8% reduction in transmittance after modification. In addition, we evaluated the transmittance at a wide range of wavelengths from 200 nm to 1000 nm to provide a reference for its optical property study and application in optical-related devices. The improved hydrophilicity was achieved by introducing a large number of hydroxyl groups, which also resulted in excellent bonding strength of PPc-Si chips. The bonding condition was easy to achieve and time-saving. Real-time PCR tests were successfully conducted with higher efficiency and lower non-specific absorption. This chip has a high potential for a wide range of applications in point-of-care tests (POCT) and rapid disease diagnosis.

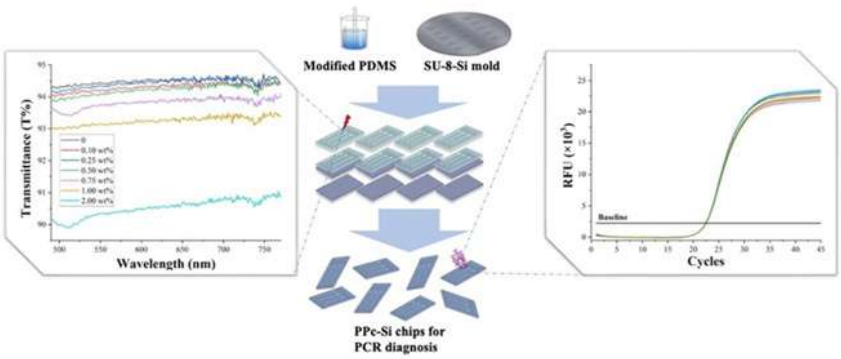

Figure: Graphical abstract

Biography

Qingyue is a PhD candidate in Biomedical Engineering at the Hong Kong University of Science and Technology (HKUST) with a keen interest in biomaterials and microfluidics. Her research centers around the utilization of microfluidics in the field of biomedical engineering, specifically focusing on applications such as polymerase chain reaction and flow cytometry. Throughout her academic journey, she has published 3 works and developed a strong expertise in materials characterization and nanofabrication techniques.

Qingyue's proficiency extends to various software used for platform design, numerical simulation, and data processing. Additionally, she has successfully collaborated with research-driven commercialization companies specializing in bio-chip detection technology and solar panel systems. These experiences have provided her with valuable insights into research and development operations, as well as the patent drafting process.

Beyond her academic pursuits, Qingyue has diverse experiences, having worked as an English home tutor, completed an internship at the Institute of Public Policy, and participated an exchange program in Germany.

Surface Plasmon Polariton Excitation and Propagation in Metal Tripod Systems

Muqaddar Abbas, Barry C. Sanders
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Through the activation of a planar gaseous medium consisting of four-level tripod atoms, our approach provides a mechanism that relies on the electromagnetic induced transparency (EIT) phenomena to generate the Surface Plasmon Polariton (SPP) without the requirement for a coupler. We investigate a three-layer setup where the tripod system is stacked at the bottom, a metal film is layered in the middle, and a transparent layer of either air or vacuum resides on top. The bottom layer facilitates SPP excitation via EIT window amplification in the tripod atom arrangement, caused by three laser beams: control, weak probe, and signal. The EIT effect, which can be seen in tripod atoms, compensates for the momentum difference between light and SPP. Further, we investigate the off-resonant situation, in which our atomic system acts as a double EIT with gain in the second window, resulting in light amplification as well as sharp surface plasmon resonance. We may coherently modulate the length of SPP propagation by varying the intensity of the control field, as well as resonance and off-resonant detuning. In the off- resonant setup, the combination of the control, signal, and probe fields causes a gain in one of the transparency windows, which improves transmission and reduces reflection. In addition, how SPP behavior is affected by metal thickness is examined, as well as the optical gain power, propagation length, and penetration depth of SPP. Our suggested method to generate SPP shows potential for use in photodetectors, sensors, polarizers, along lithography.

Thermal stability of nanocellulose extracted from oil palm trunk as reinforcement in poly(vinyl alcohol) composites

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[2]*Mechanical Engineering Department, King Fahd University of Petroleum and Minerals, Saudi Arabia*

This study was done to investigate the influence on thermal properties exhibited by nanocellulose extracted from oil palm trunk in poly(vinyl alcohol) (PVA) composite. Three different types of composites were fabricated namely, raw oil palm trunk (ROPT), cellulose from oil palm trunk (COPT) and Nanocellulose from oil palm trunk (NOPT) with 5% (w/w) was added to epoxy. The NOPT was characterized by FT-IR, XRD, TEM, and TGA. For composite the characterization was done using TGA. The peak at 1730 cm−1 was absence indicating the complete removal of hemicellulose and peaks corresponding to lignin at peaks 1515, 1428 and 1245, respectively were not visible after extracting nanocellulose as compared with raw oil palm trunk (ROPT). The crystallinity index for NOPT was increased to 65%. TEM showed a form of needle-like structure for NOPT. The interaction between NOPT and PVA was characterized by FT-IR with an increment of peak 1089 and 1028 cm^{-1}, which shows the physical interaction that occurred between PVA and NOPT. The dispersion of NOPT was quite homogenous, as observed in FESEM. The NOPT exhibited a good thermal stability, and less amount of char was formed at 700 °C compared to ROPT. Furthermore, the TGA demonstrated better improvement after addition of 5% NOPT into PVA.

Biography

Dr. Mohamad Nurul Azman bin Mohammad Taib graduated with a BSc (Hons) in Applied Sciences in Bio-composite Technology from Universiti Teknologi MARA Malaysia and continued in the same field for his MSc. He obtained a doctorate degree in chemistry from the University of Malaya in 2021. he joined KFUPM as Post-Doctoral Fellow starting in May 2023. His research interests include bio-polymers, bio-composites, wood composites, nanoadditives, and processing of polymers as well elastomers. He is also a member of professional technologist from Malaysia Board of Technologists (MBOT). He is actively involved in research and development (RnD) of the polymer-reinforced filler composite material products, such as for polymer composite and wood composite products. Latest research he investigated the flame retardancy of polymer composite reinforced with nano cellulose and nano lignin. He has published many of his research work in reputable journals and presented many scientific papers in various national and international conferences.

Automated crack detection in radiographic welding testing using convolutional neural networks

Abdulmalik Mohammed Yahya AlAbdali AlShareef

Bachelor's degree in Electrical Power Engineering Master of Nuclear Engineering

Industrial radiography is a non-destructive testing (NDT) technique that uses radiation to find defects in materials and their locations. The qualities and usability of the material are unaffected by this procedure, and this inspection can lower the likelihood that engineering structures will fail.

This paper proposes a CNN technique that uses binary classification to detect weld defects. In the first stage, the images were classified as training, testing, and validation after being cropped to 150 x 150 pixels and contrasted to make training the model easier. Furthermore, the results of multiple models were compared when filters were applied to cropped images versus without filters. It has been demonstrated that the use of filters improves the quality of results by increasing the visibility of defects and facilitating their identification.

I compared it to a model that uses binary classification and detects three types of defects. And the model demonstrated that it can handle two or more defects. The accuracy of the model is higher than 91%. As a result, the study suggests using the model.

Biography

Abdulmalik Mohammed Yahya AlAbdali AlShareef, graduate from Umm Al-Qura University in Saudi Arabia from the Department of Electrical Power Engineering, and master's degree from King Abdulaziz University specializing in nuclear power engineering. He have many professional and academic certificates such as Project Management Professional Certificate and Radiological and Emergency Management. He worked for a Swiss company as a project manager. He aspire to work in the field of energy and improve his knowledge expertise. One of his hobbies is writing articles and also, he have scientific literature (Book) on review stage.

Road disease detection algorithm based on YOLOv5s-DSG

Haichen Wang
Chang'an University, China

Automatic detection and classification of road damages are critical for the timely maintenance and repair of road surfaces. To address issues in road damage detection, such as single detection type, low detection efficiency, low-resolution detection objects, and difficulty in detecting small target features, this paper proposes an improved road damage detection algorithm YOLOv5s-DSG based on YOLOv5s. First, optimize the depth and width of the network structure to reduce the impact on road damage image detection performance. Second, the Ghost module replaces the traditional convolution to reduce the number of model parameters, making the model lightweight and improving the detection rate. Finally, the Space-to-depth-Conv module is introduced to adapt to low-resolution and small object detection tasks. Numerous experiments on datasets such as Road Damage Dataset 2022 demonstrate that the improved model's average accuracy increased by 1.1% compared to the original model, FPS increased from 85 to 90, and the parameter quantity decreased by 21.7%. It effectively alleviates problems in recognizing small targets. Compared to existing algorithms, it has significant advantages in road damage detection and classification.

Biography

Haichen Wang, Richard received his PhD degree in Computer Science from the School of Computing, National University of Singapore (NUS) in 2007 and an MS degree in Parallel Computing, also from NUS. He obtained his BEng. From the Dept. of Comp. Sci. and Eng., NWPU in 1990. Currently as a professor, he worked with School of Information & Engineering, Chang'an University in Xi'an China. His research interests include Computer Architecture, Parallel Computing, and Intelligent Traffic System.

Enhanced visible light-driven photocatalytic activity and stability of novel ternary ZnO/CuO/MoO_3 nanorods for the degradation of rhodamine B and alizarin yellow

Muhammad Khalid Hussain[1,2], N.R. Khalid[3], M.B. Tahir[4], Muhammad Tanveer[2], Tahir Iqbal[2] and **Maira Liaqat[2]**

[1]Research School of Chemistry, Australian National University, Australia
[2]Department of Physics, Faculty of Science, University of Gujrat, Pakistan
[3]Department of Physics, Institute of Physics and Materials Science, University of Okara, Pakistan
[4]Department of Physics, Khwaja Fareed University of Engineering and Information Technology, Pakistan

A newly developed photocatalyst, ZnO/CuO/MoO3 (ZnO/CuO/M), composed of nanorods, was synthesized through a straightforward hydrothermal treatment. The nanorods were thoroughly characterized, including an examination of their surface morphology, optical properties, and the dynamics of separating photoexcited charge carriers. In terms of photocatalytic performance under visible light, the ZnO/CuO/M nanorods exhibited substantial improvement compared to pristine ZnO, CuO, MoO3, and a binary CuO/M composite. Notably, the nanorods demonstrated superior degradation of organic pollutants, particularly achieving a 97% degradation of rhodamine B (RhB) and a 79% degradation of alizarin yellow (AY) within 120 minutes. Comparative analyses revealed a remarkable enhancement, with the ZnO/CuO/M nanorods surpassing pristine MoO3 by 57 times for RhB and 64 times for AY in terms of photocatalytic activity. This enhanced performance is attributed to the advantageous heterojunction structure of the ZnO/CuO/M nanorods, which facilitates the efficient and rapid transfer and separation of photoexcited charge carriers.

Biography

Dr. Muhammad Khalid Hussain is working as a Research Fellow at the Australian National University (ANU). He has joined the University of Gujrat as a Lecturer Physics. He has been serving as a reviewer for some journals, including Advanced Composites and Hybrid Materials, Journal of Sol-Gel Science and Technology, Madetarin Journal of Chemistry and Chemistry Select etc.

He then started his own Research Career with many National and International research collaborators in 2021. Hussain's research interests include in material science/condensed matter physics. His interest in research is development of novel nanostructures including metal oxides, chalcogenides, phosphides and carbon based materials with morphologies of 1D, 2D and 3D for photo-(electro)catalytic applications. He has gained proficiency in a wide range of materials characterization by microscopy (SEM, TEM, EDS) and spectroscopy (UV-visible, PL, EIS, FTIR, XPS, Raman, XRD) techniques. He has an excellent research background in many peer-reviewed international journal publications.

The application of generalized Rayleigh equation for description of periodic intramolecular rearrangements

Vladimir Voronov

Irkutsk National Research Technical University, Russia

This work is devoted to the substantiation of a fundamentally new idea of controlling a quantum dot and a method for its synthesis from paramagnetic molecules that are characterized by intra-molecular rearrangements, in particular, valence tautomerism. The primary task of the study was to select a model that would allow the experimental implementation of such an idea. In this re-gard, the possibility of using the self-oscillatory system described by the Rayleigh equation to describe intramolecular periodic oscillations was analyzed. Such a self-oscillating process is nothing but the periodic overcoming of the energy barrier separating the states between which the transitions of the place take place. These states can be realized for molecular systems whose behavior at the macrocosm level is associated with the manifestation of nonlinearity of intramolecular processes. Analysis of the coefficient before the second term of the generalized Rayleigh equation using the Prigogine-Lefebvre model shows that oscillations can be stable over time with very real energy barriers characteristic of intramolecular motions. It is concluded that the generalized Rayleigh equation, in principle, makes it possible to determine specific molecular systems that can be used as starting materials for the creation of quantum dots characterized by states with significantly different magnetic properties. Coordination compounds containing atoms with empty 3d-, 4f-, and 5f-shells are suitable for this purpose. In particular, due to the peculiarities of the electronic and spatial structure of such complexes, nonlinearities of intramo-lecular rearrangements occur, which provide the periodicity of changes in the parameters char-acterizing these multielectron systems. Based on the Prigogine-Lefebvre model, a quantum dot that works on the principle of self-organization can control the work of a nanotrigger. Such a na-notrigger is an inverter capable of independently performing the logical operation NOT and en-suring the execution of the quantum counting procedure.

Biography

Professor Vladimir Voronov's scientific interests are related to solving the problems of molecular spectroscopy and physical-organic chemistry by methods of high-resolution nuclear magnetic resonance and quantum chemistry. In addition, his research interests include research in the field of quantum information, as well as scientific and methodological problems related to the cognitive barriers of university students. He is the author or co-author of more than three hun-dred publications in domestic and foreign periodicals, including more than thirty books, including in English and Spanish. For merits in scientific and pedagogical activities, training of qualified specialists and many years of conscientious work, he was awarded the Order of Honor by the Decree of the President of the Russian Federation. He received a number of awards established by the Russian Academy of Natural Sciences, including the Gold Medal "For Innovative Work in the Field of Higher Education".

Synthesis of $Mo_2Ti_2C_3Tx$ MXene electrodes by Lewis acid molten salt route for energy storage

D. Gandla[1] and **D. Q. Tan**[1,2]

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MXenes, a class of two-dimensional transition metal carbides and nitrides, hold significant promise for electrochemical energy storage applications due to their exceptional electronic conductivity, tunable surface chemistry, and pseudocapacitive charge storage mechanisms. In this study, we demonstrate a novel one-step approach of in-situ deposition of Mo and Ti-dual oxide nanoparticles in Mo2Ti2C3Tx MXene (non-conventional nanomaterials) using the Lewis acid molten salt method (LAMS), with meticulous optimization of annealing conditions. The Mo, Ti dual oxide incorporation prevents the collapse of the MXene's layered structure and then results in the remarkable electrochemical performance of supercapacitors in aqueous electrolyte. Remarkable outcomes include a specific capacity of 434 C g-1 at 5 mA cm-2, exceptional cycle life with 94% capacity retention after 5000 charge-discharge cycles at 50 mA cm-2, and high-rate capability in 3M KOH aqueous electrolyte. This research underpins the potential of Mo and Ti-based MXenes as high-rate charge storage electrodes and paves the way to design next-generation electrode materials through sustainable synthesis routes.

Biography

Professor Tan is the Deputy Head of Department of Materials Science and Engineering, Guangdong Technion-Israel Institute of Technology. He obtained a PhD in Physics from Chinese Academy of Sciences in 1989 with expertise in defects in solids. He then taught at the University of Science and Technology of China. From 1994, Professor Tan moved to USA and received his Ph.D. in engineering from UIUC focusing on ferroelectric ceramics. Then, he developed dielectric ceramics and polymers, capacitors, and energy storage technologies in industry for 20 years. He has over 90 publications and 55 invention patents in these areas.

TPPII depletion causes presenile dementia in female mice by downregulating CYP19A1 through ATF6-SYVN1-UCHL1 axis-mediated autophagy pathway

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Tripeptidyl peptidase II (TPP2) is generally considered as a cytosolic protein which forms the largest known protease complex in eukaryotic cells to operate mostly downstream of proteasomes for degradation of longer peptides by removing tripeptides from free amino termini. However, this canonical function of TPP2 cannot explain its role in a wide variety of biological processes. The mechanistic interrelationships and hierarchical order of these processes have yet to be clarified. Here we show that TPP2 independent of its enzymatic activity is a key maintainer of intracellular calcium (Ca2+) homeostasis and thereby plays a key role in the biosynthesis of Phosphatidylcholine (PC). By generating and exploring the TPP2 knockout 293T cells and ubiquitous/excitatory neuron-specific TPP2 knockout mice, we found that TPP2 gene ablation leads to intracellular Ca2+ dyshomeostasis, PC deficit, and endoplasmic reticulum (ER) stress, which result in ATF6-SYVN1-UCHL1 axis-mediated autophagic CYP19A1 (Aromatase) degradation and ultimately estrogen depletion. Both ubiquitous and excitatory neuron-specific TPP2 knockout mice displayed impairment in learning and memory characterized with presenile dementia. This work therefore uncovers a new working mechanism of TPP2 which is not only of great significance for elucidating the pathogenesis and future treatment of dementia, but also for interpreting the role of TPP2 in other system and treatment of the related disorders.

Controlled excitation of colour centres in nanodiamonds integrated on a chip

Hamidreza Siampour

Centre for Quantum Materials and Technologies, School of Mathematics and Physics, Queen's University Belfast, UK

In this talk, I highlight recent advancements in the field of nanodiamond integration and their potential for quantum sensing and networking.

In the first part, I discuss the development of integrated quantum optical devices based on dielectric-loaded plasmonic waveguides with accurately positioned nanodiamonds containing single vacancy centres (1-4). By combining resonant and plasmonic enhancement, we significantly increase the spontaneous emission rate of single photons.

Moving on to the second part, I present a chiral nanophotonic platform with embedded single emitters that enables both Purcell-enhanced emission and strong chiral coupling. We observe record-high Purcell factors for quantum dots emitting in the slow-light spectral region and demonstrate chiral routing of spin-carrying photons with exceptional Purcell factors (5). These advancements, combining plasmonic and photonic crystal waveguide modes, enable strong bonding through radiation coupling in a shared mode. They pave the way for nanoscale functional quantum sensors and scalable quantum optical networks.

Extracellular vesicles mediated proinflammatory macrophage phenotype induced by radiotherapy in cervical cancer

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[2]*National Center for Children's Health (NCCH), Beijing Pediatric Research Institute, Beijing Children's Hospital, Capital Medical University, China*

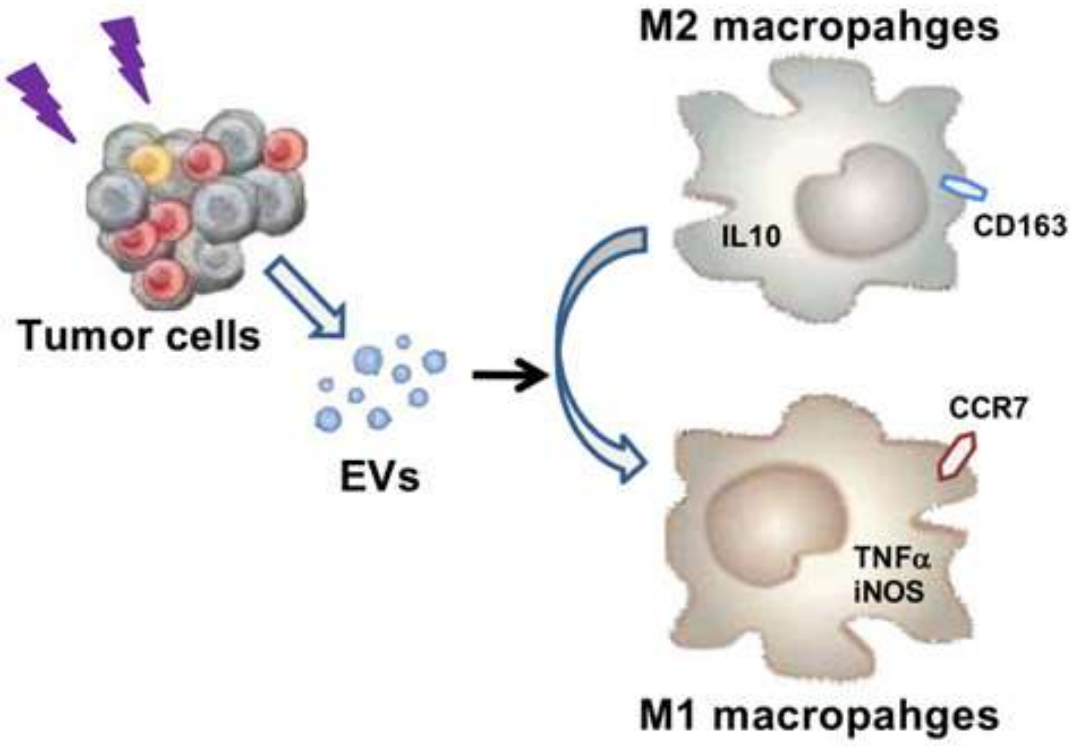
Background: Radiotherapy is a highly effective treatment for cervical cancer. Recent studies focused on the radiotherapy induced anti-tumor immunity. Whether tumor-derived extracellular vesicles (EVs) play roles in radiotherapy induced tumor associated macrophage (TAM) polarization remains unclear.

Aim: To study whether EV mediates radiation-induced anti-tumor immunity and its corresponding molecular mechanisms.

Methods: This study analysed the phenotype of macrophages in cancer tissue and peripheral blood of cervical cancer patients using flow cytometry analysis. The role of EVs from plasma of post-irradiated patients on M2-like transformed macrophages was assessed. The M1- and M2-like macrophages were assessed by expression of cell surface markers (CCR7, CD163) and intracellular cytokines (IL-10, TNF and iNOS). The capacity of phagocytosis was assessed by PD-1 expression and phagocytosis of pHrodo Red E. coli bioparticles.

Results: Our results demonstrated that radiotherapy of cervical cancer induced an increase in the number of TAMs and a change in their subtype from the M2-like to the M1-like phenotype (increased expression of CCR7 and decreased expression of CD163). The EVs from plasma of post-irradiated patients facilitated the M2-like to the M1-like phenotype transition (increased expression of CCR7, TNF and iNOS, and decreased expression of CD163 and IL-10) and increased capacity of phagocytosis (decreased PD-1 expression and increased phagocytosis of pHrodo Red E. coli bioparticles).

Conclusions: Our data demonstrated that irradiation in cervical cancer patients facilitated a proinflammatory macrophage phenotype which could eventually able to mediate anti-tumor immune responses. Our findings highlight the importance of EV in the crosstalk of tumor cells and TAM upon irradiation, which potentially leading to an increased inflammatory response to cancer lesions.



Biography

Junli Ren, Chief Physician, specializes in the diagnosis and personalized treatment of gynecological tumors (cervical cancer, endometrial cancer, vulvovaginal cancer, etc.) and malignant tumors of the digestive and urinary systems (liver, gallbladder, pancreas, rectum, prostate, etc.) through radiotherapy and chemotherapy. Social position: Young member of the Cancer Radiotherapy Professional Committee of the Wu Jieping Medical Foundation in China, member of the Gynecological Oncology Group of the MDT Professional Committee of the China Research Hospital Association.

Modelling convective transport of hybrid nanofluid in a lid driven square cavity with consideration of brownian diffusion and thermophoresis

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Previously, the homogenous models were predominant in hybrid nanofluid's studies. However, there is a serious deficiency in these models, that is, the heat transfer coefficients obtained by these models are inconsistent with the experimental results. To overcome this issue, we develop a novel hybrid nanofluid model based on the major slip mechanisms of nanofluids caused by Brownian diffusion and thermophoresis. The problem of flow and heat transfer of a hybrid nanofluid in a lid driven square cavity filled with porous medium is studied as an example to show the correctness and validity of this new model. Numerical results are given by means of the novel Coiflet wavelet homotopy analysis method in the terms of the Brownian motion and thermophoresis. The physical behaviors of hybrid nanofluids flow are discussed in terms of various quantities such as the stream-function, the isotherms, and the Nusselt and Sherwood numbers. The average Nusselt number evaluated with the help of the quadratic multiple regression analysis justifies that the thermophoretic effect is more dominant than the Brownian motion on Nusselt numbers at both walls.

Biography

Dr Sohail Ahmed received Ph.D. degree in 2022 from Naval School of Architecture Ocean and Civil Engineering from Shanghai Jiao Tong University, Shanghai China and currently working as postdoctoral researcher at School of Mathematics Shenzhen University China. He works in Computational Mathematics and Applied Mathematics with the main focus on Numerical Analysis, Partial Differential Equations, Scientific Computing, and Data Science. His work reflects a strong interplay of rigorous mathematical analysis, the design and implementation of accurate and efficient numerical algorithms for partial differential equations (PDEs), and their applications to physics, astrophysics, engineering, biology, energy, and oncology. His research interests focus on advanced numerical methods for modern PDE challenges, such as high derivatives, maximum principle preserving, singularities, high dimensions and multiscale.

Advancements in self-healing water-sealing materials for engineering applications in water-related environments

Wentong Lu, Hao Tian, Yiyao Zhu and **Jincheng Wang**

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In various engineering manufacturing sectors, particularly in river and marine engineering, groundwater projects, and deep-sea operations, the presence of water poses significant challenges due to its pervasive nature and the inability to be controlled like soil, rocks, or vegetation. Water, composed of countless tiny molecules, exhibits the characteristic behavior of gravitationally driven flow towards lower points, permeating even the smallest crevices. Prolonged water infiltration can lead to extensive leakage, posing challenges for machinery and metal components requiring dry working environments. In large-scale construction projects, machinery primarily consists of metal and its alloys, often coated with corrosion-resistant layers. However, these coatings have limited lifespans due to corrosion and abrasion during operation. Therefore, sealing materials play a crucial role in isolating water interference. Conventional sealing materials, when subjected to prolonged water exposure, often exhibit inadequate durability. Thus, adopting a "treating water with water" approach, employing elastic materials capable of water absorption and expansion, becomes imperative. Introducing water-absorbing fillers into elastic materials enhances their performance. Common fillers like superabsorbent polymers (SAP) or crosslinked sodium polyacrylate (PAANa) exhibit excellent water absorption properties, expanding their volume hundreds to thousands of times.

This work presents a self-repairing water-absorbing expansion material, wherein the material's expansion within a confined space exerts pressure on fracture ends, promoting self-repair under external forces. Polyurethane materials demonstrate superior repair efficiency compared to rubber elastic materials, especially with repair efficiency often temperature-dependent. Polyurethane materials, synthesized from polyols and isocyanates, offer flexibility in formulation selection. In this invention, polyether polyols are chosen due to their suitability for self-repairing water-absorbing polyurethane elastomers. Hexamethylene diisocyanate (HDI) is selected for its linear structure, facilitating polymer chain formation with polyols. Diamine pyridine (DAP) serves as a chain extender, contributing to both chain extension and repair.

The main theme of this work is the utilization of perfluoropolyether diol (PFPE), possessing dipole-dipole interaction capabilities through C-F bonds. Leveraging dipole-dipole interactions and metal coordination, self-repair is promoted. While water affects metal coordination efficiency, dipole-dipole interactions remain largely unaffected, even in harsh water conditions, facilitating self-repair. This comprehensive approach offers promising avenues for enhancing the durability and performance of materials in water-related engineering applications, addressing critical challenges in construction and maintenance in such environments.

Biography

Wentong Lu has mainly engaged in the research of functionalized polymer materials, and his current research interests include the development of polymer materials in natural sources, the development of polymer materials in engineering, and the development of functional materials in water-related environments. The main research contents are self-healing engineering elastomers, degradable soil slow-release capsules, underwater sealing devices, etc. He has published more than 10 SCI papers.

Effects of various nanofluids on the performance of double tube heat exchangers

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In this study, different nanofluids such as SiO_2, Al_2O_3, CuO, and Ag, with water as the base fluid, were numerically investigated to analyze the heat transfer and fluid flow characteristics and their impact on the performance of a double tube heat exchanger. Computational Fluid Dynamics (CFD) simulations were conducted using ANSYS Fluent software. The results indicated that SiO2 nanofluid achieved the highest increase in Nusselt number in the double tube heat exchanger, as well as the largest increase in pressure drop.

Biography

Ebrahim Tavousi: PhD student in Mechanical Engineering at Birmingham City University.

Actinides Th and U in Atmospheric Particulate Matter in Yakutsk

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The distribution of Th and U was studied in the near-ground atmosphere of the city of Yakutsk. The chemical compositions of particulate matter (PM) in the summer atmosphere and in the solid and soluble phases of the snowpack were studied in 2019–2020. In the summer atmosphere, Th and U are concentrated mostly in the dust fraction of PM, together with a group of siderophile elements. The wintertime PM is characterized by a more homogeneous size of its particles. PM minerals with which concentrations of actinides correlate are amphiboles and pyroxene for Th and carbonates for U. The Th and U concentrations were found out to systematically decrease in the sequence soil–summer PM (dust)–winter PM (snow), at the dominance of Th, but the aqueous phase of the snow contains U concentrations one order of magnitude higher than those of Th.

The bulk (close to 90%) of actinides is deposited during the warm season (table).

Actinide	Statistical parameter	Summer PM		Winter snow				Total deposition
				Dust		Aerosols		
		mg / m² day	%	mg/m² day	%	mg / m² day	%	mg / m² year
Th	Cavg	0.233	89	0.028	11	0.9 ·10-7	n ·10-7	46.5
	Cmax	0.934	95	0.053	5	0.3·10-6	n·10-6	169
U	Cavg	0.084	91	0.008	9	0.8·10-6	n·10-6	16.4
	Cmax	0.274	97	0.009	3	1.0·10-5	n·10-5	48

Note: C_{max} – maximum concentration, C_{avg} – average concentration.

The total amount of actinides falling out in Yakutsk is 63 mg/(m2 year), with two-thirds of this amount being Th. This value may locally increase to 200 mg/(m2 year) and more in areas of

contrasting anomalies, with the predominance of Th. The main sources of actinides entering the near-ground atmosphere of Yakutsk are dusting from the soil surface and emissions from vehicles, with lesser amounts coming from energy-producing and construction-industry facilities.

Biography

Makarov Vladimir Nikolaevich – chief researcher at the Institute of Permafrost Science named after P.I. Melnikov SB RAS, Yakutsk, Russia, Doctor of Geological and Mineralogical Sciences, Professor. V. Makarov is a specialist in the field of permafrost geochemistry, author of 344 scientific works, including 19 monographs, 7 patents. He substantiated the position about the phenomenon of cryogenic migration of ore chemical elements, covering the entire thickness of permafrost and glacial ice. Developed the scientific basis for geochemical prospecting for mineral deposits in the permafrost zone; studied the large-scale ecological and geochemical transformation of natural (in mineral deposits: diamonds, gold, tin, antimony, hydrocarbons, coal, etc.) and technogenic (development of mineral deposits, residential areas) objects, established the characteristics of the migration of toxic chemical elements (nitrogen, lead, arsenic, actinides, etc.) in the cryolithozone.

Novel hydrothermal surface modification process for powder manufacturing of Al alloys

M. Atamna, A. Sobolev and **M.Zinigrad**

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This research examined the impact of the hydrothermal coating technique on the modification process of Al powder. Commercial pure aluminum powders were coated with a silica nano-layer via a single-step hydrothermal treatment. This study investigates the effect of incorporating surface-modified particles on the properties of aluminum powder manufactured using the powder metallurgy method. The samples were analyzed using scanning electron microscopy (SEM) with an EDS detector, optical microscopy, image analysis software, X-ray phase analysis (XRD), and tensile test machine measurements. The findings showed that the sample's structural characterizations revealed a silica nano-coating on aluminum particles, as depicted in the SEM micrographs with the cross-sectional results of the EDS-mapping analysis of the coating aluminum particles by HTT technology. The EDS-mapping analysis confirmed the presence of a silica layer that is continuously coated on the core particle surface of aluminum. Furthermore, the incorporation of surface-modified particles by powder metallurgy resulted in improved grain structures and a decrease in grain size. Mechanical testing proved that the modified samples displayed superior tensile strength and elongation in comparison to pure aluminum samples. This research highlights the potential of surface modification of aluminum powder in advancing the powder manufacturing of aluminum alloys for nanotechnology applications, offering insights into the fabrication and characterization of nanostructured materials for industrial applications.

Biography

Maria Atamna is a Ph.D. student member of the Materials Research Centre fellow at Ariel University, Israel, contributing significantly to the field of Chemical Engineering under the esteemed guidance of Prof. Micheal Zinigrad and Dr. Alexander Sobolev. Her research primarily focuses on the pioneering development of a cutting-edge technology that applies modification of aluminum and its alloys by nano-modifiers surface coating that influences the structure and mechanical and physical properties, a breakthrough with substantial implications for aerospace technologies. Currently, Maria is engrossed in the production of these nano-coatings, specifically tailored for utilization in 3D printing applications. Her scholarly contributions extend to the publication of several papers in prestigious journals, shedding light on the pivotal role of nanotechnology and metallurgy. Her ongoing work, which continues to push the boundaries of this field, is in the process of being communicated to the broader scientific community.

Advances in organosulfur-based polymers for drug delivery systems

Fawad Islam and **Qingle Zeng**

College of Materials, Chemistry & Chemical Engineering, Chengdu University of Technology, China

Organosulfur-based polymers have unique properties that make them useful for targeted and managed drug delivery, which can improve therapy while reducing side effects. This work aims to provide a brief review of the synthesis strategies, characterization techniques, and packages of organosulfur-based polymers in drug delivery. More importantly, this work discusses the characterization, biocompatibility, controlled release, nanotechnology, and targeted therapeutic aspects of these important structural units. This review provides not only a good comprehension of organo-sulfur-based polymers but also an insightful discussion of potential future prospective in research. The discovery of novel organosulfur polymers and innovations is highly expected to be stimulated in order to synthesize polymer prototypes with increased functional accuracy, efficiency, and low cost for many industrial applications.

Biography

Fawad Islam received his Bachelor's degree from Shaheed Benazir Bhutto University Sheringal Dir (U), KPK Pakistan in 2022. Currently He is doing research for his Master's degree under the supervision of Professor Qingle Zeng at Chengdu University of Technology. His research interest is in drugs delivery system, Nano coating of different drugs, Natural Products chemistry, Organic Synthesis and different biological activities.

A Review of the Efficiency of White Light (or Other) Emissions in Singly and Co-Doped Dy^{3+} Ions in Different Host (Phosphate, Silicate, Aluminate) Materials

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University of Johannesburg, Johannesburg, South Africa

In this wide-ranging work, we examine a collection of research papers devoted to the investigation of white light emission, both from Dy^{3+} doped and undoped phosphor materials, with a particular emphasis on optimizing the optical emission properties for commercial white light emitting diodes (wLEDs). In a quest of a singular phosphor material capable of delivering high-quality white emitting light when excited by UV or near UV radiation remains an active area of research for researchers today. Amongst the various rare earth elements employed, Dy^{3+} stands out as the unique rare-earth ion capable of simultaneously emitting both blue and yellow light upon UV excitation. Fine-tuning of the intensity ratios of these yellow to blue emissions becomes crucial in achieving the desired white light emission. The Dy^{3+} (4f9) ion exhibits approximately four emission peaks at 480 nm, 575 nm, 670 nm, and 758 nm, corresponding to transitions from the metastable $^4F_{9/2}$ state to various lower states ($^6H_{15/2}$ - blue, $^6H_{13/2}$ - yellow, $^6H_{11/2}$ - red, and $^6H_{9/2}$ - brownish red). Remarkably, the hypersensitive transition at $^6H_{13/2}$ (yellow) is inherently electric dipole in nature, exhibiting prominently when Dy^{3+} ions occupy a low symmetry site that lacks inversion symmetry in the phosphor host matrix. Conversely, the blue magnetic dipole transition at $^6H_{15/2}$ becomes pronounced when Dy^{3+} ions are strategically located at highly symmetric sites within the host material with inversion symmetry. Despite the achievement of white color emission from Dy^{3+} ions, these transitions primarily involve parity-forbidden 4f-4f transitions, occasionally leading to reduced white light emissions. Consequently, the inclusion of a sensitizer becomes crucial in enhancing the forbidden transitions experienced by these Dy^{3+} ions. Throughout this review, our focus extends to the variation in yellow-to-blue emission intensities observed in various host materials, covering phosphates, silicates, and aluminates, whether Dy^{3+} ions are doped or undoped. The investigation involves a thorough examination of their photoluminescent properties (PL), CIE chromaticity coordinates, and correlated color temperature (CCT) values, with the goal of achieving compliant white color emissions suitable for varied environmental temperature applications.

Biography

Prof. L Reddy, a distinguished scholar, earned his prestigious PhD in Physics from the esteemed University of Johannesburg in South Africa. With a profound expertise in condensed matter physics, he has consistently demonstrated a fervent passion for research and exploration. Initially delving into the magnetic properties of bulk materials, Prof. Reddy has since shifted his focus towards the captivating realm of luminescent properties in phosphor materials. This captivating field opens exciting avenues in diverse applications such as phototherapy, energy storage in battery cells, light-emitting devices, and cutting-edge display lighting systems. As a visionary leader, Prof. Reddy leads a dedicated research team that explores magnetic properties at the nanoscale level, pushing the boundaries of scientific understanding in this domain. His contributions to the scientific community are invaluable, with a prolific publication record in esteemed peer-reviewed journals. Recognized for his expertise, he is frequently invited to deliver keynotes and invited lectures at prestigious conferences worldwide, illuminating current topics in nanotechnology. Prof. Reddy's mentorship has played a pivotal role in nurturing future talent, as he has successfully supervised numerous MSc and PhD students, leaving an enduring impact on the scientific landscape. In South Africa, he is esteemed as an NRF-rated scientist, a testament to his remarkable contributions and dedication to advancing the field of nanotechnology. He envisions nanotechnology as the vanguard of solving contemporary challenges in medicine, health, battery technology, lighting devices, communication technology, and solar cells, making him a catalyst for innovative solutions that benefit humanity.

Quantum entanglement between a hole spin confined to a semiconductor quantum dot and a photon

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[2]*Institute of Theoretical Physics and Astronomy, Vilnius University, Lithuania*

We demonstrate quantum entanglement between a single hole spin confined to a positively charged semiconductor quantum dot (QD) and a photon spontaneously emitted from the matter's excited state. The QD system is in the Voigt geometry with two ground hole spin states and two excited trion states. We consider the light-matter coupling initially prepared in one of the ground hole spin states. For very weak Rabi frequencies, the spin-flip process transfers most of the population to another hole spin state, leading to the disentanglement between the single photon and single QD hole spin. A maximum entanglement is achieved by increasing the intensity of Rabi frequencies. In this case, the population almost equally distributes among all the bare quantum states. Our results may pave the way toward creating a scalable QD quantum computing architecture relying on the photon as flying qubits to mediate entanglement between distant nodes of a QD network.

Biography

Meisam Memarzadeh and he graduated from the University of Tabriz with a Ph.D. in Photonics, specializing in Quantum Optics. With a keen interest in both academia and industry, he have extensive teaching experience at the undergraduate and graduate levels. As a dedicated researcher, he have published four papers in ISI journals, showcasing his expertise in the field of Quantum Optics. his commitment to advancing the boundaries of knowledge has earned him respect in both academic and professional circles. He continue to contribute to the field through innovative research and a passion for teaching and mentoring the next generation of scientists and engineers

Curved Momentum Spaces: Investigating G.Z.K Cutoff Energy and Modified Compton Scattering

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[1]*Physics faculty of Mazandaran University, Babolsar, Iran*
[2]*Physics Faculty of Amirkabir University, Tehran, Iran*

This study delves into the extension of the G.Z.K equation within a curved momentum space, demonstrating its congruence with experimental data on the cutoff energy displacement. Furthermore, an analysis of Compton scattering, incorporating a modified dispersion relation derived from this model, was investigated. The analysis specifically focused on exploring energy cutoffs and the behaviour of Compton scattering in a spatial geometry defined by de-Sitter properties. The results show that a limit value for momentum is obtained in the desired de-Sitter momentum space.

Biography

He was PhD applicant interested in cosmology working specifically on CMBs and Blackholes. Having a great understanding of cosmology, quantum mechanics and mathematical physics he was trying to develop the intersections of these fields with each other. He was also drawn to the prospect of contributing to collaborative research initiatives at international research institutions or universities.

Horizontal rate of spread of Polycyclic Aromatic Hydrocarbons in soil

Prahash Chandra Sarma and **Niranjan Phukon**

Cotton University, Guwahati, India

The rate of horizontal spread of Anthracene, Fluorene and Phenanthrene in soil is determined in an experiment spread over a year under natural environment. The study regarding their natural degradation or enhanced degradation by different addendums have been widely done and reported. However, the study regarding their vertical and horizontal movement in soil is very limited and is not reported. Since, soil is one of the best supporters of life on earth; rate of horizontal movement of a pollutant such as polycyclic aromatic hydrocarbons in soil plays a major role in animal health. As such, the work needs extensive awareness and systematic study.

In the present work, Known amount of the hydrocarbons were added to prepared and protected soil beds, extraction of the same were done later on at definite time intervals, at definite distances from the point of application and quantitative determinations were done by HPLC analysis of the extract. An experiment in internal plot of soil was also set up in order to study the extent of degradation during the study period. The quality of the experimental soil was determined by analyzing the soil with respect to important physico-chemical parameters and the concerned aromatic hydrocarbons.

The values of soil parameters were in agreement to the characteristics of a good soil. It has been found that one-year time is sufficient for the applied quantity of the hydrocarbons to spread uniformly to attain a concentration, which is at par with natural concentration of the hydrocarbons in the experimental soil. Studies on kinetics of the reaction imply that the reaction occurs in different phases, rate constants being gradually increased with time. It has been found that the most probable rate of horizontal spread of the hydrocarbons Anthracene, Fluorene and Phenanthrene is 4.83, 2.80 and 2.89 $X10^{-8}$ m s^{-1} respectively.

Biography

Dr Prahash Chandra Sarma is an M Sc in Chemistry, an M Phil in Environmental Science, and a Ph D in Chemistry from Gauhati University. He started his carrier as a Lecturer in Chemistry (1985) and retired as an Associate Professor in Chemistry in 2023. Presently he is one of the Ph D guides of the Department of Chemistry, Cotton University. He completed three innovative research projects under Department of Science and Technology, Govt of India and four research projects under UGC, India. One of his innovations 'Low cost combined water and soil testing kit' was accepted by the Govt of India as the official instrument during Year of Scientific Awareness, 2004. He has successfully produced one M Phil, two PhDs and guided 37 M Sc student projects. Six students are pursuing Ph Ds under his supervision. He has published more than 27 research papers and 11 book chapters.

Time Reversed States in Barrier Tunneling

Kanchan Meena and **P. Singha Deo**

S N Bose National centre for Basic Sciences, India

Tunneling, though a physical reality, is shrouded in mystery. Wave packets cannot be constructed under the barrier and group velocity cannot be defined. The tunneling particle can be observed on either side of the barrier but its properties under the barrier has never been probed due to several problems related to quantum measurement. We show that there are ways to bypass these problems in mesoscopic systems and one can even derive an expression for the quantum mechanical current under the barrier. A general scheme is developed to derive this expression for any arbitrary system. One can use mesoscopic phenomena to subject the expression to several theoretical and experimental cross checks.

For demonstration we consider an ideal 1D quantum ring with Aharonov–Bohm flux ,

connected to a reservoir. It gives clear evidence that propagation occur under the barrier resulting in a current that can be measured non-invasively and theoretically cross checked. Time reversed states play a role but there is no evidence of violation of causality. The evanescent states are known to be largely stable and robust against phase fluctuations making them a possible candidate for device applications and so formalizing the current under the barrier is important.

Biography

Her name is Kanchan Meena, and she holds a Master's degree in Physics with a 70% score. She has successfully cleared the CSIR-JRF national exam in India twice. Kanchan Meena is a meritorious student who has her own fellowship from the "Human Resource Development Group (HRDG)" ministry of the government. Kanchan joined S. N. Bose Institute in August 2019 as a Research Fellow and is currently pursuing her Ph.D. under the supervision of Prof. P. Singha Deo in mesoscopic physics in the department of Physics of Complex Systems. She has two published papers, as mentioned above, focusing on the crucial problem of phase shift of an electron wave function. Kanchan is recognized for her diligent work and is nearing the completion of an efficient study on local entities in quantum systems, specifically in mesoscopic systems. Her primary focus is on theoretical research, utilizing tools such as Burger's circuit and Argand diagram, which fall under Functional Analysis and van-Neumann quantum mechanics.

Artificial neural network (ANN) used to optimized the hydrophilic and hydrophobic studied by Emulsion method

Djebbar Mustapha

Laboratory of process engineering and chemistry of solutions (LGPCS), Department of process Engineers (ST), University of Mascara , Algeria

The loading of (AP) in a solution contains surfactants are natural candidates for stabilizing emulsions provided by water (hydrophilic) and Active principle often fatty, oil (hydrophobic) was studied by EMULSIONS method. The results were modeled using artificial neural network (ANN) and pseudo-first and second order. We used MATLAB and HYSYS software to determine the test, validation and overall regression. The synthesis method was Stacking of natural kaolinite solid particles into zeolite by thermal activation at 500°C which was improved by increasing the temperature. The maximum capacity (AP) on untreated and treated zeolite X at equilibrium (Qe) 130 mg/g and maximum charge adsorption capacity was found to be 100.09. % of (AP) per gram of zeolite X respectively.

Sediment transport in accelerated flows

Arno Roland Ngatcha Ndengna[1], Daniel Bandji[2] and **Abdou Njifenjou[3]**

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Several coastal flows observed in the nature are turbulent or accelerated due to the morphology of the bottom. When bottom moves, small vortical structures are created and become important over time. The literature does not provide an averaged hyperbolic sediment transport model (STM) for coastal zones that accounts for turbulence arising by the presence of an abrupt mobile bottom. Models based on classical shallow water are commonly used to describe sediment transport, but they are not applicable when the flow becomes distorted or when there are vortical structures. These models only consider the mean motion and neglected the fluctuating motion arising by the fluid velocity fluctuation correlations. We propose a new description of the sediment transport with accounting the turbulence in long-wave approximation. The model obtained in this study builds upon previous work by authors in 1980, 2007, 2012, and 2018, while also improving upon more recent models developed in 2020-2023.

An approach to the quasi-equilibrium state of a self-gravitating system

Azizollah Azizi and **Amir A. Khodahami**
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An approach will be proposed to find out when a self-gravitating system is in a quasi-equilibrium state. This approach is based on a comparison between two quantities identifying the behaviour of the system: a measure of interactions intensity and the area. Gravitational scattering cross section of the system, defined by using the two-particle scattering cross section formula, is considered as the measure of interactions intensity here. A quasi-equilibrium state of such system is considered as a state when there is a balance between these two quantities. As a result, an equation will be obtained which relates density and temperature for such a system in the non-relativistic classical limit. This equation is consistent with the TOV equation as expected..

Biography

He is a PhD Candidate at Shiraz university, Shiraz, Iran, specializing in Theoretical High Energy Physics (HEP-Th). His focus areas include Field Theories and Quantum Information. Currently, his researching the informational content of black hole radiation through Entanglement Entropy.

Production of a Higgs boson in association with a pair of fermions in the presence of a circularly polarized laser field

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We have investigated the process of Higgs-strahlung production in association with a pair of fermions, $e^{+}e^{-}\rightarrow f\bar{f} H$, at the leading order in the presence of an intense electromagnetic field with circular polarization. We have considered only the initial particles inside the laser field as a first step. In the second part, we have embedded both initial and final particles in the laser field. We have analyzed the angular distribution of the produced Higgs boson as a function of the laser parameters in both cases. We have found that, the order of magnitude of the differential cross-section of both processes $e^{+}e^{-}\rightarrow\mu^{+}\mu^{-}H$ and $e^{+}e^{-}\rightarrow b\bar{b} H$ is reduced more significantly in the case where both initial and final particles are embedded in the laser field.

Magnetocaloric effect (MCE) of a quantum pseudodot

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[2]Laboratoire de Mécanique, Matériaux et Structures, Département de Physique, Université de Yaoundé1, Cameroon
[3]Department MO, IMT-Atlantique, France
[4]International Chair in Mathematical Physics and Applications (ICMPA-UNESCO Chair), University of Abomey-Calavi, Republic of Benin

The magnetocaloric Effect (MCE) of a quantum pseudodot was investigated by considering the influence of spin–orbit interaction (SOI). The entropy and internal energy change have been calculated using the Tsallis formulation. Our results reveal that both the SOI effect and external parameters have a significant impact on the entropy and internal energy changes of a quantum pseudodot. It is important to note that the MCE is closely linked to the behaviour of the magnetic dipoles, and the presence of external magnetic fields and SOI exert considerable influence on the entropy change, both analytically and numerically. Additionally, our results highlight the sensitivity of the MCE to the extensivity parameter.

Biography

Dr. Nguepnang defended his PhD at the university of Yaoundé 1 in Cameroon since February 2024. his work focused on the dynamic and decoherence of the polaron and bipolaron in transition metal dichalcogenide, this experience allowed us to publish a few scientific articles in indexed and peer-reviewed journals. As a young researcher he also explored the thermodynamic and magnetocaloric effect of quasiparticules in nanostructures such as quantum dots. So, at the moment, they are therefore working on the magnetocaloric effect in transition metal dichalcogenides for their applications in cooling processes both on residential and industrial scale.

Time-domain Green's function associated to the Interface problem for the Klein-Gordon equation

Khedidja SALHI[1] and **Mounir TLEMCANI**[2]

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The main goal is to show how to obtain a representative form of the Green's function associated with the source or interface problem of the Klein-Gordon equation from a known result of the solution of the non-dispersive wave equation. The results can be extended to more general situations, particularly stratified media where the Cagniard-de Hoop method fails.

Biography

Dr. Khedidja. Salhi works as an assistant professor in the preparatory department at the Higher School of Economics in Oran, Algeria. She has about ten years of teaching and research experience, specializing in applied mathematic.

SYNCOP: An evolutionary multi-objective placement of SDN controllers for optimizing cost and network performance in WSNs

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[2]Gazvin Islamic Azad University, Iran
[3]South Tehran Branch, Islamic Azad University, Iran
[4]Amirkabir University of Technology, Iran

Wireless Sensor Networks (WSNs) are inherently dynamic, making network management challenging. Software-Defined Networking (SDN) offers a promising solution by introducing a logically centralized control plane. To enhance fault tolerance, scalability, and overall performance, deploying multiple SDN controllers in a physically distributed manner is common. However, despite this physical distribution, the logical centralization principle of SDN necessitates a consistent network state view across all controllers. Deploying multiple controllers incurs higher synchronization and deployment costs. Therefore, optimizing the placement of SDN controllers to balance network performance and synchronization costs is a complex research problem.

This paper addresses the controller placement problem as a multi-objective optimization challenge. The formulation considers several constraints, including reliability, fault tolerance, latency, synchronization overhead, and deployment costs. Due to the impracticality of finding exact solutions for this NP-hard problem We employ the Cuckoo optimization algorithm, a meta-heuristic inspired by the brood parasitism of cuckoo birds, to tackle this optimization problem effectively.

Our approach is evaluated against existing methods in the literature. Experimental results show that our method outperforms traditional approaches such as Simulated Annealing (SA) and Quantum Annealing (QA) in terms of performance and synchronization costs. SYNCOP's performance was compared to QA and SA using benchmarks of 100 to 300 sensors. It improved synchronization costs by 4.16% to 4.53% and performance by 1.93% to 2.38% compared to QA. Additionally, compared to Integer Linear Programming (ILP), our proposed algorithm demonstrates greater scalability, making it more suitable for large-scale WSN applications. The findings of this study shed light on the balance between the cost of synchronizing controllers and the delay in communication between sensors and controllers.

Biography

Elmira Rezabeyk is a talented researcher who earned her Master of Science degree in Computer Architecture Engineering from Amirkabir University of Technology. With a keen focus on the intersection of Edge Computing, Cloud Computing, IoT, and Optimization Problems, Elmira has emerged as a promising figure in her field. She collaborates closely with multidisciplinary teams in the lab, driving innovative solutions that enhance the efficiency and effectiveness of edge services. Her research aims to optimize the deployment and management of computing resources at the network edge, improving latency and resource utilization for IoT applications. Elmira's work is characterized by a rigorous analytical approach and a commitment to practical implementation, making significant contributions to both theoretical foundations and real-world applications. Her dedication to advancing technology through collaborative efforts and her insightful research continues to impact the landscape of edge services.

Mesoporous Cr2O3/MWCNTs/PANI nanocomposite as a high-performance anode material for rechargeable lithium-ion batteries

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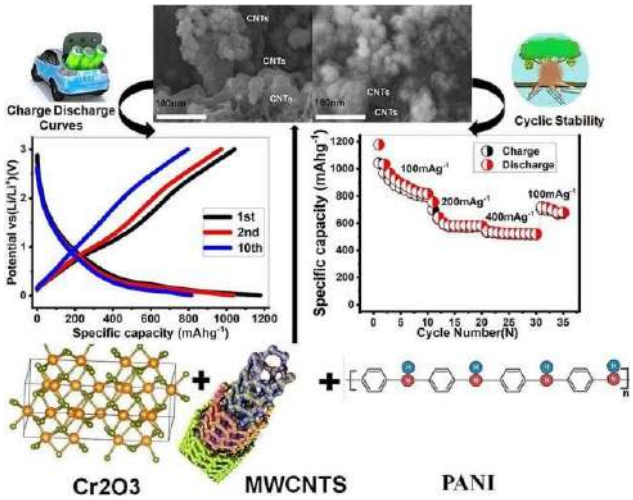
Chromium oxide (Cr_2O_3) is a highly promising material for use as an anode in lithium-ion batteries (LIBs). Nevertheless, the battery's performance is hindered by a significant increase in volume, which leads to damage to the material's internal structure. This study demonstrates the achievement of dual modification by the development of a Cr_2O_3 nanocomposite with multi-walled carbon nanotubes (MWCNTs) using an affordable and reproducible coprecipitation process. This method effectively lowers volume changes by boosting electronic conductivity and mechanical strength. Concurrently, a polyaniline (PANI) coating was utilized by the process of in-situ polymerization of aniline monomer. This coating enhances the conductivity of lithium ions and permits efficient electron transportation, ultimately leading to exceptional stability. This study primarily investigates the impact of PANI coating, which facilitates conductive contact between the active material and electrolyte. The homogeneous nanocomposite consisting of Cr_2O_3-MWCNTs and PANI has excellent electrochemical performance. The Cr_2O_3-MWCNTs(12%)-PANI material exhibits a discharge capacity of 815 milliampere-hours per gramme (mAh g−1) when tested at a current density of 100 milliamperes per gramme (mA g−1), with a coulombic efficiency of 97.5%. Furthermore, the nanocomposite has excellent capacity to maintain its performance at different rates and throughout multiple cycles.



Selection of sustainable industrial livestock site using R Number GIS-MCDM method: A case study of Iran

Sahar Shahrabi-Farahani Ashkan Hafezalkotob, Davood Mohammaditabar and **Kaveh Khalili-Damghani**

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Today, the livestock industry, as a key supplier of human food resources, plays an essential role in contributing to globally adopted sustainable development goals (SDGs). General policies are needed to guide the livestock industry in an economically, socially, and environmentally sustainable manner. These policies should include sustainable development goals, considering specific spatial situations and existing risks. The initial step toward achieving sustainable development in the livestock industry involves the selection of suitable sites while considering associated risks. This study focuses on examining the ecological, economic, and social potential of Iran's Khuzestan province for livestock breeding and identifies crucial information indicators for livestock industry development. This article is one of the first articles to study industrial livestock site selection using the GIS-MCDM hybrid method with the R-numbers. This method aims to address uncertainty and prevent errors associated with fuzzy numbers. In this research, 13 suitable places for livestock development were identified. To determine the most suitable place among the candidate places, we use a hybrid decision-making framework utilizing R-number and MULTIMOORA methods. To confirm the validity of the research methods, we computed data with other methods, and all methods selected the A1 site as the most suitable place for livestock.

Biography

Sahar Shahrabi-Farahani is currently pursuing the Ph.D. degree in industrial engineering with Islamic Azad University (IAU) South Tehran Branch, Tehran, Iran. Her research interests include supply chain, production planning, game theory, mathematical modeling, GIS, MCDM methods and Sustainable issues. She has published some research articles in conferences and journals in production planning and sustainability issues.

EPR and luminescence properties of Mn^{2+} doped $BaCO_3$ nanoparticles synthesized by autocombustion method

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Undoped and Mn^{2+} doped $BaCO_3$, were synthesized using the autocombustion method. The powders obtained by autocombustion were characterized using X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), Raman spectroscopy, scanning electron microscopy (SEM), electron paramagnetic resonance (EPR), and photoluminescence (PL). The orthorhombic phase is obtained just after autocombustion without additional heat treatment. The Crystallite size changes from (64.1 to 70.5 nm) to (41.7 to 44.9 nm) for undoped to Mn^{2+} doped $BaCO_3$. The FTIR and Raman spectra show the characteristic vibration modes of BaCO3. Morphological analysis shows that the synthesized powders consist of spherical and agglomerated particles. The EPR measurements show for doped sample the appearance of the characteristic broad signal of Mn^{2+} ions, in addition to the narrow response of $BaCO_3$ with g = 2.0025, which shows the incorporation of Mn^{2+} ions in the matrix. The estimated optical deviation values, obtained by extrapolating the linear portion of the curve for the undoped and Mn^{2+} doped $BaCO_3$ samples, are 3.22 eV and 3.28 eV, respectively. Photoluminescence showed that the sample had intense yellow emission at 567 nm ($^4T1 \rightarrow {}^6A1$) when excited at a wavelength of 366 nm. The typical CCT value of Mn^{2+} doped $BaCO_3$ was estimated to be around 4070 K. The CIE coordinates of the sample are (x=0.421, y=0.556) with a purity of 94%, which makes it a potential candidate for laser emission.

Neutron single-particle states in ^{101}Sn by polynomial fits and shell model calculations for light sn isotopes

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[3]*PRIMALab Laboratory, El-Hadj Lakhedar Batna1 University, Algeria*

The neutron single-particle energies (SPEs) in 101Sn is one of the main ingredients needed in nuclear studies in the region around the doubly magic ^{100}Sn nucleus. Due to the lack of experimental data of ^{101}Sn spectrum, the determination of SPEs needed for nuclear structure, reaction and astrophysics studies is a real challenge. This paper discusses the derivation of the relative SPEs outside the doubly magic ^{100}Sn nucleus using a systematic method. We performed 2nd order polynomial fits for each set of experimental data corresponding to the single-particle states $d_{3/2}$, $h_{11/2}$ and $s_{1/2}$ in light odd tin isotopes. By obtaining the single-particle spectrum of 101Sn, neutron SPEs of the model space orbitals are defined. Shell model calculations for even and odd $^{102\text{-}107}$Sn isotopes are carried out using the new interactions, fit1 and fit2. The energy spectra obtained from fit1 and fit2 are presented in comparison with the available experimental data and the results from the other interactions (well-known interaction sn100pn, pc1 obtained by Hartree-Fock method and set2 obtained by artificial neural network method). Among them, χ^2 test confirms that fit1, fit2 and set2 are the best to reproduce the experimental spectra of light tin isotopes.

Biography

He was a nuclear physics. he was a lecturer at Ferhat Abbas Setif1 university- Algeria.

His research areas of interest are:

Nuclear structure: nuclear shell model using NuShellX code.

Few body system in nuclear physics applied to study halo nuclei using EFADDY code.

Artificial Neural Network (ANN) applied in nuclear physics

Diffusion across the interface and equilibrium and growth of phases in alloys

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Although alloys have been well-known for a considerable period of time and significant resources have been dedicated to their study, there remains a notable absence of theoretical models derived from first principles that accurately describe the growth kinetics of their phases. Existing models in use are predominantly semiempirical in nature.

The objective of this work is to obtain, from thermodynamic and statistical principles, the expression that describes the diffusion through the interfaces of a substitutional alloy. From this, the mathematical models that describe an substitutional alloy out of equilibrium

under certain conditions, its growth kinetics, metastablestates, etc

The model was developed based on the concept of ideal alloy. It is postulated that the migration process through the interfaces involves point defects present on the surfaces contiguous to the interfaces. In this way, jumps frequency, from one phase to the other, would be determined by the probability that a particle finds one of these defects and by the probability that the jump has enough energy. Equations of the models together with the heat equation and the diffusion equations would allow modeling the kinetics of the non-glissile growth of the phases in this type of alloys. In addition, making some approximations, equations were reached that are used semi-empirically today.

This model could be utilized to optimize directional solidification techniques, and it could also be applied to describe single-component materials or alloys containing more than two phases and components. Through this model, a novel stability criterion was identified. The theoretical model was validated using empirical results, demonstrating its reliability. Moreover, this model holds the potential to facilitate the discovery of new alloys with enhanced properties.

Biography

Dr. JORGE A. GORDILLO is an Argentine physicist with a distinguished academic and research career. He works at the National Atomic Energy Commission (CNEA) as a lead researcher, heading a team focused on materials science and nuclear technology. His main fields of expertise are alloys, phase transformations, diffusion, piezoelectric materials, high-voltage techniques, transformers, radionuclide production techniques, and nuclear fuels. He has published several scientific papers in international journals. Among his achievements, a few years ago, he invented transformers that generate high voltages using piezoelectricity. Additionally, he developed a model that predicts the phase growth and stability of substitutional alloys.

Validation of independence hypothesis in HI induced fusion reactions

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[2]Department of Physics, Aligarh Muslim University, India
[3]Department of Physics, University of Lucknow, India

Heavy-ions (HI) provide an excellent probe for investigating compound nucleus (CN) reactions and in particular the role of angular momentum. By using different HI beams and target combination, it is possible to form the same CN having nearly same excitation energy and angular momentum distribution. Under these circumstances, the independent hypothesis is likely to hold good. The validity of Bohr's independent hypothesis has been demonstrated by Ghoshal, where the same CN ^{64}Zn* was formed via two different entrance channels. However, the HIs impart relatively larger angular momentum resulting in the population of the residues in high spin states along with high excitation energy. As such, it influences the probability of the reaction residues produced in the exit channel of the same CN. Therefore, an attempt has been made to verify Bohr's independent hypothesis using the ^{18}O+^{159}Tb and ^{12}C+^{165}Ho producing the same CN ^{177}Ta, at nearly same excitation energies. The EFs of various radio-nuclides populated in these reactions were measured. The EF's for ^{18}O+^{159}Tb and ^{12}C+^{165}Ho systems were also obtained using the code PACE4, and compared with the corresponding experimentally measured ones. At relatively higher energies the experimental EFs for the residues ^{174}Ta(3n) and ^{173}Ta(4n) produced through the two distinct entrance channels were found to agree reasonably well, indicating the validity of independence hypothesis. On the contrary, at lower excitation energies, the EFs are found to be quite dissimilar. The observed discrepancy at lower energies has been attributed due to the mismatch in angular momenta involved in the reactions. The difference in angular momentum starts diminishing with increase in the excitation energy of the CN. This is because at relatively higher excitations the mean energy of the evaporated particles increases giving way to the nearly similar angular distributions.

Biography

Dr. Mohd Shariq Asnain is a distinguished scholar with a Ph.D. in Experimental Nuclear Physics. His research focuses on the intricacies of nuclear reactions, particularly in the realm of incomplete fusion reactions and breakup fusion dynamics. Dr. Asnain has made significant contributions to the field through his rigorous experiments conducted at the 15UD Pelletron accelerator facility in India. Dr. Asnain's dedication to advancing scientific knowledge is evident through his numerous publications in highly respected international peer-reviewed journals, including

Physical Review C (PR C) and Nuclear Physics A (NP A). These publications underscore his expertise and the impactful nature of his research. In addition to his research achievements, Dr. Asnain is known for his active participation in the scientific community. He has presented his findings at various international and national conferences, earning accolades for his insightful presentations. Notably, he received the Best Poster Award at the National Conference on “Low Energy Nuclear Reaction Dynamics” held at Aligarh Muslim University in 2022. Given his substantial research accomplishments, scientific integrity, and personal qualities, Dr. Mohd Shariq Asnain is a highly esteemed figure in the field of experimental nuclear physics. His work continues to inspire and pave the way for future advancements in nuclear science.

A comparative study of different approaches for heavy quark energy loss

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Department of Physics, Ferdowsi University of Mashhad, Iran

We have examined collisional and radiative energy loss of heavy quarks in Quark-Gluon Plasma and presents a comparative analysis of three different methods for collisional energy dissipation.

The study focuses on calculation of the nuclear modification factor (R_AA) of charm quarks in Pb-Pb collisions at √S_NN = 5.02TeV. All three methods are examined using the same numerical evolution based on the well-known Fokker-Planck equation by considering critical phenomena like a non-equilibrium state at the onset of heavy ion collisions.

The outcomes of each approach are compared with the latest data from ALICE and ATLAS experiments spanning from 2018 to 2022. This study aims to compare the degree of agreement between each approach and recently obtained experimental data, in the intermediate and high P_T regions.

We have found that all three energy loss approaches describes the range of intermediate P_T better than small or large P_T regions. However, Hard-Thermal-Loop mechanism which has proposed by Braaten and Thoma provides a better description of the intermediate P_T range, in comparison with the other energy dissipation methods.

Biography

Marjan Rahimi Nezhad, a researcher and Ph.D. candidate at Ferdowsi University of Mashhad.

Her area of expertise lies in the field of particle physics, with a specialization in studying Quark-Gluon Plasma (QGP). Specifically, she researches on the energy loss of heavy quarks within the QGP.

She has a published paper titled "A Comparative Study of Different Approaches for Heavy Quark Energy Loss, based on the latest experimental data" which was featured in the prestigious EPJP journal.

Currently affiliated with the Department of Physics at Ferdowsi University of Mashhad.

A study of longitudinal magnetic field effect on EIT resonances in a multilevel V-type atomic system

Chandan Das, Sekhar Dey and **Biswajit Ray**
Department of Physics, University of Calcutta, India

In the present work, we have studied both theoretically and experimentally the effect of an external magnetic field on the electromagnetically induced transparency (EIT) in a multi- level V-type system of 87Rb using D1 and D2 lines. We apply the magnetic field at room temperature parallel to the direction of co-propagating pump-probe laser beam. The Zeeman shift of the energy levels results in the formation of several shifted V-type subsystems. The net effect is to create multiple EIT windows, each of which produces the EIT resonances of significantly lower contrast than the original EIT resonance. We have observed five independent EIT peaks at a moderate magnetic field of 72.5 G when 87Rb-D1 line is used as a pump laser and the probe laser is scanned across the 87Rb-D2 transitions. In the second case, the pump laser is tuned to the 87Rb-D2 transition and 87Rb-D1 transition is used as a probe field. In this case, we have observed two EIT peaks at a similar magnetic field of 72.5 G. We also investigate the effect of pump field power on the splitted EIT peaks at a particular magnetic field. A theoretical analysis has been done to represent the experimental results considering the V-type subsystem. The theoretically calculated values agree well with the experimentally observed values. This detailed study may find useful applications in many branches of quantum technology, in optical magnetometers, and also in quantum information processing.

Study of the 4He, 10Be, 14C, 14N, and 16O Accompanied Ternary Fission of 248Cf Isotope in the Fragments Equatorial Geometry

M.R. Pahlavani and **M. Saeidi Babi**

Department of Nuclear Physics, Faculty of Basic Science, University of Mazandaran, Iran

In this comprehensive study, the ^{4}He, ^{10}Be, ^{14}C, ^{14}N, and ^{16}O, LCP-accompanied ternary fission of the 248Cf isotope has been investigated based on equatorial geometry fragmentation. Utilizing the Three-Cluster Model (TCM) and using the WKB approximation, the Q-values, the driving potentials (V-Q), the probability of tunneling through the barrier, the yields, and the decay constant λ for an extensive array of various fragment combinations with positive Q-values are calculated. After testing for all possible combinations, combinations with higher Q-values and considerable yields are selected for further analysis. Calculated results for each LCP were tabulated and yields versus mass number of one fragment A1 are plotted for detailed analysis. Our study significantly contributes to the understanding of ternary fission of the ^{248}Cf nucleus and highlights the role of the interaction potential for different LCPs, emphasizing the importance of shell effects in the ternary fission process. The calculated results pave the way for future studies in nuclear physics, particularly in understanding the complex dynamics of nuclear ternary fission involving fixed LCP.

Biography

He was a PhD candidate in Nuclear Physics at the University of Mazandaran. His research focuses on fission, particularly ternary fission. He was also interested in the irradiation of foods, shielding materials, and neutron behavior. His recent work includes a publication on the LCP-accompanied ternary fission of the 248^{248}248Cf isotope. Through his studies, his aim to advance the understanding of nuclear physics and its practical applications.

Dark energy-matter equivalence and bouncing cosmology

Aimen Rauf
University of Management and Technology

Recent astrophysical observations have revealed a fascinating picture of the universe's expansion. The spatial behavior of the universe's constituents is complex, particularly the phenomena of dark energy and dark matter. Experimental evidence, such as data from supernovae, confirms the accelerating expansion of the universe. To explain this, cosmologists have proposed various modifications to the theory of general relativity. These alternative models, including *f(R), f(G), f(R,T), f(G,T), f(R,G),* and *f(R,φ)* theories, offer potential explanations for the accelerating expansion by altering the gravitational action.

This work focuses on the equivalence between dark energy and dark matter through the evolution of the cosmic equation of state and explores a bouncing cosmology scenario. The study provides exact solutions to the field equations within the framework of modified gravity theories. By investigating the dynamics of these solutions, we aim to shed light on the fundamental nature of dark energy and its interplay with dark matter and address issues such as the initial singularity and late-time cosmic acceleration.

Our results suggest that certain modified gravity models can naturally lead to a bouncing universe, avoiding the initial singularity and providing a consistent picture of the universe's evolution. These findings contribute to our understanding of the universe's accelerated expansion and the role of dark components in cosmology.

Biography

Aimen Rauf holds an MS in Mathematics with research focused on cosmology. She has published works on *f(R,T)* gravity and higher-order torsion gravity. Her research interests include the dynamics of cosmological solutions and bouncing scenarios, aiming to address fundamental questions about the universe's expansion and dark energy.

Investigating the superposed e ect of cosmic ray diurnal anisotropy on weak Forbush decreases using data from isolated neutron monitors

Menteso. F.M[1] and **O. Okike**[2]

[1]*Department of Physics, Jinka University, Ethiopia*
[2]*Department of Industrial Physics, Faculty of Science, Ebonyi State University, Nigeria*

Forbush decreases (FDs) are one of the most spectacular phenomena in the time-intensity changes of cosmic ray (CR) flux. They play a crucial role in space-weather predictions. Their varieties and manifestations at different locations are frequently linked with solar ejections and the associated anisotropic particle fluxes. As a key variable in space-weather research, every part of the events including precursors, onset, FD minimum, main/recovery phase, and the attendant CR anisotropies has received considerable attention in the literature. Nevertheless, the focus has generally been on high-magnitude FDs (CR(%) ≥ 3). Investigation of small amplitude FDs (CR(%) ≤ 3), which are also caused by similar space weather conditions that generate large events, remains an open field as it has yet to receive adequate attention. While there are several catalogs of high-magnitude FDs, for example, we are not aware of any catalogs of low-amplitude FDs besides the event list recently published by our team. The detailed and rigorous analysis performed in the current work shows that two naturally superposed CR signals—11-year solar cycle oscillations and CR diurnal anisotropy— could make manual cataloging of small FDs difficult. Using an extremely sensitive version of the recently developed automatic functional harmonic analysis, catalogs of small-amplitude FDs are created from thirty neutron monitors at different locations. The relationship between these events and the amplitude of the accompanying CR anisotropies at the respective locations is tested. The results show that the connection between the parameters varies significantly between different points on the Earth. Although there are some exceptions, high- and low-rigidity stations register stronger and weaker connections, respectively.

Magnetoconductivity behaviour due to electron–electron interactions, weak localization and Zeeman effects in 2-D-layered WS_2

Adelhamid El kaaouachi

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Here, we studied the behaviour of magnetoconductivity (MC) as a function of temperature and magnetic field on sample of 2-D-layered WS2. In fact, in our model, we re-analysed experimental measurements obtained by Zhang et al (J. Appl. Phys. Lett. 108:153114, 2016). The experimental values of MC will be confronted with complex theoretical models to provide physical explanations for the change of sign of the MC when the temperature decreases and magnetic field increases. We developed a theoretical model indicating the contributions to the MC due to electron–electron interaction effects, weak localization effect and Zeeman effect. Several scale parameters were compared with each other to highlight their respective influence on the behaviour of MC, such as the coherence length Lu, interaction length Lint and magnetic length LB.

Energy conversion and age-related changes in atom-molecular architecture of native bone

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[3]St. Petersburg State University, Institute of Earth Sciences, Russia

Bone is a hierarchically organized composite material. X-ray diffraction, X-ray absorption, photoelectron, Raman and IR spectroscopic, and electron microscopic studies of native bone were carried out to investigate spatiotemporal changes in its atom-molecular architecture under physiological and pathogenic conditions. Two series of bone specimens were used. The first group (cortical bone of newborn, adult and mature healthy rats) was used to examine age-related deformation on the nanoscale. The second group (saw-cuts of human femur and tibia at arthroplasty of the osteoarthritis, OA, damaged knee compartment) was used to study the influence of gravity forces in the skeleton and to inspect the pathogenic effects on the architecture.

Our main conclusions:

1) Mineralized bone is a kind of electric hub. It is formed from a series of nanometric electric cells each of which is composed from a negatively charged calcium hydroxyapatite nanocrystal embedded into positively charged intercrystallite medium. The charges are maximum in young bone and drop with age. The electrochemical insight on native bone allows us to link the density of electrostatic energy accumulated in it with its age-related changes. Energy conversion, age effects on bone nanostructures and anti-bone aging strategy is discussed.

2) The OA deformations in subchondral bone are conditioned by catalytic reactions, carbonization and amorphization of mineral bone at the interface with strong distortions of atomic and electronic structure in a depth of subchondral bone. For the first time a 3D image of structural disorders on the nanoscale is reconstructed for subchondral bone under OA conditions.

This new physical insight on the atom-molecular architecture of native bone opens up broad horizons for understanding the mechanisms of bone aging under physiological conditions and for developing new approaches to the medical treatment of bone diseases. The results open up broad prospects for design of new nature-like (osteo-mimetic) materials too.

The work is financially supported by Russian Science Foundation Grant 23-21-00172.

Biography

Andrey Pavlychev is a professor at the St. Petersburg State University in the Solid States Electronics department. He lectures “Electronic structure of solids”, “Quantum chemistry of polyatomics”, “Nanophenomena in solids”. Recently his main interests have been focused on composites and hierarchical nanostructures. Andrey Pavlychev has succeeded in studies of spatiotemporal changes in the atom-molecular architecture of bone tissues and the hierarchy effects in electronic and atomic structure of bone. He is the leader of research projects “Relationships between Hierarchical Organization of the Skeleton and Nanostructure of Bone Tissue” (RBRF) and “Spatiotemporal Changes in Atom-molecular Architecture of Bone Tissue: The Basis of a Novel Convergent Technology” supported by the RSF.

Impact of graphene oxide nanosheets and polymethyl methacrylate on nano/hybrid-based restoration dental fller composites: ultrasound behavior and antibacterial activity

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[2]Department of Physics, College of Education for Pure Sciences, University of Babylon, Iraq
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[4]Department of Physics, Faculty of Science and Health, Koya University, Iraq
[5]School of Physics, Universiti Sains Malaysia, Malaysia

Purpose: Graphene-polymer nanocomposites signifcantly impact dental fller and antibacterial applications. The study aims to overcome some problems dental flers present and improve their properties and antibacterial activity. Synthesis graphene oxide (GO) and poly (methyl methacrylate) (PMMA) were used to reinforce two types of commercial hybrid/nano-dental fllings.

Methods: Developed acoustic-solution-sonication-casting methods were applied to fabricate the new graphene-polymerdental fller nanocomposites. The structure, morphology, rheological and mechanical properties, and antibacterial of the newly fabricated flling-PMMA/ GO nanocomposites were investigated.

Results: Fourier transform infrared (FTIR) showed a signifcant interaction between the flling and the additional materials. The X-ray difraction (XRD) analysis revealed a considerable change in crystalline behavior. Optical microscope (OM) with feld emission scanning electron microscopy (FESEM) pictures demonstrated a substantial change in the morphology of the samples with a homogeneous and fne dispersion of the nanomaterials in the fller matrix. Multi-frequency ultrasound mechanical properties measured the ultrasonic velocity, absorption coefcient, compressibility, bulk modulus, and other mechanical properties that notably enhanced after GO contributed up to 325% of the ultrasonic absorption coefcient compared with hybrid/nano-fllers. Rheological properties were measured as viscosity, absorption coefficient, and specific viscosity, which significantly improved after adding PMMA and incorporating GO up to 57% of the viscosity, compared with hybrid/nano-fllers. The inhibition zone of moth bacteria, such as Enterococcus faecalis and E. staph bacteria, improved after the contribution of GO Nano sheets up to 46%.

Conclusion: Nanofllers nanocomposites presented better properties and inhabitances zone diameter of antibacterial.

Biography

Muhannad Abdul Salam Hussein, and he is from the State of Iraq, Baghdad. He obtained a bachelor's degree from the University of Baghdad, College of Science, specializing in physics, in 2010. He completed a higher diploma in materials physics and its applications from the University of Babylon, College of Education, in 2018 and a master's degree in 2022. The title of the thesis was (Efficient of Graphine based Hybrid-nano composite for Dental Filler application), and it was published as scientific research. In reputable scientific journals, He conducted several local and international studies in the field of materials physics and nanotechnology, especially Nano graphene oxide and its use in the fields of medicine and dentistry. He will attach links to published research. Professionally, He have been working as a physics teacher in the Iraqi Ministry of Education since 2010 and a lecturer at the Open Educational College affiliated with the same ministry.

Theortical study of strucural, electronic and Optical properties of europium chalcogenides

Aman Kumar

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In this report, we have investigated the EuS europium chalcogenides compound with the help of the WIEN2K software package. The investigation of the structural and electronic properties is conducted via the full potential augmented plane wave (FP-LAPW) approach, using the generalised gradient approximation (PBE-GGA) as exchange correlation potentials to describe the electron-electron interactions. This method allows for a comprehensive analysis of both the geometric arrangement of atoms and the electronic behaviour within the material. The structural characteristics of the material were determined using the Birch-Murnaghan equation (BME). The parameters encompass the lattice parameter, the bulk modulus, the first derivative of the bulk modulus, the minimum energy, and the volume of the material. These parameters provide crucial insights into the stability, compressibility, and overall behaviour of the material under different conditions. By combining the electronic and structural information, a comprehensive understanding of the material's properties can be obtained, enabling further exploration and potential applications in various fields such as electronics, energy storage, and catalysis. The observed experimental data aligns with the predicted structural properties. To describe EuS electronic properties, we can look at its band structure (BS) and the profiles of its total and partial density of states (T-DOS and P-DOS). When employing PBE-GGA potentials. Further various optical parameters have also been examined such as real dielectric constant 1 ( ), real dielectric constant 2 ( ), absorption ( ), refractive index n ( ), energy loss L ( ), and reflectivity R ( ), We believe that such insights offer a new starting point and a framework for future research.

Analysis of the spatial and temporal variability of direct rainfall in lake Tana, Ethiopia

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[2]Abay Construction plc, Ethiopia

The Blue Nile's source, Lake Tana, is the biggest lake in Ethiopia and offers multiple services to local, regional, and international communities. The first step to effectively, efficiently, and sustainably utilize the services that the lake may provide is to analyse its water balance using accurate estimations parameters, including direct rainfall.

Direct rainfall to Lake Tana is one of the most important water balance terms of the Lake that needs precise estimate. This study tries to analyse the spatial and temporal variability of direct rainfall to the Lake and estimate the mean annual and mean monthly direct rainfall to the lake using sufficient data and appropriate methodologies. Thirty years (1986–2015) monthly and mean annual data from 13 meteorological stations were collected and used to analyse the spatial and temporal variability.

Spatial and statistical tools were used for data processing, analysis, and presentation. Five interpolation techniques: Thiessen polygon, spline, isohyetal, inverse distance weighting, and Kriging were considered, and their performances were assessed with evaluation criteria. The results indicate that the isohyetal method is better than the other four methods to implement in a geographic information system (GIS) with Geostatic Analysis in ArcGIS. Further, the analysis has shown that the mean annual direct rainfall to Lake Tana is 1313.43 mm. In addition, we find significant spatial and temporal variability of direct rainfall on Lake Tana. In terms of spatial variability, the Lake gets maximum direct rainfall in the south-eastern part and a minimum value in northwest part with an annual mean value of 1720 mm and 860 mm, respectively. In terms of temporal variability, maximum direct rainfall is estimated in July as 374.11 mm in the summer season and the minimum is less than 12.3 mm in December to March in winter season.

Biography

Eshete, Getasew Derso is a Project Manager at Abay Construction Private Limited Company, working as a design and construction expert on infrastructure of water supply and irrigation projects. He completed his Masters of Science education at Bahir Dar University, with a thesis titled: - Analysis the Spatial and Temporal Variability of Direct Rainfall in Lake Tana, Ethiopia. He was currently writing a research paper on "Trend Analysis of Flood Mitigation in Ribb River, Abay Sub-basin, Ethiopia" for submission to the Applied Science in International Journal of Switzerland in collaboration with Dr. Tom Lotz and Prof. Christian.

Development of super sensitive moisture sensor by ceramic nanoporous thin film: A comparative study

Manju Pandey and **Manju Rughwani**
Ajeenkya D.Y. Patil University, India

In this paper we report super sensitivesensitive capacitive humidity sensor whose stability and response is completely unaffected in toxic ambience.The developed sensor has fast response and recovery time, and high selectivity for moisture. Standard characterization techniques such as AFM, FESEM, BET,XRD and impedance spectroscopy were employed for micro-structural and electrical characterization of RH sensor. The nano porous alumina film developed by sol-gel technique undergoes a huge change in dielectric upon adsorption of moisture, ensuring large change in capacitance. The prototype instrument can be used for sub ppm level moisture detection in highly toxic environment for different applications. Response and recovery time of developed sensor are in seconds. Novelty of this sensor is ,its performance remains same in toxic environment which is confirmed by experiments.

Biography

Dr Manju Pandey working as Research Associate in Ajeenkya D.Y. Patil University, Pune, Maharashtra, India. Her research area is based on nano porous thin films for developing moisture sensors.

ACBSO: a hybrid solution for load balancing using ant colony and bird swarm optimization algorithms

Yogita Yashveer Raghav
K R Mangalam University, India

In order to balance the load in cloud comput- ing, this study suggests a hybrid technique called "ACBSO" that uses both ant-colony and bird swarm optimization techniques. Comparative analysis of the proposed hybrid algorithm has been done with Ant-colony optimization and bird swarm optimization techniques. Simulation results show that the hybrid approach outperforms both the ant-colony optimization approach and the bird swarm optimization approach. Comparison has been done based on primary factors such as makespan, throughput, ftness score, and resource consumption. To obtain the outcomes of the necessary simulations,the cloudsim simulator is employed.

Biography

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Yogita Yashveer Raghav is an assistant professor in the computer science department at K R Mangalam University, Gurugram, Haryana. She has done PhD from Banasthali Vidyapith, Rajasthan, India, and has already achieved impressive qualifications, including UGCNET and HTET. With research interests focused on cloud computing and data mining, she has submitted her thesis in June 2023. She has published several articles in national and international journals and conferences, showcasing her expertise in these areas. As a faculty member, she is committed to teaching and mentoring students, sharing her knowledge and passion for computer science with the next generation of professionals. Their dedication to research and publication is a testament to their ongoing commitment to advancing the field and making meaningful contributions to the academic community. She is IEEE member.

The Impact of Zn^{2+} Ions on dielectric properties and initial permeability of Ba-Ni ferrite nanoparticles through nonmagnetic doping

Sadiq. H. Khoreem[1], A. H. AL-Hammadi[2] and **Azmi A.M.Othman[3]**

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[2]Physics Department/Faculty of Science, Sana'a University, Sana'a, Yemen
[3]Affiliation Yemen Standardization, Metrology, and Quality Control Organization, Yemen

The effects of composition, temperature, and frequency-dependent dielectric properties of barium-nickel-based ferrites have been investigated. The conventional ceramic technique prepared the compositions BaNi2-xZnxFe16O27 (at x = 0.0, 0.4, 1.2, and 2). According to the frequency and Zn concentration, the dielectric parameters were properly set. Overall, the dielectric properties of this sample make them a suitable candidate for flexible super capacitors and are best suited for high-frequency region applications. The initial magnetic permeability of the prepared sample was increasing as the Zn ions contents increase. The produced samples were suitable for application as microwave absorbers, data storage appliances, and magnetic recording mediums. Generally, the decrease in dielectric parameters such as loss tangent and increased dielectric constant resulting from the incorporation of Zn+2 ions advocate appropriation of these materials in high-frequency applications such recording media, sensors, circulators, microwave devices, electronic devices, and phase shifters. The samples' frequency-dependent ac conductivity has grown as their frequencies got higher. The samples' initial permeability to magnetic fields showed an upward trend as Zn concentrations rose and displayed ferromagnetic activity. As Zn2+ ion replacement increases, the initial magnetic permeability increases. This might be accounted for by magnetic Ni2+ ions replacing non-magnetic Zn2+ ions. Based on the generated samples may be employed in microwave absorbent and data storage devices based on their magnetic characteristics.

Biography

(Deputy Editorial Director: Nanotechnology Journal of the Malaysian Institute [01/03/2023 – Current- Deputy Editor-in-Chief SCIREA Journal of Materials.

Lecturer at Saada University - College of Applied Sciences + College of Education Lecturer at Al-Razi University - Faculty of Medical Sciences

Lecturer at Ibn Al-Nafis University - Faculty of Medical Sciences Lecturer at University of Science and Technology

Lecturer at Saeeda University)

Nanofluid based pipe flow analysis in absorber pipe of flat plate solar collector: Effectes of inclination and porosity

Lipika Panigrahi

Gandhi institute for education and technology, Bhubaneswar, India

Nanofluid applications in solar collectors are an emerging area for enhanced heat transfer resulting in heat gain for domestic and industrial use. In the present work, the performance of a Flat Plate Solar Collector (FPSC) having water-CuO-based nanofluid has been studied. The effect of the tilting angle of cylindrical pipe and porosity of porous material is investigated for this nanofluid-based FPSC. A numerical approach has been adopted to stimulate the governing equations in the tube. The similarity transformation simplifies the model (PDEs) into ordinary differential equations (ODEs). The governing non-dimensional PDEs along with their appropriate boundary conditions are solved numerically using the 4th order Runge-Kutta method cum shooting technique. The impacts of significant and relevant physical parameters and physical quantities of interest are analyzed. From the present study, it is observed that amplification of tilting angle and curvature parameter ameliorates the heat transfer rate while that of porosity parameter controls it effectively. A similar approach can be employed for other solar collectors to assess the heat transfer augmentation by using nanofluids instead of existing fluids.

Biography

Dr. Lipika Panigrahi, Assistant professor in mathematics at Gandhi institute for education and technology, Bhubaneswar, Odisha India. She recently completed her doctorate entitled on “Study of some flow problems in viscous and viscoelastic fluids”. she has always been fascinated by applied fluid dynamics like nano fluid, MHD flow, porosity, viscous fluid and non-Newtonian fluids and dedicated her academic journey to exploring its depths. Through her research, she has gained a deep understanding of the complexities and nuances within this field. she has published 11 papers in internationals journals.

Adaptive fuzzy clustering based atom search optimization segmentation for accurate Alzheimer's Disease detection on magnetic resonance images

Nirupama S. Patodkar

MGM University, Chh. Sambhajinagar, India

The algorithm incorporates adaptive fuzzy clustering to enhance the precision of cluster assignments, allowing for a more nuanced representation of neuroanatomical structures. The integration of Atom Search Optimization further refines the segmentation process, optimizing the spatial distribution of clusters and improving the overall accuracy of region-of-interest identification.

The research outlines the algorithm's architecture, detailing the implementation steps involved in applying ASO for neuro-imaging data segmentation. A comprehensive evaluation is conducted using local and global datasets, demonstrating the algorithm's effectiveness in accurately segmenting brain regions relevant to Alzheimer's pathology. The results showcase the algorithm's potential in achieving improved sensitivity and specificity in comparison to existing segmentation methods.

By introducing this innovative algorithmic approach, the research contributes to the advancement of Alzheimer's Disease detection methodologies, specifically focusing on the critical step of accurate segmentation. The proposed technique holds promise for enhancing the precision of neuroimaging analyses, ultimately leading to more reliable early detection and diagnosis of Alzheimer's Disease.

Biography

Nirupama S. Patodkar is a dedicated and seasoned Assistant Professor in the Department of Computer Science at Dr. G. Y. Pathrikar College of CS & IT, MGM University, Maharashtra State, India bringing over 18 years of valuable experience to the academic community. Her passion for computer science and commitment to education have marked career as a distinguished educator and researcher.

Throughout her 18-year tenure, she remains committed to inspiring the next generation of computer scientists. Her approachability, enthusiasm, and ability to relate complex concepts to practical applications have made beloved figure among students.

Apart from Her teaching and research responsibilities, she has taken on leadership roles within the Computer Science Department. She served on various committees, contributing to the continuous improvement of academic programs and fostering a collaborative environment among faculty members.

Cognitive therapy for human mental illness detection using naïve bayes algorithm

Dr. Shahid Naseem

Dept. of Information Sciences, Division of Science and Technology, University of EducationPakistan

Mental Stress and anxiety are a necessary part of our lives and can have both beneficial and negative effects. The stress response is primarily determined by our perception of an event, transition, or problem. Finding a balance in our lives and managing our stress can be an immense challenge. WHO forecasted that one in four people will suffer from mental and other neurological disorders in near future. Thus, the computation, detection, and providing a solution for stress anxiety and depression has become an important point of focus for the researchers and also for the psychologists. Psychologists utilized various scales to quantify a degree of mental issue. On the other hand, to measure such an Illness level, we are dealing with a knowledge-based expert system that will be used to process such an illness level among students and employees who are not associated with technology by surveying among them. Many methods for detecting the cause of these mental issues and stress computation have been introduced by various researchers. This paper focuses on the use of one of the AI methods like naïve Bayesian for predicting sentiments. Our developing and ever-evolving human society has become a great cause of stress and mental issues for its natives. These mental stress and anxiety issues have been a critical point of focus for the researchers because of their endless and strong effects on human behavior. Many methods for detecting the cause of these mental issues and stress computation have been introduced by various researchers.

Antibacterial, antioxidant, visible light-induced dye degradation potential of green synthesized ag/ zno nanocomposites utilizing seeds of *Girardinia diversifolia*

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[2]Department of chemistry, Army cadet college, Indian Military Academy, India
[3]Department of Biochemistry, Mahatma Gandhi University, India

Growing concerns over the toxicity of metallic nanocomposites synthesized using physical and chemical techniques seems to be a major hurdle for researchers.Green synthesis of NCs is one of the promising, eco friendly and safer methods. Ag/ZnO NCs were prepared by green method. The obtained NCs were characterized by UV-Vis, XRD, FT-IR, TEM and EDX. The results indicated that high purity of nanosized Ag and ZnO-NCs were successfully obtained having cubic and hexagonal crystalline structures respectively. The band gap energies of Ag/ ZnO NCs were estimated using UV-visible absorption spectra using tauc plot. In addition, the photocatalytic property of these nanocomposites were divulged by their rose bengal, Methylene blue dye degradation potential. The residual concentration of dyes was monitored using UV-visible absorption spectrometry. In this case the degradation efficiency of the photocatalyst nanoparticles after 2h irradiation time was about 93% with a reaction rate of 3.61 × 10−3 min−1. Further, these NCs rrevealed antimicrobial effects against clinical pathogens such as Staphylococcus aureus, *Escherichia coli* and *Klebsiella* pneumoniae. The research further evaluated the antioxidant capabilities of these NPs using H_2O_2 radical scavenging assay.

Penile amputation after neonatal circumcision: A case report

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[3]Department of the Pediatric Surgery, Samsun Training and Research Hospital, Turkey

Introduction and Importance

In children, one of the most common surgical procedures worldwide is circumcision, which has strong religious implications and is frequently performed for non-therapeutic reasons. Circumcision is typically associated with old customs. Complete penile amputation is extremely uncommon, and the prognosis is little understood.

Casepresentation

A 7-day-old male term baby was circumcised with a cauter by an unexperienced practitioner, and the patient was admitted to the department of pediatric surgery. Both the glans and the body had become discolored and necrotic. The patient was taken into the theatre and given general anesthesia. We removed the debridement and inserted a catheter into the urethra to prevent urethral stenosis.

Discussion

The procedure of circumcision has several medical benefits and is widely performed for religious, cultural, and medical reasons. It is generally agreed that circumcision prevents against Sexually transmitted diseases, penile and cervical cancer in adults, as well as urinary tract infections in children.

Partial or complete penile amputation injuries are rare and frequently the result of psychotic self-harm. Operators must correctly conduct the circumcision in order to prevent the potential complications that can happen when the procedure is performed out by untrained hands.

The most common cause of penile amputation injuries, whether partial or total, is psychotic self-harm. Operators must carry out the procedure carefully to prevent the potential complications that can happen when circumcision is performed by untrained hands.

Conclusion

We present here a case of a 7-day-old boy who had ritual circumcision with a cauter complicated by an entire penile amputation, which was treated with the insertion of a catheter to prevent the closure of urethra. The patient reported his penis was circumcised with cautery one day later the glans and the entire penis became discolored and necrosis, unfortunately, the entire penis was lost with the overlying skin.

Biography

Dr. Omar Adam is a senior lecturer and researcher at the faculty of Medicine and Surgery, Somali National University. He is graduated Bachelor of Medicine and Bachelor of Surgery from Salaam University, Somalia and Master degree in Histology and Embryology at Ondokuz Mayis University, Turkey. He is a senior lecturer in SNU for 10 years. He Is an active member in the European Society for the Study of Peripheral Nerve Regeneration and American Society for Peripheral Nerve. He has 7 papers published peer review journals.

Predicting the physicochemical properties of drugs for the treatment of Parkinson's disease using topological indices and MATLAB programming

Mehri Hasani and **S. Masoud Ghods**

Faculty of Mathematics, Statistics, and Computer Science, Semnan University, Iran

In this study, we analyzed twelve drugs used to treat Parkinson's disease. We created graphs of the drugs' structures and used computational techniques, and vertex and edge partitioning methods to calculate the topological indices derived from the M-polynomial. To simplify calculations and data analysis, a computer-based computing technique along with the algorithm has been employed. Topological indices are numerical values that describe the properties of chemical compounds based on their molecular structure and connectivity. These indices can be used to predict various physicochemical properties of compounds such as boiling point, flashpoint, enthalpy of vaporization, molar refractivity, molar volume, polarizability, surface tension, and surface area. Analyzing drugs used in treating a specific disease through topological indices is a valuable technique to reduce unnecessary laboratory expenses. We utilized linear, quadratic, cubic, logarithmic, inverse, power, compound, s-curve, growth, and exponential regression model analyses to create QSPR models between the topological indices and eight physicochemical properties of the drugs to determine their effectiveness. Confidence intervals at a 95% level were computed for both the slope and intercept of the linear regression models. Additionally, based on the maximum R2, optimal equations for estimating the boiling point, enthalpy of vaporization, molar refractivity, polarizability, and molar volume using different indices have been determined, and linear, quadratic, and cubic equations have been specified. For example, the optimal equation for estimating Molar volume (MV) using the harmonic index is a cubic equation with a maximum R2 of 0.931 and a maximum F value of 60.95. Calculated feature values are strongly correlated with actual values, indicating reliable predictive capabilities of the indices. For statistical analysis and to determine if there is a significant difference between the averages of the two groups, we used either an independent T-test or Welch's T-test. The results indicate that the p-value is less than 0.05, showing that the mean difference between the samples is statistically significant.

Biography

She pursuing her PhD in applied mathematics at Semnan University in Iran. Her research primarily focuses on graph theory, fuzzy graphs, graph chemistry, and discrete mathematics. Specifically, she has conducted extensive research on a variety of cardiac drugs (such as beta-blockers and calcium channel blockers), Parkinson's drugs, epilepsy drugs, migraine drugs, and kidney drugs. Some of this research is currently going through the publication process. In addition to her academic activities, she has 26 years of experience teaching high school math.

Hepatoprotective role of thymoquinone coated zinc oxide nanoparticles against aflatoxins induced hepatotoxicity

Dr. Huma Mujahid and **Amina Batool**

Institute of Biochemistry and Biotechnology, University of Veterinary and Animal sciences, Lahore

Aflatoxins (AFs) are the group of highly carcinogenic mycotoxins produced primarily by the fungus *Aspergillus flavus*. Feed contamination might increase the risk of aflatoxins spreading into animal-derived goods resulting in major economic losses, refusal of supplies for national or international exchange, as well as causing human and animaldeaths. Conjugation of TQ with Zinc Oxide Nanoparticles and to analyze the hepatoprotective effect of thymoquionone laded ZnONPs against aflatoxins induced hepatotoxicity in albino rat.Thymoquinone loaded ZnO nanoparticles have hepatoprotective effect against the aflatoxin inducedhepatotoxicity. Thymoquinone solution (2 mg/mL), 10 mg ZnO nanoparticles in 1 mL acetone. Adding thymoquinone to ZnO. TLC and HPLC measured toxin extracted in acetonitrile water. After the estimation of the toxin, a 28-day feeding trial was conducted at the Animal House, UVAS, Lahore. One month old, 20 albino rats were randomly selected and divided into 5 groups, each including 4 rats. Group A was given (normal feed), B (aflatoxin contaminated feed), C (aflatoxin contaminated feed +25ppb ZnONPs), D (aflatoxin contaminated feed + 10ppb TQ), E (aflatoxin contaminated feed + 25ppb TQ-ZnONPs). Experimental rats were slaughtered and blood was drawn for biochemical testing and liver tissue samples were collected for histopathological observations. All the results were analyzed statistically by one way ANOVA and means were compared by Duncan's Multiple Range test. The P-value < 0.05 was considered as significant. Results of Biochemical evaluation showed that thymoquinone coated zinc oxide nanoparticles improved the liver function tests ALT (28±1.00) and AST (35±4.00). Histopathological findings of liver also showed that thymoquinone coated zinc oxide nano particles treated group retained the normal architecture of cells as compared to aflatoxin treated group. In conclusion thymoquinone coated zinc oxide nano particles effectively reduced the hepatotoxic effects caused by aflatoxins present in animal feed.

Biography

Dr. Huma Mujahid is a PhD in Biochemistry from University of Veterinary and Animal Sciences, Lahore. She has participated in various national and international conferences, trainings and workshops and presented her work in international conferences. She is also served as Associate Director Student Affairs (2019-2022).

Biotoxicity of *Achrostichum aureum* L. synthesized Zinc Oxide Nanoparticles against Aedes albopictus, and impact on predation efficiency of mosquito fish *Gambusia affinis*

M. Roni[1], C.Panneerselvam[2] and **C.C.Harilal[3]**

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Millions of people worldwide are at risk of death from diseases carried by mosquitoes. India is currently dealing with the threat posed by Aedes mosquitoes, which spread the arboviruses that cause dengue and Chikungunya and instill fatal terror in the population throughout the world. Control of arthropod pests in growing countries is a key issue with different aspects. Therefore, in this research, we synthesized ZnONPs from Achrostichum aureum L. to manage mosquito vectors. The synthesized ZnONPs were characterized by using SEM and TEM, with a size ranging from 36.8 nm to 68.4 nm. Further, XRD analysis indicates the crystalline nature of the face-centered cubic structures of synthesized ZnONPs. Also, the FTIR confirms the role of a variety of phytoconstituents that are involved in binding with nanomaterials in order to stabilize them for a long period of time. Insecticidal assays showed that both ethanolic leaf extract of A. aureum and its fabricated ZnONPs had significant toxicity on different life stages of targets with LC50 values were 15.65-I instar, 17.07-II instar, 18.59-III instar, 18.35-IV instar, and 19.50-puape respectively. Concerning non-target effects, the predatory potency for Gambusia affinis was 46.73%, and 32.87% on III and IV larval instars of A. albopictus in standard laboratory settings while in ZnONPs treated aquatic environmental settings, the predatory efficiency of fish was boosted to 60.06%, and 40.86%, respectively. In conclusion, this research explored that both A. aureum extract and its fabricated ZnONPs may be considered as an alternative tool against dengue vector.

Biography

Dr.Roni.M is a proud alumnus of Bharathiar University completed her Ph.D in Zoology from Department of Zoology, Bharathiar University during 2014-2019. She is recipient of UGC-DSK-PDF during 2020-2023. Since 17th December 2020, she is working as UGC-Dr.S Kothari Post Doctoral Fellow in the Division of Environmental Science, Department of Botany, University of Calicut, Malappuram-673 636. She has published about 18 peer-reviewed papers, 1 book chapter in ISBN numbered book. She is a peer reviewer of few International Reputed Journals including Natural product research (Taylor and Francis), Entomological Research (Wiley Publications), Biomass Conversion and Biorefinery...etc. Her research focus is on "Arthropod-borne disease control using biosynthesised nanomaterials. Her talk in this conference will be on "Biotoxicity of Achrostichum aureum L. synthesized Zinc Oxide Nanoparticles against Aedes albopictus, and impact on predation efficiency of mosquito fish *Gambusia affinis*".

Vibration analysis of laminated composite beams reinforced with different fractions of nano-particles

Saman Momeni[1] and **Abolghassem Zabihollah**[2]

[1]*Sharif University of Technology, Iran*
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Composite structures (beams) are being used in many engineering applications, especially in high technology, including wind turbine blades, helicopter blades, industries, etc. The dynamic response of laminated composite beams reinforced with nano-particles has been investigated in the present work. Most of the existing works on the effects of nano-particles on the stiffness of composite structures are limited to very low-weight fractions, around 3% to 5%. This work studies the effect of a higher percentage of nanoparticles (up to 10%) on the dynamic behavior of the composite structures via experimental tests. Adding nano clay up to 3% of weight fraction increases the natural frequency; beyond that, up to 5 %, the natural frequency slightly decreases, and at 10%, a sharp reduction in natural frequency is observed. An in-house experimental setup has been developed to validate the experimental results with theoretical ones. Another feature of importance is the increasing damping coefficient of the laminated beam when the amount of nano-particles reaches 10%.

Biography

Dr. Momeni received his Ph.D. in Mechanical Engineering from the Sharif University of Technology, Iran, in 2018. He has published several research articles in peer-reviewed journals and conferences and taught several courses at Universities at Post-graduate and undergraduate levels. As a professional engineer, Dr. Momeni has extensive experience in mechanical engineering, including oil and gas and renewable energies. He is researching and developing his studies in various fields, including biomechanics, control, and smart structures.

Enhanced zeolite/activated-carbon composite for the removal of volatile organic compounds from indoor air in hospital environments

men AMRI[1,2], Aymen Amine ASSADI[3,4], Abdelkader Ouakouak[5,6] and Noureddine HAMDI[1,2]

[1]Higher Institute of Water Sciences and Techniques, University of Gabès, Tunisia
[2]Laboratory of Composite Materials and Clay Minerals, National Center for Research in Materials Sciences (CNRSM), Tunisia
[3]College of Engineering, Imam Mohammad Ibn Saud Islamic University, Saudi Arabia
[4]Univ Rennes, Ecole Nationale Supérieure de Chimie de Rennes, France
[5]Research Laboratory in Subterranean and Surface Hydraulics, University of Biskra, Algeria
[6]Hydraulic and Civil Engineering Department, University of El Oued, Algeria

In this study, we investigated the potential of a newly developed synthetic Na-P1 zeolite/activated carbon composite as an effective adsorbent for volatile organic compounds (VOCs) such as chloroform and dimethyl disulfide. The Na-P1 zeolite was synthesized from local Illito-Kaolinitic clay sourced from the Tejra region in South-east Tunisia, while the innovative activated carbon was derived from waste generated by wooden tongue depressors collected from hospitals during the initial wave of the COVID-19 pandemic.

The mineralogical properties of the raw clay and the synthesized materials were determined using X-ray diffraction (XRD) and Attenuated Total Reflectance-Fourier Transform Infrared (ATR-FTIR) spectroscopy. Morphological characteristics were examined through scanning electron microscopy (SEM), revealing a high level of particle size uniformity in Na-P1 zeolite and a well-defined structure in the activated carbon.

The Na-P1 zeolite exhibited a remarkable cation exchange capacity, reaching 279 meq/100 g. The BET (N2 adsorption–desorption) analysis of the synthesized activated carbon revealed a high specific surface area of 1511.842 m^2/g and a mean pore volume of 0.621 cc/g.

The addition of synthesized activated carbon to Na-P1 zeolite enhanced its mesoporous characteristics, increasing adsorption capacity. Kinetic data fitted well to the pseudo-second order, and the Langmuir model showed the Na-P1-activated carbon composite's maximum adsorption capacity: 54.13 mg/g for chloroform and 28.16 mg/g for dimethyl disulfide. These findings underscore the composite's potential for efficient VOC removal, making it a promising solution for hospital indoor air purification.

Biography

Imen AMRI, a recent graduated doctor in water sciences and earth graduated from the higher Institute of Sciences and Technologies of Water of Gabès, Tunisia (ISSTEG) and a member of the research laboratory of Composite Materials and Mineral Clays (LMCMA), at the National Center of research on Material Sciences (CNRSM). Her research focuses on clay minerals, zeolite synthesis, solid waste recycling, activated carbon synthesis, water and gas treatment and adsorption.

Treadmill exercise with nanoselenium supplementation afects the expression of Irisin/FNDC5 and semaphorin 3A in rats exposed to cigarette smoke extract

F. Rostamkhani[1] and **H. Shirvani**[2]

[1]*Department of Biology, Yadegar-e-Imam Khomeini (RAH) Shahre Rey Branch, Islamic Azad University, Iran*
[2]*Exercise Physiology Research Center, Life Style Institute, Baqiyatallah University of Medical Sciences, Iran*

In the current study, we investigated the impacts of 6 weeks of aerobic interval training (AIT) with selenium nanoparticles (SeNPs) on muscle, serum, and lung irisin (FNDC5) and Sema3A in rats exposed to cigarette smoke extract (CSE). To this end, 49 male Wistar rats (8 weeks old) were divided into seven groups: control, SeNPs (2.5 mg/kg b.w by oral gavage, 3 days/week, 6 weeks), AIT (49 min/day, 5 days/week for 6 weeks, interval), SeNPs+AIT, CSE (150 µL by IP injection, 1 day/week for 6 weeks), CSE+AIT, and CSE+SeNPs+AIT. The CSE group showed a signifcant reduction in irisin and Sema3A serum levels, as well as a decrease in FNDC5 and Sema3A gene expression in lung tissue ($p<0.05$). A combined treatment (AIT with SeNPs) signifcantly increased the serum level and the expression of muscle and lung irisin (FNDC5) and Sema3A in CSE received groups ($p<0.05$). There was a positive and signifcant correlation between muscle FNDC5 and lung FNDC5 in the CSE+SeNPs+AIT group ($r=0.92$, $p=0.025$). In addition, there was a positive and signifcant correlation between serum Sema3A and lung Sema3A of CSE+SeNPs+AIT group ($r=0.97$, $p=0.004$). Seemingly, performing aerobic exercises with the antioxidant and anti-infammatory supplement nano-selenium in the model of lung damage (similar to COPD) can boost myokine irisin and Sema3A, especially in serum and lung tissue. These results displayed the paracrine/ endocrine regulatory function of these myokines on other tissues. In other words, these interventions emphasized the creation of crosstalk between skeletal muscles and damaged lung, focusing on its recovery; however, further research is needed.

Biography

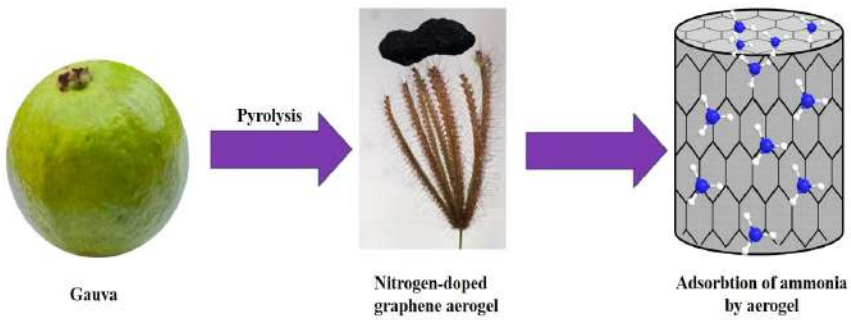
Dr Fatemeh Rostamkhani, 42 years old, PhD of Developmental Biology, Assistant professor and faculty member of Department of Biology, Yadegar-e-Imam Khomeini (RAH) Shahre Rey Branch, Islamic Azad University, Tehran, Iran. She was working as a faculty member of university for 14 years. She has published more than 30 papers during these years.

Ecologically sustainable graphene aerogel for the effective adsorption of indoor air pollutants

Aryan Singh[1], K. Sandeep Raju[2] and **Kumud Malika Tripathi[2]**

[1]Department of Chemical Engineering, Indian Institute of Petroleum and Energy, India
[2]Department of Chemistry, Indian Institute of Petroleum and Energy, india

The hazardous nature of volatile organic compounds (VOCs) and toxic gases (TGCs), which are produced from diverse natural and anthropogenic activities, poses a serious threat to human health.[1] Consequently, it is essential to implement effective methods for the removal of TGCs like adsorption, absorption, condensation and membrane separation.[2] Adsorption is preferred over conventional methods because of its selectivity, regenerability, versatility and compact environmental friendly. Graphene aerogel (GA) has gained importance because of its remarkable adsorption capability and unique structural characteristic.[3] Herein, the synthesis of ultra-light weight, coarse pore structure nitrogen doped-GA (N-GA) from biomass (Guava) is reported. Further, The N-GA was used as adsorbent for the effective adsorption of TGCs. These N-GA exhibit high adsorption of TGCs with high recyclability due to high porosity and surface area. N-GA show fairly good adsorption of TGCs such as NH3 (~408 mg g-1), formaldehyde (~332.03 mg g-1), carbon disulfide (~186.4 mg g-1), hydrochloric acid (~319.7 mg g-1), acetone (~341.8 mg g-1), ethanol (~184.5 mg g-1). The results indicate that N-GA exhibit considerable potential for diverse applications in air purification.



The use of keratin-7 antisense represents a novel and highly effective strategy to suppress tumorigenesis and promote apoptosis in cases of breast cancer

Mohammad Rahmati

Department of Medical Biotechnology, Faculty of Paramedicine, Guilan University of Medical Sciences, Rasht, Iran

Expression of the keratin-7 (KRT7) is upregulated in breast cancer, and has been shown to correlate with cancer's poor prognosis; however, the precise mechanisms underlying its involvement in tumorigenesis and apoptosis are largely unexplored. In the present study, by using specific oligonucleotide antisense against KRT7, in combination with KRT7-AS overexpression, we investigated the in vitro effects of the knockdown of KRT7 on tumorigenesis and apoptosis of breast cancer cell lines. According to the results, antisense targeting KRT7 exerted a dose-dependent inhibitory effect on the viability of MDA-MB-468 and MCF-7 cell lines, whereas no cytotoxic effect was observed in normal cells. Our results suggest that KRT7 plays a significant role in directed migration, invasion, and proliferation during tumor growth, leading us to interpret that KRT7 is a metastasis-associated protein and has regulatory activity in EMT and subsequent cancer metastasis. In addition, our cellular studies showed that this approach resulted in a remarkable decrease in mammosphere formation (37% in mammosphere's number and 25% in size; in comparison to the control group of MDA-MB-468 and MCF-7 cells), as well as a decrease in cancer cells migration and an increase in cancer cell apoptosis (48% and 45%, respectively). Altogether, our findings have effectively established the involvement of KRT7 in the advancement of breast cancer through its regulation of the post-transcriptional sense mRNA.

Biography

M. Rahmati is currently an Assistant Professor at the Guilan University of Medical Sciences, Rasht, IRAN. Dr. M. Rahmati received his PhD degree in Medical Biotechnology from Zanjan Medical University - Iran. Dr. M. Rahmati published a number of papers in several preferred Journals, and presented academic as well as research-based papers at preferred conferences. His areas of interests are targeting of tumorigenesis-related pathways in order to diagnosis and treatment, cancer targeted therapy, and antisense therapy.

Synthesis of multi-position 3-PRS manipulator based on spherical constraints by eliminating the PARA

Srinivasa Rao Pundru

Department of Mechanical Engineering, Mahatma Gandhi Institute of Technology, India

This work presents synthesis of 3-PRS manipulator based on spherical constraints by eliminating the PARA. The PARA can occur due to constrained mobility of the manipulator. The 3-constrained variables of manipulators are rotational freedom along z-axis and 2-translational freedom about x and y-axis of the fixed reference frame. The PARA motions are usually nonzero and are determined by the geometrical parameters of the manipulator. These PARA motions cause crucial problems in some cases. In general the amplitude of PARA motions are very small, but shows more impact on precision of motion, quality and accuracy of the mirror images of 3-PRS manipulator. To prevent these undesirable PARA motions, the synthesized architectural parameters of 3-PRS manipulator are identified by eliminating the PARA motions. The prospective application of this manipulator is in mirror image telescopic process used for alignment applications where tip, tilt and image focus of primary and secondary mirrors and positions are important.

Biography

Dr. SRINIVASA RAO PUNDRU from INDIA affiliated to Mahatma Gandhi Institute of Technology [INDIA]. He was awarded the Doctor of Philosophy in Mechanical Engineering (Robotics) at Jawaharlal Nehru Technological University Kakinada [INDIA]. He completed Master of Engineering in Machine Design at Andhra University [INDIA]. He is an Academic Expert of QS World University Rankings and have been selected as a Recognized Researcher in Times Higher Education “World University Rankings”, based on his record of research publications. He submitted the highly confidential reports to Academic Reputation of Times Higher Education "World University Rankings” in respective Years 2024, 2023 & 2022. All his published research articles are Cross referred and Scopus. All his Springer articles are promoted to Cross reference appendix, Scopus appendix, and also all his published Springer articles are promoted externally to NASA and incorporated by NASA Astrophysics Data System. His Springer published articles are promoted to Harvard University and Researcher App. He was selected as an Academic Expert in "Times Higher Education- World University rankings" based on his Record of Research Publications. https://www.harvard.edu/search/?q_as=Srinivasa%20Rao%20Pundru

Assessment and characterization of agricultural salt-affected soils around abaya and chamo lakes, South Ethiopia Rift valley

Azmera Walche[1,2], Wassie Haile[2], Alemayehu Kiflu[2] and **Dereje Tsegaye[1]**

[1]College of Agricultural Sciences, Arba Minch University, Ethiopia
[2]College of Agriculture, Hawassa University, Ethiopia

Soil salinity/sodicity is becoming a challenge for crop production in Ethiopia's semi-arid and arid regions. However, more information on soil salinity/sodicity needs to be available around Abaya and Chamo Lakes, South Ethiopia Rift Valley. This study aimed to assess and characterize soil salinity/sodicity and determine salt-affected soils' morphological, physical, and chemical properties. The representative soil pits that were 60*60*60cm in size were examined, and samples were taken from 0-20, 20-40, and 40-60 cm depths based on the criteria set for agricultural salt-affected soil studies. The soil properties determined include soil color, structure, consistency, bulk density, particle density, porosity, texture, pH, EC, SAR, ESP, CEC, BS, OC, TN, available P, $CaCO_3$-, exchangeable bases, and soluble ions (Na^+, Ca^{2+}, Mg^{2+}, K^+, Cl^-, SO_4^{-2}, NO^{3-}, $CO_3^{-2}$and HCO_3-). The soil analyzed results was rated and interpreted following a guide to standardized analysis methods for soil data. The results of this study reveal that the soils had considerable heterogeneity in soil morphological, physical, and chemical properties. The soils of the study site were highly alkaline and had very high sodium content, very high CEC value, and low levels of organic carbon and exchangeable calcium. The dominant soluble cation was sodium, followed by magnesium, calcium, and potassium in all soil depths of the pits. Similarly, Cl- was dominant among the anions throughout the soil depth, followed by HCO_{3-}, SO_4^{2-}, and NO_{3-}. The findings of this study imply that removing sodium and salts from the soil depth may improve the salt-affected soils' productivity in the study area. Application of organic amendments, including manures and crop residues, may also be beneficial in increasing fertility and organic matter content.

An insight into SDG 12 through the heat treatment industry's sustainable waste valorization by hydrated nano-structures formation in alkali-activated ceramic membranes

Farzaneh Mohammadi

Chemical Engineering Department, Faculty of Engineering, Ferdowsi University of Mashhad, Iran

Depleting natural resources, increasing greenhouse emissions, and socio-economic concerns have led to the recognition of sustainable development as the most important concept in environmental policy. An essential aspect of sustainable development is the reuse of waste and its transformation into valuable materials. Slags are by-products of smelting ores and are generally sorted as waste in most industries while they contain valuable metal and oxides. Reusing/recycling slags can reduce the environmental pollution of slag disposal in landfills. Two challenging issues in ceramic membrane synthesis are the high cost of starting materials and the sintering process. So, finding a technology that utilizes low-cost materials and reduces the synthesis temperature would be highly beneficial. Slags in joint with alkali-activation technology and geopolymers, offer promising opportunities in this regard. This research represents the first attempt to address the challenges of alkali-activated blast furnace slag ceramic membranes by exploring the potential of alkali-activated phosphorus slag as a material for synthesizing ceramic membranes. Furthermore, a comprehensive analysis was conducted to examine the interplay between key factors influencing the properties of common alkali-activated cementitious materials and their impact on membrane properties. This analysis included aspects such as hydrophilicity, flexural strength, topographical properties, thermogravimetric characterization and membrane performance. By employing FESEM & AFM imaging techniques at various scales ranging from microns to nanometers, a striking resemblance between the morphology of alkali-activated ceramic membranes (AACMs) and alkali-activated cementitious materials was established. The main hydration product identified was calcium silicate hydrate (C-S-H). The optimal membrane exhibited a pervaporation separation index, flux, and separation factor of 954.52, 3.61 kg/m2.h, and 264.41, respectively, in ethanol dehydration through pervaporation. Notably, this result was achieved without zeolite coating. Therefore, the novel and sustainable application presented in this study can reduce environmental pollution associated with phosphorus slag and highlight the circular economy in ceramic membranes.

Biography

Farzaneh Mohammadi is a senior researcher with over 7 years of experience in sustainable ceramic membrane synthesis via geopolymers & alkali activation. Her background lies in the synthesis & characterization of ceramic & polymer membranes. Since 2015, her research has been focused on the sustainable valorization of by-products for the fabrication of low-cost ceramic membranes. The results of her research have been published as research papers & patents in scientific societies. In 2023, she joined the Elsevier Reviewer Hub as a reviewer, receiving an invitation from the journal of the European Ceramic Society. As a professional process engineer & technical manager, she has worked on water & wastewater treatment projects in the representation of Atech Innovations GmbH Co.

Role of Nano candle carbon soot in nanotechnology

Shivani Dhall

Department of Physics, DAV College, Jalandhar

In recent years, carbon materials are widely investigated because of their extraordinary chemical, electrical and physical properties. But most of the researchers utilize graphite, graphene, reduced graphene oxide (rGO), carbon nanotubes (CNT), etc., as carbon material due to their excellent aforesaid properties. Keeping this in mind, we have synthesized the candle carbon soot using candle flame at room temperature conditions. I have found that a simple flame of candle is used to synthesize the layers of carbon soot with low cost. Candle carbon soot is attractive material for research community for various applications such as in battery, photovoltaic cell, electronics and gas sensor.

Biography

Dr. Shivani Dhall has been working as an Assistant Professor in the Department of Physics, D.A.V. College, Jalandhar, since July 2018. Previously, she worked as a NPDF in Department of Physics, IITD. During her PhD, she worked in CEN, Electrical Department, IIT Bombay. She got best INUP project award from IIT Bombay in 2015. In 2018, she awarded with CSIR Nehru and DS Kothari Fellowships. In 2019, She received TARE project under DST for continue her research work. She is working on carbon materials, nanoparticles and their device fabrication using lithography technique for gas sensing, photo sensor and interconnected applications. She is reviewer of many SCI journals. She has 25 SCI Journals publications.

Secondary mandibular reconstruction with patient specific 3D printed implant

Dr.Harsimran Singh[2], Dr.Neha Sharma1, Dr.Anish Goyal[3], Dr. Mandeep Singh and **Malhotra[1]**

[1]Consultant in Department of Surgical Oncology at C.K.Birla Hospital, India
[2]Consultant in Department of Surgical Oncology at C.K.Birla Hospital, India
[3]Cheif Dentist-Dental Arch, India
[4]Director in Department of Surgical Oncology at C.K.Birla Hospital, India

Oral cancer is one of the most common cancer in India. Every year 77,000 new cases and 52,000 deaths are reported. 70% of them present in the advanced stages. Surgery in resectable locally advanced oral cancer often includes segmental /hemi mandibulectomy. Primary osseous reconstruction is definitely the preferred option but in majority of circumstances in India due to lack of resources and / or lack of adequate skill or patient having certain comorbidities, the defects are closed with only soft tissue flaps. These patients over the time develop deviation of residual mandible causing malalignment and occlusal disturbances leading to repeated traumatic ulcers which might cause another malignancy. Mandibular reconstruction at a later stage i.e. secondary settings although challenging should be considered in such situations. With advancement in three-dimensional (3D) imaging software and alloplastic technology a complete prosthetic mandibular replacement can also be done. We share our experience around this with the case discussed.

Biography

Dr Harsimran Singh is a prolific surgical oncologist in Delhi- NCR region with over 15 years of clinical experience. He completed his Fellowship in Head & Neck Onco Surgery from HCG Manavta Cancer Centre, Nashik, Maharashtra University of Health Sciences. Dr Singh has authored many articles for both national and international publications.

Electrochemical properties of CNT doped nanoporous tin oxide hybrid electrode formed on cold spray tin coating for supercapacitor application

Mehdi Zarei[1,2], Salman Nourouzi[1], Roohollah Jamaati[1], Irene Garcia Cano2, Maria Sarret[2], Sergi Dosta[2], S.H. Esmaeili-Faraj[3]

[1]Department of Materials Engineering, Babol Noshirvani University of Technology, Shariati Ave., 47148-71167 Babol, Iran
[2]Thermal Spray Centre, Department of Material Science and Physical Chemistry, Universitat de Barcelona, C/Martí i Franques 1, 08028 Barcelona, Spain
[3]Faculty of Chemical and Materials Engineering, Shahrood University of Technology, 36199-95161 Shahrood, Iran

In this study, a hybrid electrode by combining a nanoporous tin oxide thin film with carbon nanotubes on a tin cold sprayed coating was formed. Field emission scanning electron microscopy (FESEM) and transmission electron microscopy (TEM) were used to conduct structural examinations. The characterization results indicate that employing the pulsed electrophoretic technique for depositing carbon nanotubes on nanoporous tin oxide resulted in the formation of a homogeneous arrangement of carbon nanotube particles on the surface. The electrochemical properties of the resulting electrode were analyzed using cyclic voltammetry (CV), galvanostatic charge-discharge (GCD), and electrochemical impedance spectroscopy (EIS). The excellent electrochemical performance of the hybrid electrode can be attributed to its high surface area and exceptional conductivity, which are a result of the inclusion of carbon nanotubes. Incorporating carbon nanotubes into the porous tin oxide framework leads to a substantial enhancement in capacitance. The electrode made of a combination of nanoporous tin oxide and carbon nanotubes had a specific capacitance of 0.036 F.cm-2 when tested at a scan rate of 50 mV s-1. The findings indicated that the nanoporous tin oxide-CNT hybrid electrode has the potential to be utilized in energy storage applications.

Biography

Mehdi Zarei have a Ph.D. in material science. He was passionate about cold spray, nanostructure materials, thin films, power storage systems, and composite coatings. He specialize in materials characterization using techniques like FESEM, TEM, XRD, OM, AFM, and electrochemical methods. He also skilled in evaluating coatings for strength, adhesion, hardness, corrosion, and wear resistance. He has experience in preparing thin and thick films and synthesizing and characterizing nanomaterials. Through his research and skills, he committed to expanding our understanding of material science and encouraging others to explore its possibilities.

Eco-friendly approach of synthesis, characterization and technological applications of zinc oxide nanostructures

José, Basílio José Augusto[1], Shinde and **Mahendra Devidas[2]**

[1]*Licungo University, Mozambique*
[2]*Sandip University, India*

Environmental sustainability, nanotechnology, and materials science represent critical focal points for global researchers. This study addresses this challenge by exploring the environmentally friendly synthesis of zinc oxide (ZnO) nanostructures through a green approach utilizing various biogenic materials such as Citrus reticula, eggshell, moringa seeds, rice husk ash (RHA), and reetha fruit extracts. Each material was selected based on its rich phytochemical content documented in the literature. Through an eco-conscious methodology, the study investigates the mechanisms underlying ZnO formation, encompassing stabilization, reduction, capping, and Ostwald ripening, resulting in versatile materials suitable for diverse applications. Characterization techniques including X-ray diffraction (XRD), transmission electron microscopy (TEM), UV-Vis spectroscopy, Raman spectroscopy, X-ray photoelectron spectroscopy (XPS), field-emission scanning electron microscopy (FESEM), energy-dispersive X-ray spectroscopy (EDX), atomic force microscopy (AFM), zeta potential measurements, current-voltage (i-v) characteristics, and dielectric studies were employed. The synthesized ZnO exhibited crystallite sizes ranging from 16 nm to 24.9 nm, with diverse morphologies such as flower-like structures, nanowires, and spherical formations observed through TEM and FESEM imaging. Band-gap energies were determined to range from 3.21 eV to 3.275 eV, while Raman spectroscopy revealed distinctive peaks indicative of different vibration modes. The chemical composition of the nanostructures was confirmed through XPS analysis, showcasing the presence of zinc, oxygen, and carbon peaks. EDX analysis further confirmed the composition, with zinc and oxygen being the predominant elements. The synthesized ZnO demonstrated negative surface charge and good colloidal stability, with zeta potential values ranging from -26.9 mV to -45.05 mV. Photocatalytic activity studies revealed an efficiency of 89% in removing Methylene Blue under UV light, showcasing promising applications in nanofluids, LEDs, optoelectronics, and energy devices. By advocating for eco-friendly synthesis methods, this research offers sustainable alternatives to conventional approaches, thereby mitigating environmental risks associated with intense chemicals.

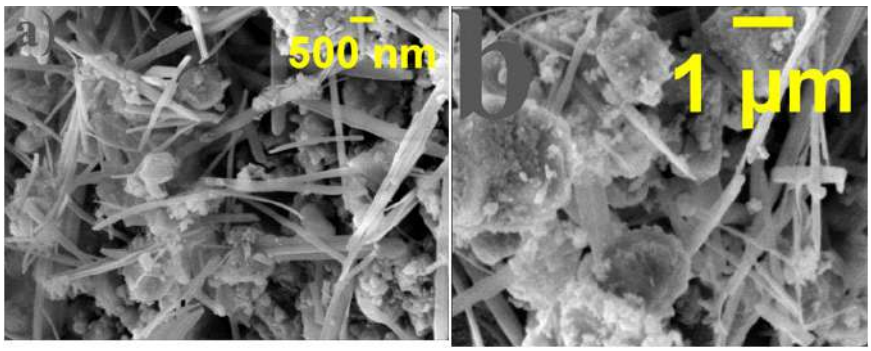


Figure 1: FESEM-EDX (a) Nanowires (b) Sphere like growing alongside nanowires

Biography

Mr. Basilio José Augusto José is a researcher specializing in environmental sustainability, nanotechnology, and materials science. With an academic background in physics and electrical engineering, coupled with extensive experience in education and research. Throughout the career, he have proficiently employed advanced analytical techniques such as XRD, TEM, FESEM, EDX, Raman, AFM, UV-VIS, FTIR, Zeta potential, LCR Meter, and I-V measurements using PPMS. His interdisciplinary expertise extends to areas such as electricity, photovoltaic systems, meteorology, and astronomy, further enriching his understanding of scientific principles. He is proficient in sophisticated fabrication techniques including Dip Coating, Spin Coating, SILAR, PLD, Probe Sonicator, Ultrasonicator, and Centrifuge, enabling precise control over nanostructure properties. His commitment to addressing environmental challenges is evident through he involvement in initiatives like the Inter-District Early Warning System and the establishment of the Association for the Environment and Climate Response-AMARC. He excels in collaborating with diverse stakeholders and implementing effective strategies for positive community impact. Additionally, he possesses skills in Project Management, Monitoring & Evaluation, and Theory of Change application, ensuring successful project outcomes.

For high-performance humidity sensors using Fully Printed electronic-based cellulose nanofiber-Ag nanoparticle composites

Dong-Soo Kim

Department of Creative Convergence Engineering, Hanbat National University, Republic of Korea

This study presents a high-performance humidity sensor fabricated using an innovative sensing material consisting of cellulose nanofibers (CNF) and silver nanoparticles (AgNP). The interdigital electrode pattern was created using reverse offset printing with Ag nano-ink, and the sensing layer on the printed interdigit electrode (IDE) was constructed by depositing CNF-AgNP composites through inkjet printing. Sensor performance was evaluated by measuring the change in impedance according to the change in relative humidity. The CNF-AgNP sensor showed a very sensitive and rapid response to the change in humidity compared to the CNF sensor. This means that the improved performance in humidity detection resulted in increased conductivity of Ag nanoparticles and adsorption of free water molecules due to the porous properties of the CNF layer. This suggests that CNF-AgNP composites can fabricate high-sensitivity, fast response, reproducibility, flexibility, and cost-effective humidity sensors.

Biography

He completed his PhD at Yeungnam University in 2000 and completed his postdoctoral research at the Korea Institute of Machinery & Materials. He has been a professor at Hanbat University since 2012, and is the director of the 3D Printing Industry Association of the Ministry of Trade, Industry, and Energy. He has published more than 50 papers on SCI and is engaged in related research with more than 200 patents.

The new era of immunological treatment, last updated, and future consideration of CAR T cell-based drugs

Siavash Taremi[1,2], Kaveh Hadiloo[1,2], Salar Hozhabri Safa[2], Sima Amidifar[2] and Abdolreza Esmaeilzadeh[3,4]

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[2]School of Medicine, Zanjan University of Medical Sciences, Iran
[3]Department of Immunology, Zanjan University of Medical Sciences, Iran
[4]Cancer Gene Therapy Research Center (CGRC), Zanjan University of Medical Sciences, Iran

Cancer treatment is one of the fundamental challenges in clinical setting, especially in relapsed/refractory malignancies. The novel immunotherapy-based treatments bring new hope in cancer therapy and achieve various treatment successes. One of the distinguished ways of cancer immunotherapy is adoptive cell therapy (ACT), which mainly utilizes genetically modified immune cells against cancer cells. In ACT, one of the frontier ways is the chimeric antigen receptor (CAR), using a unique structure to create armored-immune cells targeting a particular antigen on the cancer cells. Among all the immune cells, the T cells are pioneers due to their particular cytotoxicity action against tumor cells; therefore, CAR-engineered T cells have emerged as a potentially effective way to treat cancer patients. This technology progressed until it introduced six US Food and Drug Administration-approved CAR T cell-based drugs. These drugs act against hematological malignancies appropriately and achieve exciting results, so they have been utilized widely in cell therapy clinics. In this review, we introduce all CAR T cell-approved drugs based on their last data and investigate them from all aspects of pharmacology, side effects, and compressional. Also, the efficacy of drugs, pre-and post-treatment steps, and expected side effects are introduced. Then, we decipher the differences among the drugs and compare them from various clinical aspects. Finally, in the last speech, we will discuss the challenges and new solutions in CAR T cell therapy.

Biography

Siavash Tarami was born in Zanjan, Iran in 1998. He studied medicine at Zanjan University of Medical Sciences for seven years and graduated as a general physician in 2023. In addition to working as a general physician, he is interested in cancer research and novel drugs used in this field, so he has collaborated on several related projects. He is also interested in learning artificial intelligence and its application in various aspects of cancer, such as diagnosis, treatment, and patient follow-up.

Antimicrobial and mechanical properties of colored cement based on novel nanocomposite

W.M.Abd El-Gawad and **D.S. Mahmoud**

Polymers and pigments Dept., National Research Centre, Egypt

Cement production consumes a lot of energy and emits a large amount of carbon dioxide, nitrogen oxide, and sulphur oxide into the atmosphere. It causes global temperatures to rise and acid rain to form. The application of hybrid cementitious materials could provide a beneficial approach to solving these problems. Herein, novel hybrid cementitious materials, composed of industrial waste-modified ZnO.CoO or ZnO.CuO, were applied in cement pastes to replace a part of cement. Additionally, these hybrid cementitious materials could offer good compressive strength, color properties, and antimicrobial activity. The prepared materials were characterized using different analytical and spectro-photometric techniques, such as X-ray fluorescence, energy dispersive X-ray/scanning electron microscopy, and transmission electron microscopy. After the synthesis and characterization of the new cementitious materials, they were admixed to OPC with different doses (e.g., 0, 2.5, 5, 10, 20 mass%). The obtained findings showed that cement having 10% of the prepared cementitious materials was the best. Additionally, the antimicrobial activity of cement containing waste-modified ZnO.CuO was better than that of cement containing waste-modified ZnO.CoO. Moreover, the color investigation demonstrated that the cement containing a waste-modified ZnO.CoO has a green color.

Biography

Walaa would like to express her interest in sharing at the 4th Global Conference on Advanced Nanotechnology and Nanomaterials. With more than thirteen years of work experience in the research field, she has developed strong expertise that could qualify me to share in the conference. She was a researcher in the Polymers and Pigments Dept. at the National Research Centre in Egypt. She was a member of a team that is a specialist in material science and is working on the preparation of innovative new cost-effective multifunctional nanomaterials to be used in different applications such as polymer composites, polymeric coatings, coated papers, plastic, rubber, etc. Additionally, in the building construction field, these materials can be used as anticorrosive materials for reinforced concrete steel, as additives in cement paste and concrete for color purposes, or to improve their mechanical properties. She will be happy if her abstract is accepted. Thanks in advance.

Noval Bayesian distributed adaptive neural structure for Titanium and Aluminium alloy nanofluidic model with gyrotactic microorganisms

Zahoor Shah[1], Muhammad Asif Zahoor Raja[2], Muhammad Shoaib[3] and **Faisal Shahza[d4]**

[1]Assistant Professor, Department of Mathematics, COMSATS University Islamabad, Islamabad Campus, Pakistan
[2]Future Technology Research Center, National Yunlin University of Science and Technology, Taiwan
[3]Yuan Ze University, AI Center, Taiwan
[4]Department of Mathematics, Mohi-Ud-Din Islamic University Nerian Sharif AJK, Pakistan

The purpose of this research study is to evaluate the solutions of Titanium and Aluminum alloy nanofluidic model with gyrotactic microorganisms (TAA-NFMGM) by applying stupendous knacks of Bayesian distributed adaptive neural structure (BDANS). The use of nanofluids containing gyrotactic microorganisms in combination with titanium and aluminum alloys have potential applications in diverse fields, including engineering, bioremediation, biomedical devices, biotechnology, and research depending on different factors like design of the system and use of certain microorganism. A dataset for BDANS is generated for the eight different events with Adam numerical technique for TAA-NFMGM by varying Prandtl number (Pr), mixed convection parameter ( ), microorganisms concentration parameter (Ω), bioconvection peclet number (Pe), and bioconvection Lewis number (Lb). The reference data set generated with Adam numerical technique is utilized for numerical calculation of different parameters on TAA-NFMGM by employing the artificial intelligence based BDANS. The accuracy and justification of the performance of BDANS is efficaciously substantiated through negligible level of MSE, calculation of regression metrics and distribution of instances of error on histograms. The excellent measures of performance in terms of MSE are achieved at level 5.5677E-13, 6.1903E-13, 2.3037E-13, 1.3474E-12, 2.4083E-13, 3.2598E-13, 7.2327E-13, and 1.0241E-13 against 958, 114, 181, 212, 105, 849, 117,and 215 epochs. The comparative study of the proposed and reference dataset implies the authenticity and precision of BDANS based on error analysis, which is around E-04 to E-09 for all scenarios.

Biography

Dr. Zahoor Shah, Educationist/Researcher

Designation: Assistant Professor, Department of Mathematics

Affiliation: COMSATS University Islamabad, Islamabad Campus, Pakistan.

Modeling of gas sensor based on Zinc Oxide Thin Films by Feedback Loop using Operational Amplifier

Raju Bhattarai[1], Rishi Ram Ghimire[1], Deependra Das Mulmi[2] and **Ram Bahadur Thapa[1]**

[1]Patan Multiple Campus, Nepal
[2]Nepal Academy of Science and Technology, Nepal

Nanostructured Zincoxide thin-film is widely used as a sensing material because of its tunable surface microstructure and wide optical bandgap but synthesizing a film with desired value of resistance and reproducibility of film is challenging, particularly by chemical method. In this work, we showed how a ZnO film of arbitrary resistance can be used as a sensor without application of heat using operational amplifier. Zinc oxide thin film was synthesized by using the Sol-gel method (Spin coating) and was characterized by XRD and SEM which revealed wurtzite polycrystalline nature of Zinc oxide film with average grain size 17-25 nm. In this report, we designed a noble electronic circuit capable of detecting analyte gas molecule even if very small change in film resistance occurs due to the influence of gas molecule. In recently available sensors, the quality of the film degrades over time due to repeated heating and cooling, resulting in a reduced lifetime for the sensor. To address this issue and achieve higher sensitivity, as well as to fabricate an affordable, portable, precise, energy-efficient and durable device, this electronic model offers advantages over classical temperature-dependent sensors.

Biography

Throughout his academic journey; graduation in Physics, he has been deeply passionate about the field of nanotechnology.

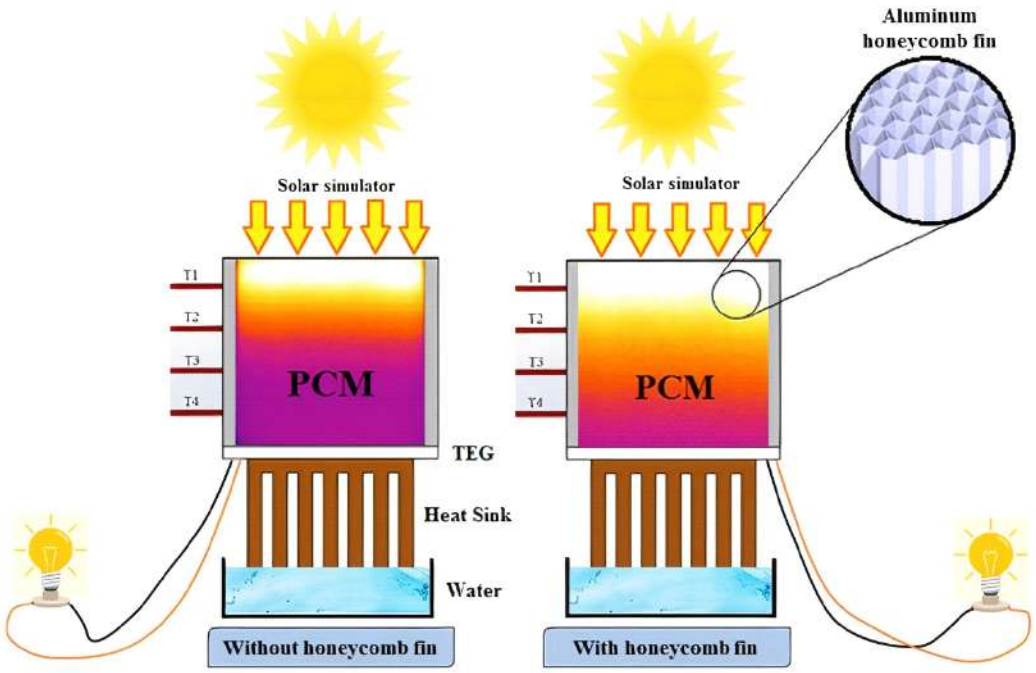
He has been a part of research on nanomaterial fabrication and gas sensing application of AZO at Nepal Academy of Science & Technology (NAST), which has honed his theoretical knowledge and practical skills in nanomaterial fabrication and its characterization. During his research, he worked on a project that involved the fabrication of a noble gas sensing device which has been published in Heliyon. This experience not only strengthened his technical skills but also taught me the importance of collaboration and effective communication in research.

Solar-thermal conversion and thermal energy storage of different phase change materials

Ali kianifar, Amirhossein Joveini and **Emadoddin Erfani Farsi Eidgah**
Department of Mechanical Engineering, Ferdowsi University of Mashhad, Iran

This study aimed to evaluate various phase change materials (PCMs) combined with thermoelectric devices for solar energy storage and electricity generation. The PCMs investigated encompassed industrial-grade Rubitherm 35HC and Rubitherm 42, as well as edible alternatives like margarine, sheep fat oil, and coconut oil. The main objective was to improve energy storage efficiency and ensure cost-effective, uninterrupted electricity production in the absence of solar radiation, while considering PCM material longevity. The findings emphasized the significant influence of energy storage materials on electricity generation, particularly under conditions without solar radiation. Notably, honeycomb fins yielded varying storage efficiencies for different PCMs. Rubitherm 35HC demonstrated exceptional performance with a storage efficiency of 71%, while sheep fat oil exhibited the lowest performance at 27%. Coconut oil, margarine, and Rubitherm 42 achieved storage efficiencies of 36%, 29%, and 47%, respectively. Rubitherm 35HC not only substantially enhanced energy storage efficiency but also yielded over 200% increased voltage production compared to scenarios without PCM integration. Furthermore, incorporating honeycomb fins amplified this percentage to 222%. These results underscore the importance of selecting suitable PCMs and optimizing their integration with thermoelectric devices to maximize energy storage and electricity generation efficiency. The research contributes to the development of efficient and cost-effective systems for harnessing solar energy across diverse applications.

Solar-thermal conversion and thermal energy storage of different phase change materials



Biography

Professor Ali Kianifar, a renowned faculty member in Mechanical Engineering at Ferdowsi University of Mashhad, boasts a prestigious degree from the University of Strathclyde. With over four decades of expertise in renewable energy and fluid mechanics, he is recognized internationally as a top-tier scientist and among the most highly cited researchers. In 2021, he published 54 influential articles, amassing 3562 citations, reflecting the significant impact of his work. His research advances understanding in energy systems and fluid dynamics, exploring emerging energy sources and fluid behaviors in engineering. Committed to education, he mentors students with innovative teaching methods and fosters interdisciplinary problem-solving. Professor Kianifar's collaborations with global research institutions address complex engineering challenges, driving transformative innovations and leaving a lasting mark on the field.

A new tri-layered nanostructure consisting electrospun fibers, hydroxyapatite nanoparticles and gelatin hydrogel for bone tissue engineering applications

Mehdi Sadat-Shojai

Department of Chemistry, College of Sciences, Shiraz University, Iran

Electrospinning is a useful method for producing ultrafine fibers appropriate for use in tissue engineering scaffold. Electrospun scaffolds are limited by their tightly packed network, which provides only a surface porosity structure. Alternatively, hydrogels can be utilized to generate scaffolds with a well-connected porous structure; however, these materials have limited mechanical stability and bioactivity, making them unsuitable for three-dimensional bone tissue engineering structures. Therefore, this work represents a successful attempt to develop and build a novel 3D hybrid scaffold composed of mechanically robust fibrous electrospun fibers coupled with modified gelatin/hydroxyapatite nanoparticles. Furthermore, the integrated gel matrix was employed to encapsulate the cell populations necessary for bone repair. While the hydrogel layers provide an appropriate environment for cell encapsulation, the inserted fibers serve as a strong backbone, enhancing the scaffold's mechanical qualities. Furthermore, encapsulating hydroxyapatite nanoparticles within the hybrid scaffold significantly improved matrix mineralization. According to the findings, the construct had significantly greater mechanical characteristics than standard hydrogels. Furthermore, bone cells within the scaffold were extremely alive and infiltrated into the electrospun center after 14 days of encapsulation. Given its great strength and capacity to encapsulate cells, the novel cell-laden tri-layered scaffold was predicted to improve bone repair in vivo. The approach described here does not need complex procedures or expensive instruments and may be easily scaled up. This method is also likely to open up new opportunities for developing powerful cell-laden structures for future in vitro and in vivo applications.

Biography

Mehdi Sadat-Shojai obtained his Ph.D. degree in polymer engineering in 2013 at Iran Polymer and Petrochemical Institute, Iran. He also spent six months as a Visiting Research Scientist at Harvard Medical School in USA. He is now an Assistant Professor at Shiraz University, Iran. While, he has been selected as one of the best 100 scientists among the Iranian experts active in the field of nanotechnology, in 2017, he won the Materials Today Cover Competition (Elsevier) and received the National Prize for the Best Article published in 2015–2016 (Vice-Presidency for Science and Technology). He also have been consistently ranked in the top 2% of scientists worldwide in 2021, 2022, and 2023, as recognized by the prestigious Stanford–Elsevier report. His current work is grounded in polymeric biomaterials, but seeks to cross disciplinary boundaries, involving preparation of polymer/ceramic nanocomposites and developing new methods for preparation of bioactive nanoparticles.

Cobalt doped cerium oxide/multi walled carbon nanotubes nanocomposites based immunosensor for the electrochemical detection of CA 125

Farrukh Bashir Kayani

Pakistan Science Foundation Islamabad, Pakistan

Herein, a label free electrochemical immunosensor was prepared to detect ovarian cancer by the cancer antigen CA 125 by using cobalt doped cerium oxide/multi walled carbon nanotubes (Co-CeO2/MWCNTs) nanocomposites on glassy carbon electrode (GCE). The nanocomposites were synthesized and characterized by X-ray diffraction (XRD), Fourier Transform Infrared (FTIR) spectroscopy, and scanning electron microscopy (SEM). Each step of fabrication of the immunosensor was analyzed by using electrochemical techniques, cyclic voltammetry (CV) and electrochemical impedance spectroscopy (EIS) of [Fe(CN)6]3-/4-. Under the optimal conditions, the fabricated electrochemical immunosensor exhibited 0.1 UmL-1 the limit of detection for dynamic range of 1 UmL-1 to 100 UmL-1 of CA 125 concentration. The fabricated immunosensor has good selectivity, stability, and reproducibility. Moreover, it showed excellent CA 125 detection performance in human serum for clinical applications and research.

Biography

Farrukh Bashir Kayani, a researcher/scientist has working at the Pakistan Science Foundation Islamabad since 2010. He has obtained his PhD in Physics from Air University Islamabad in 2024. Prior to this, he completed a Master of Philosophy (Physics) at Riphah International University Islamabad in 2015. His research interests include electrochemical immunosensors, biosensors, nanotechnology, and material sciences. His research articles have been published in well known and reported journals.

Physico-mechanical characterization of eco-friendly gypsum composites incorporating shredded surgical face masks

Muhammad Hassan Javed, Muhammad Rizwan Riaz and Rizwan Azam
Department of Civil Engineering, University of Engineering & Technology, Pakistan

The global pandemic triggered by COVID-19 significantly increased the use of personal protective equipment especially surgical face masks. Consequently, there has been a substantial environmental impact, with millions of these masks being discarded and polluting various areas such as beaches, oceans, and landfills. To address this issue, this study explores a novel approach of re-purposing used disinfected face masks by incorporating them into gypsum in fiber form. For that purpose, shredded face mask (SFM) fibers were replaced with gypsum at three different percentages i.e. 1%, 2%, and 3% (by weight). In order to investigate the impact of fiber size, three aspect ratios i.e. 5mm × 20mm, 5mm × 40mm, and 5mm × 60mm were studied. As the dosage of SFM fibers increased, a decrease in density, ultrasonic pulse velocity and compressive strength was observed. In flexure, the cracking load decreased; however, after cracking, when mask fibers came into action, there was a significant improvement in post-peak behavior and ultimate load-carrying capacity. Furthermore, an increase in fiber dosage resulted in higher water absorption of composite prisms. On the contrary, increasing the aspect ratio of the SFM fibers resulted in a slight increase in mechanical properties (flexural strength and compressive strength), density, capillary water absorption, and ultrasonic pulse velocity. However, the 24-h water absorption showed an opposite trend and slightly decreased. All composite prisms satisfied the minimum 1 MPa and 2 MPa limits specified by BS EN 13279-2-2014 standard in flexure and compression tests respectively. The flexural strength of composite false ceiling plates decreased, however the post-peak behavior showed a significant improvement. Additionally, all tested false ceiling plates fulfilled the 6 kg mid-span load criteria specified by UNE-EN 14246-2006 standard. After analyzing the experimental results and taking into account factors such as ease of mixing, placement, and finishing, the optimal recommendation for plate manufacturing is to use a 2% fiber replacement with a 5mm × 40mm aspect ratio of SFM fibers. The cost comparison revealed a marginal cost difference between the conventional plate and composite plates, highlighting the composite product's suitability for mass production.

Biography

Muhammad Hassan Javed holds a BSc. degree in Civil Engineering and an MSc. degree in Structural Engineering from the University of Engineering and Technology, Lahore. He is currently working as an Assistant Director in the Irrigation Department, Government of Punjab.

Blue Laserdisintegrated copperactivated salicylic acid (Cu-SA) nanocomposites as an effective antifungal seedborne mycopathogens of rice

Garima Gandhi[1] and **Anjali Sidhu**[2]

[1]*Punjab Agricultural University, India*
[2]*Punjab Agricultural University, India*

Driving phytopathological fact-finding is centred on overseeing seed-borne pathogens of rice through the utilization of modified nano-composites. Here, on the contrary basis of prepared sonicated formulations, blue laser-induced topo-morphologically nano-advanced copper salicylates (Cu-SA) (Cu-SA in 1:1 and 1:2 ratio) were synthesized and assessed for their enhanced antifungal ability along with seed invigorating impacts. Non-Linear laser beam of 405nm was imposed on the sonochemically dispersed nanoformulations to achieve high degree of success and precision using laser beam, which yielded consistently dispersed spherical nanoparticles with a narrow size distribution and better crystallinity than aqua-dispersed sonicated formulations. For a couple of times, In vitro antifungal assessment against rice seed-borne pathogens viz. Fusarium fujikuroi and Fusarium verticillioides, uncovered the expanded potential of laser-disintegrated nanoformulations (l-CuSA) in comparison to sonicated (s-CuSA) and bulk samples. Laser-induced nano sodium bis(2-oxobenzoato) cuprate (II) (l-CuSA2) with CuSA in 1:2 proportion was the finest to restrain the in vitro contagious development. Ultra-micrographs and fungal double-staining assay further rationalized the membrane disruption as the mode of action for the fungitoxicity. Nanopriming of contagious swarmed rice seeds with l-CuSA2 at 2500 µg/mL for 8 h appeared the greatest lessening of seed rot (80.43%) and seedling blight (63.15%) with regard to control (untreated). The seed-invigorating variables of l-CuSA2 nanoprimed seeds were upgraded to most extreme degree and appeared the most noteworthy per cent germination (35.29%), shoot length (11.42%), root length (21.14%), dry weight (75.43%) and vigour index (81.04%) over the control. CuSA2 is accounted as the best nanoformulated complex which have opened the doors for its utilization as seed nanopriming agent in agrosystems.

Biography

Garima Gandhi, finished her thesis, "Synthesis and evaluation of various metal salicylates nano formulations against pathogenic fungi of rice" as part of her postgraduate studies in chemistry. Additionally, she have a research paper that was published under the title" Laserdisintegrated copperactivated salicylic acid (CuSA) nanoparticles suppressed the seedborne pathogens of rice with enhanced seed invigoration parameters". The "International Conference on Emerging Trends in Science and Technology" was another event she attended in 2022. She was currently employed by a German company as a research associate.

Investigation of the structural, electrical, and magnetic behavior of Co3+-Ti4+ doped strontium hexaferrite: validation of measured and theoretical models

Priyanka Sahu[1,2]

[1]*Department of Electronics and Communication Engineering, IIIT RGUKT RK Valley, Idupulapaya, India*
[2]*Department of Metallurgical Engineering and Materials Science, Indian Institute of Technology Indore, India*

We report the effect of Co3+ -Ti4+ doped SrFe12-(x-y)CoxTiyO19 (x=y=0.0, x=0.225,y=0.1125) hexaferrite successfully prepared using the conventional ceramic route. The structural, optical, electrical, and magnetic properties were analyzed via X-ray diffraction, scanning electron microscopy, diffuse reflectance spectroscopy, complex impedance spectroscopy, and vibrating sample magnetometer. The structural analysis (Rietveld Refinement) revealed that all the samples exhibit magnetoplumbite hexagonal crystal structures with P63/mmc space group. At the same time, their increase in grain size and the bandgap energy showed evidence of dependency on Co3+ -Ti4+ content in SrFe12O19. The impedance and modulus spectra showed the suppression of surface charge polarization with substituting Co3+ -Ti4+ ions and cocontribution of the grain and grain boundary effect presented by modeling the electrical processes using an equivalent circuit model. Two transition peaks were observed in the temperature-dependent dielectric constant plots, represented as Td and Tm. However, Tm is nearly frequency-independent, and only one transition peak is identified in frequency versus dielectric constant plots. The temperature Td is due to dipole relaxation, whereas Tm is assigned as dielectric phase transition, modeled by modified Curie–Weiss law. Further, the AC conductivity was examined by Jonscher's powder law and random free energy barrier model, showing that the AC conductivity increases by increasing frequency due to electronic and overlapping large-polaron hopping mechanisms. Finally, in the magnetic measurements, a simple phenomenological model was modeled based on the Lorentzian function model, representing a transition from hard to soft ferrites in the doped Co3+ -Ti4+ SrFe12O19 with saturation magnetization of 123.66 emu/g and coercivity of 316.69 Oe.

Biography

Dr. Priyanka Sahu is currently working as an Assistant Professor in the Department of Electronics and Communication Engineering at Rajiv Gandhi University of Knowledge Technologies R K Valley, Andhra Pradesh (IIIT RGUKT RK Valley). She did his PhD from Indian Institute of Technology Indore (IIT Indore) in the year 2023. She obtained M.Tech (R) degree from National Institute of Technology Rourkela and Bachelor degree in Electronics and Telecommunication Engineering from Government Engineering College Bilaspur Chhattisgarh, India. She has published 12 + research papers and presented more than 10 international conferences. Her research interest is mainly in the field of development of novel soft magnetic

materials, magnetocaloric materials and composite materials using different processing routes and also to design and develop the thermodynamic models using Redlich-kister polynomial equation and Miedema Semi-empirical model. She also finds interest to design and develop the theoretical models that fits with the experimental results. She is also expertise in operating different instruments such as X-ray diffraction (XRD) operation, Field emission Scanning Electron microscopy (SEM) Coupled with EDS and Elemental mapping, Inverted Optical microscopy (Zeiss) operation, Differential Scanning Calorimetry (DSC) operation, Thermogravimetric Analysis (TGA) operation, Complex Impedance Spectroscopy operation, Mechanical alloying using a Planetary ball mill , Automatic Polisher, Semi-automatic polisher, Controlled atmosphere Tubular Furnace and Muffle Furnace, Hot and Cold Mounting , Low-speed saw Diamond Cutter & Abrasive cutter etc. She received best oral presentation award in progress in Metallurgy & Materials (ISPMM-2023) at IIT Indore. She became the 1st runner-up in poster presentation award in Research and Industrial Conclave (RIC-2023) at IIT Indore. She has also given her first invited talk at the International conference on Renewable Energy and Sustainable Technologies (ICREST) at Jamia Millia Islamia, Central University at New Delhi, India on 5/07/2024.

Investigation Of Thin Film Nanocomposite (TFN) membrane with NH_2-CuBTC for CO_2/N_2 separation

Mahdi Fakoori

Department of Process, South Pars Gas Complex (SPGC), Iran

Wordwide heating is a general alarming subject agented via maximum CO2 transmission to atmospher. therefore, CO2 removing applying thin film nanocomposite membranes (TFNs) is a competent method to increment the CO2 gas separation yeild. TFNs including two layers, support layer via polysulfone and thin layer for selectivity and permeability via pebax1657 filling by NH2-Cu BTC was produced to separate gases. The achieved expriments from thermal gravity analysis (TGA) and field emission scanning electron microscope (FESEM) make known that the qualified samples declared a superior affinity among fillers and Pebax. The permeation analysis of total samples was investigated over different feed gas pressure was done range of 2 – 10 bar. Mixed gas feed was used for permeability and ideal selectivities improved by filling MOFs into the Pebax. At 15 wt.% filling of MOFs for total samples analysis. The permeability of gases (N_2, CO_2 and CH_4) reached to 4.65, 202.7 and 6.82 Barrer, respectively, for neat sample were incremented as the used feed gas pressure incremented of 2 bar. Furthermore, the selectivities (CO_2/N_2 and CO_2/CH_4) was incremented to 43.59 and 29.72; respectively. Achieved tests revealed that the membranes performance was incremented at higher used feed gas pressure. The Sample of membrane including 15wt% NH2-CuBTC hint a CO_2 permeability of 238.8 Barrer at 10 bar pressure.

Biography

Dr. Mahdi Fakoori was born in Borazjan city of Boushehr province.

2007-02-24 to present (Department of Process, South Pars Gas Complex (SPGC), Assalouyeh, Iran.) Employment.

Specialized fields: Oil and Gas | Membrane separation process, Nanotechnology, Process modeling and simulation, Catalysts, Hydrates, Gas processing (GTU), LPG Treatment and storage, Sulphur recovery unit.

PhD (Chemical Engineering-Transfer Phenomena and Separation Processes).

M.SC (Petroleum Engineering-Reservoir Engineering).

B.SC (Chemical Engineering- Gas Industry).

Segmentation of the cirrhotic liver using a deep learning technique

Pushpa B[1] and **Vivekanandan s**[2]

[1]*Assistant Professor, Department of Biomedical Engineering, SRM Institute of Science & Technology, Ramapuram Campus, India*
[2]*Managing Director & Liver Transplant Surgeon, Dept of HPB & Liver Transplantation, RPS Hospitals, India*

In recent years, transfer learning techniques have been the method of choice for computer-aided diagnosis (CAD) of a range of diseases because they enable classification from small training datasets. The potential of deep learning (DL) to enhance imaging-based differentiation of the aetiology of liver cirrhosis is examined in this study. Current work describes a technique for segmenting liver cirrhosis from CT images using AI-based medical imaging technologies. The 571 individuals in this retrospective, monocentric analysis had a confirmed diagnosis of non-alcoholic cirrhosis (n = 475). The CT image dataset were divided at random for 85% training and 15% testing using five-fold cross-validation. An ImageNet pretrained convolutional neural network (CNN) architecture; GoogLeNet has been evaluated following automated liver cirrhosis segmentation. GoogLeNet with pre trained parameter values demonstrated good classification performance on cirrhosis test data, with precision, recall, F1 score and area under curve (AUC) as 97.76, 99.58, 98.66 and 0.89 respectively. The performance of classification has shown significant results from the extracted features, by the pre-trained models. Current work demonstrates the performance of deep learning classifiers to distinguish the liver cirrhosis based on conventional CT (computer Tomography) scan.

Biography

PUSHPA B (Pushpa Balakrishnan) received B.E degree in EIE from St. Peters Engineering College, Chennai affiliated to Anna University, Chennai, Tamil Nadu in 2007. M.Tech Degree in ECE from SRM University, Kattankulathur, Tamil Nadu in 2010. M.B.A Degree in HSM from Anna University, Guindy Campus, Chennai, Tamil Nadu in 2023. Ph.D. degree at the Department of Electrical Engineering, Annamalai University, Chidambaram, Tamil Nadu, India. His research interests include Artificial Intelligence, Medical Image Processing, Bio signal Processing, and Health service Management.

Bulk acoustic wave (BAW) resonator-based MEMS magnetic field sensor

Vinita[1,2], and **Jitendra Singh**[1,2]

[1]*CSIR-Central Electronics Engineering Research Institute (CSIR- CEERI), India*
[2]*Academy for Scientific and Innovative Research (AcSIR), India*

This paper experimentally demonstrates a MEMS magnetic field sensor which is working at 0.873 GHz resonant frequency. The Bulk Acoustic Wave (BAW) resonators are most suitable for high-frequency (GHz) operation and, therefore, appropriate for high-sensitivity magnetic field sensors. The sensor has a multilayer stack of (Si/SiO2/Pt/ZnO/Fe65Co35) thin films with Fe65Co35 as a magnetic field-sensing layer and Zinc Oxide (ZnO) as piezoelectric actuation layer. The influence of an external applied magnetic field up to 1847 Oe has been investigated in terms resonance frequency shift due to ΔE effect. The magnetic sensor shows sensitivity (S) of 48.23 ppm/mT with outstanding performance at high frequency and large magnetic field range (0–1847 Oe). The developed MEMS magnetic field sensors are compact, exceptionally sensitive, and possess potential utility in diverse sectors, including automotive, defence, robotics, medical apparatus, space technology, geophysics, and industrial gauging.

Biography

Vinita, a senior research fellow under University Grant Fellowship (UGC). She received her M.Tech (2019) degree from Rajasthan Technical University (RTU) Kota, Rajasthan, India and she is currently pursuing the Ph.D. degree in Engineering science from Academy of Scientific and Innovative Research (AcSIR) at CSIR-Central Electronics Engineering Research Institute (CSIR-CEERI), Pilani. Her research interests include nanomaterials, surface and bulk acoustic wave based sensors and devices

Development of a highly porous bioscaffold by the combination of bubble entrapping and freezing-thawing techniques to fabricate hyaluronic acid/ gelatine tri-layer wound dressing

Fatemeh Koohzad[1] and **Ahmad Asoodeh**[1,2]

[1]*Department of Chemistry, Faculty of Science, Ferdowsi University of Mashhad, Iran*
[2]*Cellular and Molecular Research Group, Institute of Biotechnology, Ferdowsi University of Mashhad, Iran*

The electrospun nanofibers and porous scaffolds hold great promise in regenerative medicine. In this work, a novel tri-layer wound dressing (nanofiber-hydrogelsilicone) has been designed and fabricated to address the limitations of each platform. The bottom nanofiber layer with a 110 mm diameter meets the wound surface and regulates cell attachment and migration. The middle hydrogel layer was fabricated through the optimization of chemical crosslink formation and freezing-thawing cycles (physical crosslink). The fabricated hydrogel with inter-connected porous structure has optimized properties (gel fraction (89.45 %) and porosity (80 %)) for wound dressing application. The silicone layer on the outer surface was designed to fix the wound dressing on the skin and prevent the penetration of pathogens. The scanning electron microscope micrograph showed structural integrity in the tri-layer scaffold. In vivo data showed that the tri-layer scaffold accelerates wound healing in the mice model and angiogenesis in the chorioallantoic membrane model. Therefore, the designed scaffold inspired by the skin's structure can be used as a wound dressing to treat wounds.

Biography

Fatemeh Koohzad is a post-doctoral student at the Orthopedic Research Center of Mashhad Faculty of Medical Sciences. She received his doctorate in biochemistry from Ferdowsi University of Mashhad. She works in the field of designing and manufacturing tissue engineering scaffolds with a nanotechnology approach. She has research and application experience in electrospinning, bioprinting, drug delivery, vascular bioreactors, nanoparticles, wound dressing and porous material design. She has expertise in biomaterials synthesis, cell culture, real-time gene expression, in vivo wound healing studies, and angiogenesis.

Currently, she is managing the writing of an international book on tissue engineering and vascular bioreactor design for regenerative medicine nanoscaffold simulation and optimization.

The role SDS surfactant on *Pterospermum acerifolim* plant fruit shell for methylene blue dye adsorption

Mahendra Ram[1], Ajay Oraon[2] and **Anuj Kumar Prajapati[3]**

[1]*Indian Institute of Technology, India*
[2]*BIT Sindri, Dhanbad, India*
[3]*Indian Institute of Technology (BHU), India*

Microporous biochar has been prepared from the waste of a plant fruit shell named *Pterospermum acerifolium*. It was pre-treated with HNO3, which improved the biochar's porosity and nitrogen content. Since methylene blue is a cationic dye, the adsorbent was modified by sodium dodecyl sulfate (SDS) surfactant to increase the negative charge density on the biochar surface which enhanced the adsorption capacity. Nitric acid-treated *Pterospermum acerifolium* fruit waste biochar (NAT-PABC) and SDS-modified nitric acid-treated Pterospermum acerifolium fruit biochar (SDS-NAT-PABC) have been characterized by FTIR, XRD, FE-SEM, EDX, elemental mapping, BET, XPS, and point of zero charge. Additionally, an in-depth study of the functional groups responsible for the adsorption of methylene blue (MB) dye and their interactions in both samples was conducted using the XPS technique. Batch experiments were performed to determine the optimal adsorption conditions in 240 min. The maximum removal percentage of MB dye was achieved at pH 10 for NAT-PABC and pH 9 for SDS-NAT-PABC. The mass transfer modeling, isotherms, and kinetics were examined and fitted with the experimental data. On the basis of the correction coefficient (R2), nonlinear forms of the pseudo-second-order kinetic and Langmuir isotherm models were best suited for both NAT-PABC and SDS-NAT-PABC. A possible reaction mechanism for adsorption has also been described. The Gibbs energy and enthalpy for the methylene blue adsorption process by NAT-PABC and SDS-NAT-PABC were found negative and positive, respectively, suggesting that the process was spontaneous and endothermic in nature; therefore, the reaction is highly attainable at higher temperatures.

Biography

Dr. Mahendra has pursued an M. Tech and Ph.D. from the Indian Institute (Banaras Hindu University) Varanasi, Uttar Pradesh. He has pioneered work in biomass gasification, in which he used industry wastewater as a catalyst to increase the concentration of hydrogen. He has also worked in waste-water treatment, where he has adsorbed heavy metals, Congo red/methylene dye on prepared activated carbon, nano-composite, and surface-modified biochar. He has published several research papers in SCI journals in both fields. He has more than six years of teaching experience and joined IIT Patna as an assistant professor in October 2022. He has planned to extend his work in neurolinguistic programming, food, and nutrition.

Improving the fatigue design of mechanical systems such as refrigerator

Seongwoo Woo

Manufacturing Technology, Mechanical Technology Faculty, Ethiopian Technical University, Ethiopia

To enhance the lifetime of mechanical system such as automobile, new reliability methodology – parametric Accelerated Life Testing (ALT) – suggests to produce the reliability quantitative (RQ) specifications—mission cycle—for identifying the design defects and modifying them. It incorporates: (1) a parametric ALT plan formed on system BX lifetime that will be X percent of the cumulated failure, (2) a load examination for ALT, (3) a customized parametric ALTs with the design alternatives, and (4) an assessment if the system design(s) fulfil the objective BX lifetime. So we suggest a BX life concept, life-stress (LS) model with a new effort idea, accelerated factor, and sample size equation. This new parametric ALT should help an engineer to discover the missing design parameters of the mechanical system influencing reliability in the design process. As the improper designs are experimentally identified, the mechanical system can recognize the reliability as computed by the growth in lifetime, LB, and the decrease in failure rate. Consequently, companies can escape recalls due to the product failures from the marketplace. As an experiment instance, two cases were investigated: 1) problematic reciprocating compressors in the French-door refrigerators returned from the marketplace and 2) the redesign of hinge kit system (HKS) in a domestic refrigerator. After a customized parametric ALT, the mechanical systems such as compressor and HKS with design alternatives were anticipated to fulfil the lifetime – B1 life 10 year.

Biography

Dr. Woo has a BS and MS in Mechanical Engineering, and he has obtained PhD in Mechanical Engineering from Texas A&M. He majors in energy system such as HVAC and its heat transfer, optimal design and control of refrigerator, reliability design of thermal components, and failure Analysis of thermal components in marketplace using the Non-destructive such as SEM & XRAY. In 1992.03–1997 he worked in Agency for Defense Development, Chinhae, South Korea, where he has researcher in charge of Development of Naval weapon System. He was working as a Senior Reliability Engineer in Refrigerator Division, Digital Appliance, SAMSUNG Electronics. Now he is working as associate professor in mechanical department, Ethiopian Technical University.

Phosphorene and phosphorene nanoribbons: A Raman study

Z. Arbaoui , O. Boutahir and **Ah. Rahmani**

Advanced Material and Applications Laboratory (LEM2A), Moulay Ismail University FSM-ESTM-ENS, Morocco

In this study, we present a force constant model specifically developed for Black phosphorene, which aims to accurately reproduce its vibrational properties as derived from density functional theory (DFT) calculations. We validated the model by comparing it with experimental Raman spectroscopy data, finding a strong agreement between the theoretical and experimental results. This correlation confirms the group theory predictions concerning the number of Raman-active modes in Black phosphorene. Moreover, we explored how the vibrational characteristics of phosphorene nanoribbons (PNRs) are influenced by edge type and ribbon width. Our analysis revealed that as the ribbon width increases, the Ag2 Raman-active mode shows distinct behavior: it shifts to higher frequencies in armchair-edged PNRs and to lower frequencies in zigzag-edged PNRs.

Biography

Zakariya Arbaoui is a doctoral candidate at Moulay Ismail University in Meknes, Morocco, affiliated with the Laboratory of Advanced Materials Studies and Applications (LEM2A). He holds a Master's degree in Modern Physics from Sultan Moulay Slimane University and a Bachelor's degree in Fundamental Materials and Applications from Moulay Ismail University. His research expertise spans solid-state physics, nanomaterials science, Density Functional Theory (DFT), and Raman Spectroscopy. Zakariya actively contributes to international conferences, presenting his work at ICAMME2024 and IAPM2023, among others. As a doctoral assistant at the Faculty of Science, Meknes, he supervises practical physics sessions, supports student experiments, and contributes to the academic community through his roles in organizing committees and as a conference speaker.

Design and numerical modeling of Cs2BiAgI6 as a Lead-Free alternative with diverse HTL and ETL materials

Ankit Mishra

ISBM UNIVERSITY, Department of Electrical and Electronics, India

The population and economic growth of the twenty-first century are driving up worldwide energy consumption. To offset this, the goal is to treble worldwide renewable energy capacity to 11,174 gigawatts (GW) by 2023. These solar energy technologies are used in first-generation (c-Si) and second-generation thin-film solar cells. When creating wholly new solar energy systems, finding innovative materials quicker is essential to progress toward sustainability. Given the need for environmental compatibility, Cs2BiAgI6 is being investigated as an alternative to lead-based perovskite compounds, including MAPbI3, FAPbI3, and CsPbI3. SCAPS-1D simulations are used to evaluate efficiency and IV properties.

Enhancing survey field data with artificial intelligence: A real-time kinematic GPS study

Edwin Kojo Larbi[1], Daniel Asenso-Gyambibi[1], Joseph Agyei Danquah[1], Michael Stanley Peprah[2] and **Naa Lamkai Quaye-Ballard[1]**

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The significance of adjustment and computation studies has grown in recent years, influencing allied fields like arithmetic and satellite geodesy. This empirical study explores the effectiveness of various soft and traditional regression methods in correcting survey field data. Specifically, it investigates soft computing techniques such as back-propagation artificial neural network (BPANN), radial basis function artificial neural network (RBFANN), generalized regression artificial neural network (GRANN), and traditional regression methods like polynomial regression model (PRM) and least square regression (LSR) techniques. The study aims to fill the knowledge gap regarding soft computing strategies for modifying real-time kinematics (RTK) GPS field data and the ongoing debate between artificial intelligence techniques (ANN) and traditional methods on which technique offers the best results in modifying survey field data. Performance criteria, including horizontal displacement (HE), arithmetic mean error (AME), arithmetic mean square error (AMSE), minimum and maximum error values, and arithmetic standard deviation (ASD), were used to assess each model technique. Statistical analysis revealed that RBFANN, BPANN, and GRANN achieved superior accuracy compared to conventional techniques (PRM and LSR) in adjusting real time kinematics GPS data. RBFANN outperformed BPANN and GRANN in terms of AME, AMSE, and ASD of their horizontal displacement. These findings suggest that soft computing techniques enhance real-time kinematics GPS field data adjustment, addressing critical issues in accurate positioning, particularly in Ghana. This study contributes to the knowledge base for developing an accurate geodetic datum in Ghana for national and local objectives. This will lay a foundation for the global determination of exact positions in Ghana. RBFANN emerges as a promising option for real-time kinematics GPS field data adjustment in topographic surveys. However, care should be taken to check issues of data overfitting.

Biography

Edwin Kojo Larbi is an enthusiastic Geomatic Engineer with extensive experience in drone mapping, Artificial Intelligence, engineering surveying, Geodesy and Geographic Information Systems (GIS). Currently, he is a Geomatic Engineer at the Building and Road Research Institute (CSIR-BRRI) in Kumasi, Ghana, where he specializes in remote sensing, photogrammetry, and spatial data analysis. Edwin has also served as a Surveying Engineer at Graceland Surveying Limited and a Mine Surveyor at Bea Mountains Mining Corporation. His academic background includes a first-class BSc in Geomatic Engineering from the University of Mines and Technology. Edwin is skilled in various geospatial technologies and programming languages, including Python and Matlab. Passionate about continuous learning, he holds several certifications in UAV flight, AI, robotics, and data processing. His commitment to excellence and team success drives his professional endeavors.

Quercetin nanoconjugates for lysozyme aggregation inhibition and anti-Alzheimer's activity in Drosophila Melanogaster Model

Varsha Brahmkhatri[1,2] and **Pranita Rananaware[2]**

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Owing to its anti-inflammatory and antioxidant properties, quercetin is a widely used plant polyphenol beneficial against various diseases. For the first time, we report on new polymeric quercetin nanorods and the former embellished with gold nanoparticles. Quercetin-polyvinylpyrrolidone (Q-PVP) and quercetin-polyvinylpyrrolidone-gold nanoparticles (Q-PVP-Au) conjugates were synthesized (Figure 1), and their properties were assessed using zeta potential, dynamic light scattering, Fourier transform infrared, and UV-visible spectroscopy. The conjugates' surface morphology was analyzed using field emission scanning electron microscopy. These conjugates have a restricted size distribution and a harmonized rod-like shape. Additionally, over an extended length of time, quercetin conjugates with nanorod shape showed improved and prolonged drug release. The lysozyme aggregation kinetics of the synthesized conjugates were examined. Because of its antioxidative qualities, the phytochemical quercetin is expected to have a neuroprotective effect when coupled with polyvinylpyrrolidone. The A 42 mutant of Drosophila melanogaster is employed in this investigation to examine the effects and determine the ideal dose at which quercetin and Q-PVP have the most improved effects. The mutants' increased motor activity was examined through crawling and climbing tests. The quercetin-based nanoconjugates exhibited excellent activity in lysozyme aggregation inhibition and anti-Alzheimer's activity.

Biography

Varsha Brahmkhatri earned her PhD from Maharaja Sayajirao University of Baroda, Gujarat 2013, followed by postdoctoral studies at the Indian Institute of Science (IISc), Bangalore (2013-2016). She is an Associate Professor in the Department of Chemistry, Centre of Excellence in Materials & Sensors, at CMR Institute of Technology, Bengaluru. With over 40 publications in reputed journals and several book chapters, she is an active member of the Indian National Magnetic Society (NMRS) and the Society of Materials Chemistry (SMC), BARC, Mumbai. Her research focuses on designing and fabricating nanomaterial conjugates and bio-inspired materials for biomedical applications, sensing, and catalysis.

Innovative materials for solar distillation: Towards greater efficiency and lower costs

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Water is essential for human life, it makes up 65% of the human body, and covers 70% of the Earth's surface, but lately the availability of fresh water is decreasing from natural resources more and more due to pollution, climate change and falling groundwater levels around the world. According to studies carried out, they have shown that the availability of water should decrease by 10 to 30% in certain arid and semi-arid regions, which will lead us to look for effective and less energy-consuming solutions to alleviate the water shortage. The most effective way to purify contaminated water on a small scale is solar-powered desalination, which uses a free, renewable energy source. In the field of solar desalination, the solar still is frequently used for its very easy construction and maintenance plus its lower cost compared with other technologies, but its performance is fairly poor due to several factors, namely the use of traditional materials and limited energy absorption. The use of innovative materials for solar distillation offers increased efficiency and reduced costs. This work will focus on a study of solar distillation technology for the production of drinking water in arid regions, with a comparison between the use of traditional materials and innovative materials.

Biography

Souad Nasrdine is a process and ceramic materials engineer. She has held various positions at several companies, with her most recent experience at Leyton. Currently, she is a PhD student in Energy and Materials at the Energy, Materials, and Sustainable Development Laboratory, Mohammed V University of Rabat, Morocco. She has published articles and chapters in international journals.

Advancing automotive high-performance computing: integrating direction API with LORA technology in unified machine vision for future smart cars

Kapil Chaudhary
BTKIT, India

This manuscript addresses the challenges in developing Automotive High-Performance Computing (HPC) systems for Future Smart Cars and Unmanned Mobile Vehicles (UMVs). We introduce a novel Unified Machine Vision (UMV) narrative methodology for operators overseeing UMVs. The integration of diverse sensors, Direction API software, and LoRa communication technology presents significant technical hurdles. To tackle these, we focus on integrating Direction API with LoRa in UMVs, incorporating open-source natural interaction OpenNI, and haptic driver inputs into the Master Control System (MCS). The MCS, using the Comp-GAP algorithm, serves as the central interface between the driver and machinery sensors, effectively managing commands to achieve multifaceted objectives. Additionally, we present the CCHA, CROMM-MSV parallel algorithm to mitigate power consumption issues in autonomous vehicles via centralized HPC. This new centralized Advanced Driver Assistance System (ADAS) methodology optimizes UMV energy consumption in air and enhances operational efficiency through parallel HPC techniques. Simulation results demonstrate stable behaviour in parallel processing, validating the proposed methodologies. In summary, this manuscript offers a robust framework for HPC systems in Future Smart Cars and UMVs, paving the way for improved navigation and vehicular control.

Biography

The author published more than 20 papers on image processing, Virtual Reality, Augment Reality in reputed Journals, conferences etc. Authored book on cloud Computing etc. His main research area on applications of image processing in real life, developing techniques for Image Processing with AI etc. He holds Masters degree in Digital Signal Processing and PhD in Computer Science Engineering

Exploring the impact of novel synthesized nanocomposites on strength development of eco-cement paste

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Polymers and pigments Dept., National Research Centre, Egypt

The idea in this study is to use novel synthesized nanocomposites as a partial substitute for portland cement in cement paste in order to save the environment, minimize cement use, and improve cost effectiveness. The proposed nanocomposite was prepared from waste that has been treated with barium ferrite to be introduced as a cement eco-nano additive. The environmentally friendly cement paste was prepared with different nanocompsosites amounts (e.g., 0, 2.5, 5, and 10%) of total binder weight, and the water-to-binder (w/b) ratio was fixed at 0.4. The surface morphology and chemical compositions of BaFe12O19/waste nanocomposites were determined using SEM-EDX, TEM, and XRF. The compressive strength of the cement mixes has been measured at ages 1, 3, 7, and 28 days. Experimental results showed a significant improvement in the mechanical properties of eco-cement containing 10% of the proposed nanocomposite. Analysis revealed that nanocomposite materials reduce the environmental impact of portland cement, suggesting promising future prospects for the cement industry.

Biography

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Citizenship: Egyptian

Current Job: Researcher

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Seismic activity of Moon and Mars

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The origin and seismic activity on the extraterrestrial bodies are expected to be similar, but the space missions to the Moon and Mars equipped by seismometric devices, show significant differences in the space-time distribution of the seismicity, as well as about the sources of the Moonquakes and Marsquakes. The Moonquakes and Marsquakes are a clear expression of the strata stress release on these extraterrestrial cosmic bodies. Due to this property these seismic events generate seismic waves which are the most important source of information for the internal structure of the planets and their satellites (if they are solid bodies) and the respective dynamics of their geology evolution. According the recent scientific research of the terrestrial bodies almost all initial space missions include in their scientific programs installation of seismometers and telemetric transfer of information.

Almost all missions to the Moon and Mars including seismic studies are successful and the data provided show expected similarities and surprising differences of the registered seismic events. Comparisons of these similarities and differences are important and can help the understanding of seismic processes on the space extraterrestrial studied bodies. And this is the main aim of this study, including similarities and differences of the Moonquakes and Marsquakes. It is important to mention that every seismic event is in fact the sudden stress (accumulated in solid strata) release in a very short time followed by the propagation of the seismic waves. The seismic waves are body-waves (P-primary and S-secondary) and surface waves (Raleigh and Love – named to their discoverers). These waves are registered by seismographs (broadband, short period, accelerometers, etc.) on the seismogram and the final part (tail) of the seismogram is called “coda”. The coda waves are significant different on Mars and Moon than on Erath. The conclusion is that we have rather limited knowledge about the seismic processes on the other extraterrestrial objects.

Biography

Boyko Ranguelov is Academician of the Bulgarian Academy of Sciences and Arts. Director of Natural Sciences Center and a full professor in Geophysics at University of Mining and Geology. Received the B.Sc., M.Sc. at the same University, and second M.Sc. in Appl. Math. at Technical Univ., Sofia. Got the PhD in Seismology (Physics). Spent two years in the Joint Research Center of the European Commission in Ispra and Visiting Professor at the University of Bologna, Italy. Works actively in the field of Natural Disasters and Risk Reduction. Have a numerous presentations on TV, radio and mass media lecturing to wide public.

Published 20 books (Key book - “Fractal Universe: A case study of Solar System”) and more than 400 research papers and reports in various academic journals in English and in Bulgarian on: Geophysics; Natural Hazards; Nonlinearities and Fractals; Early Warning Systems, etc. Teaches courses in Geophysics, Seismology, Natural hazards, etc. Member of the Editorial Board of the Journals: “Aerospace Research in Bulgaria”, “Research in Geophysics” and “Earth sciences”.

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