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GLOBAL EVENT ON

MATERIAL SCIENCE AND ENGINEERING

&

WORLD CONGRESS ON

NANOTECHNOLOGY

OCTOBER 30-31, 2024

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Thank You All

WELCOME MESSAGE

Michael I. Tribelsky
Lomonosov Moscow State University,
Moscow, Russia

Esteemed guests and colleagues,

It is my distinct honor to welcome each of you to the prestigious Material Science 2024, convened in the captivating city of Valencia, Spain. The sessions of this conference span an extensive range of topics, from the theoretical underpinnings essential for the creation of breakthrough new materials, to the practical challenges associated with their production. It is our hope that discussions of these topics will not only broaden our knowledge but also inspire collaborative solutions that transcend traditional boundaries.

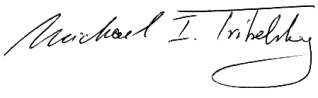
We encourage you to leverage this unique convergence of global experts to enrich your research and professional networks. The Scientific Committee and I are particularly eager to engage with you personally—to learn from your experiences and explore potential synergies. Let this conference serve as a catalyst for enduring partnerships and groundbreaking ideas.

Beyond the confines of the conference, Valencia offers a wealth of cultural and historical treasures. I invite you to immerse yourself in the local heritage, savor the exquisite cuisine, and experience the warmth of Valencian hospitality.

As we commence this exciting conference, I extend my heartfelt wishes for a fulfilling and enjoyable experience. We are truly delighted to have you with us and are confident that your contributions will enrich our discussions and help steer the future directions of our field.

Thank you for your participation and commitment to material science. Let us make Material Science 2024 a memorable and productive event. Enjoy your time in Valencia and at the conference!

Michael I. Tribelsky



WELCOME MESSAGE

Osman Adiguzel
Retired Professor of Physics, Firat University,
Elazig, Turkey

Dear Distinguished Scholars, Engineers, and Colleagues!

It is my great honour and pleasure as a Scientific Committee Member, to invite you to join with a contribution to Global Event on Material Science and Engineering (Material Science 2024), scheduled during October 30-31, 2024, in Valencia, Spain. The conference contains Plenary Lectures, Keynote Lectures, Invited, Oral Talks, and poster presentations from all over the world. Plenary and Keynote Lectures will be given by the distinguished scholars and experts from academic institutions and industry, and oral and invited presentations will be given by the delegates and poster presentations by young junior participants. This worldwide conference is established for early-career scientists, researchers, academicians, and industrial researchers who are interested in every field of material science and engineering.

This conference will provide an excellent opportunity to meet distinguished scholars and experts and to exchange new ideas and application experiences, to establish research relations and collaborations for future research and projects. The conference covers a wide variety of Materials Science and Engineering from Materials Physics, Structural Materials and Metallurgy, Crystallography to Advanced Materials and Functional and Emerging Smart Materials.

International scientific activities are big scientific platforms for the scientists, colleagues, young academicians, and participants from all over the world, to interact and communicate with each other.

I believe that Global Event on Material Science and Engineering (Material Science 2024) will provide this opportunity for delegates from different cultures and countries.

Also, this conference will be performed successfully, in favour of the qualified scholars, colleagues and experts and with their valuable and informative presentations. The conference will be very beneficial for young delegates by encouraging them and improving their self-confidence of presenting research in an international platform.

I am pleased to invite the prospective scholars, academicians, engineers, and other scientists to submit their original contributions to this important conference

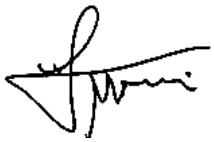
Osman Adiguzel

WELCOME MESSAGE

Paulo De Morais
Catholic University of Brasilia,
Brazil

On behalf of the Scientific Committee, I take great pleasure in welcoming you to the Global Event on Material Science and Engineering, scheduled to take place during October 30-31, 2024 in the beautiful city of Valencia, Spain. The theme of this year's conference is "Focusing on New Trends to Nurture Future directions in Materials Science & Engineering", will focus improving material science education, exploring modern methodologies while establishing a robust pedagogical framework for the next generation of materials scientists. While you are here, I sincerely hope that you take the opportunity to share cutting-edge research, foster interdisciplinary collaboration, and equip professionals with the skills needed to drive progress in materials science. All of us on the Scientific Committee would take great pleasure in meeting you in person and learning more about your amazing work. I wish you an enjoyable and productive conference. I hope you enjoy your stay in this wonderful city and use pre and post conference times to enjoy the sites. We are enthusiastic about your attendance and participation. Enjoy the conference!

Paulo De Morais



DAY 01

KEYNOTE PRESENTATIONS

OCTOBER 2024

30-31

Dimosthenis Stamopoulos

National and Kapodistrian University of Athens
Greece

Iron oxide magnetic nanoparticles, Fe3O4 or Fe2O3, radiolabeled with 68Ga and 99mTc as dual modality contrast agents in diagnostic imaging techniques

Abstract:

In recent decades, dual-imaging contrast agents (DMCAs) have gained much interest regarding their utilization in radiology techniques for the diagnosis of diseases. Compared to conventional contrast agents, DMCAs provide a synergistic effect by combining the advantages of each imaging technique (i.e., the high sensitivity of positron emission tomography (PET) or of single photon emission computed tomography (SPECT) with the high spatial resolution magnetic resonance imaging (MRI)), leading to accurate and timely diagnosis of the underlying diseases. Here, we present the in vivo evaluation of two DMCAs, the first for application in PET and MRI, while the second for utilization in SPECT and MRI. Both DMCAs are based on iron oxide nanoparticles (magnetite, Fe3O4), due to their unique biocompatibility, when surface-coated with 2,3-dicarboxypropane-1,1-bisphosphonic acid (DPD). The first DMCA, aiming for application in PET, completes upon radiolabeling with 68Ga, i.e. 68Ga-DPD-Fe3O4. The second DMCA, aiming for application in SPECT, completes upon radiolabeling with 99mTc, i.e. 99mTc-DPD-Fe3O4. Both DMCAs were evaluated in vitro and in vivo through the investigation of their (i) stability in phosphate buffer saline and human serum, (ii) biocompatibility with cells of peripheral human blood, (iii) biodistribution/biokinetics in mice models, (iv) imaging performance in MRI (68Ga-DPD-Fe3O4 and 99mTc-DPD-Fe3O4), PET (68Ga-DPD-Fe3O4), SPECT/gamma-camera (99mTc-DPD-Fe3O4) applications in mice models. The obtained results guarantee that both DMCAs deserve additional investigations and are, possibly, promising candidates for clinical applications.

Biography

Stamopoulos obtained his BSc in 1996 from the School of Electrical and Computer Engineering, National Technical University of Athens (NTUA) and his Doctorate in Physics in 2001 from the School of Applied Mathematical and Physical Sciences of NTUA. Today, he is Associate Professor at the Department of Physics, National and Kapodistrian University of Athens. His research interests refer to experimental Condensed Matter Physics: Strongly Correlated Electron Systems (superconductivity, ferromagnetism etc), Hybrid Systems of Multifunctional Behavior (piezoelectric/superconducting, ferromagnetic/superconducting) and Diagnostic/Therapeutic Applications in Biomedicine (contrast agents, microscopy techniques etc). He has more than 106 publications in international peer-reviewed journals.

Michael I Tribelsky

Lomonosov Moscow State University
Russia

What can we expect from application of resonant light scattering by Nanoobjects?

Abstract:

Resonant light scattering by nanoparticles provides a unique opportunity to concentrate a high-amplitude electromagnetic field in a subwavelength area of space as well as to tailor and control its pattern. In addition to purely academic interest, this is extremely important for numerous applications ranging from medicine and biology to telecommunication and data processing. Despite more than a hundred years of extensive study, the problem is still far from completion. A review of new results in this field is presented in this contribution. In many cases, despite the smallness of the scattering particles, their light scattering has very little in common with the conventional Rayleigh case. New, counterintuitive effects, especially those related to violating the quasi-static description of the scattering occurring at the action of (ultra)short laser pulses, are pointed out, inspected, discussed, and classified.

Biography

Tribelsky received his MS from Lomonosov Moscow State University in 1973, a PhD from Moscow Institute of Physics and Technology in 1976, and a Dr. of Sci. (habilitation) from Landau Institute in 1985. He received numerous national and international awards: Leninsky Komsomol Prize (1979); COE Professorship, the University of Tokyo (2006, 2008) and Kyushu University (2007), Japan; Honorary PhD, Yamaguchi University, Japan (2016), etc. Now he heads a laboratory at Lomonosov Moscow State University. Presently, his interest lies in subwavelength optics. He authorizes several books, book chapters, review articles, and more than 100 research papers.

Sivasubramanian Palanisamy

PTR College of Engineering and Technology
India

Examine the effects of acacia caesia bark fibers on various properties of epoxy composites

Abstract:

In recent years, there has been growing interest in utilizing bark fibers as reinforcements for polymer composites. This study focused on the characterization of epoxy composites reinforced with Acacia caesia bark (ACB) fibers, considering their mechanical, morphological, and thermal properties. Various amounts of ACB fibers with three different lengths (10, 20, and 30 mm) were incorporated into the composites, ranging from 10 to 35 wt.% in 5% increments. This resulted in 18 sample categories, which were compared to neat epoxy samples. The findings demonstrated that the introduction of ACB fibers, even at the highest fiber content, led to improved mechanical performance. However, a transition in fiber length from 20 to 30 mm exhibited conflicting effects on the composite, likely due to the tendency of bark fibers to bend and split into fibrils during loading. Regarding thermal degradation, the advantages over neat epoxy were evident, particularly for 20 mm fibers, suggesting enhanced interfacial bonding between the matrix and the reinforcement. The epoxy adequately protected the bark fibers, enabling the composite to withstand degradation at temperatures comparable to pure resin, with minimal structural damage below 320 °C.

Biography

Sivasubramanian Palanisamy currently serves as an Professor (Asst) in the Department of Mechanical Engineering at P T R College of Engineering and Technology, located in Madurai, Tamil Nadu, India. He holds a Ph.D. in the field of Mechanical Engineering from Kalasalingam Academy of Research and Education (KARE) situated in Krishnankovil, Srivilliputhur, Tamil Nadu, India. His research expertise encompasses a wide range of areas, including biocomposite materials, the characterization of fibers, fiberreinforced polymer composites, hybrid composites, fiber-reinforced elastomer composites, the study of tribological behavior in composite materials, and 3D printing. He has an impressive publication record, having authored over 55 research papers in renowned international journals and contributed to 10 book chapters. Additionally, he has delivered 20 keynote / invited talks in his specialized research domains. In recognition of his expertise, He serves as a referee for numerous esteemed journals, including but not limited to Fibers, Biomass Conversion and Biorefinery, Engineering Science and Technology—an International Journal, Applied Science and Engineering Progress, Tribology in Industry, Buildings, Processes, Sustainability, and Energies.

Nasimuddin

Institute for Infocomm Research
Singapore

Overview of reconfigurable antennas inspired by electronically tunable materials

Abstract:

The evolution of mmWave and sub-mmWave technologies owes much to the development of reconfigurable antennas, essential for meeting the dynamic demands of wireless communication, satellite operations, and radar systems. From phased arrays to leaky waves and multi-beam configurations, these antennas play a pivotal role in applications requiring advanced beam management capabilities such as scanning, forming, and steering. This importance is underscored by the impending rollout of 5G/6G networks, demanding unprecedented adaptability in frequency, radiation patterns, and polarization to cater to the needs of next-generation wireless technologies. The integration of electronically tunable materials for antenna reconfiguration emerges as a promising frontier, enabling the manipulation of antenna properties by adjusting substrate characteristics. Leveraging materials like liquid crystals, VO2, ferroelectrics, graphene, dielectric and magnetic fluids, and metasurfaces facilitates dynamic shifts in dielectric constant, permittivity, and permeability. For instance, liquid crystals afford dynamic shifts in dielectric constant through voltage modulation, while ferrite materials offer the ability to modify permittivity and permeability with external fields. Furthermore, metasurface antennas utilize physical manipulation to adjust effective permittivity, enabling precise tuning of the resonant frequency. The quest for frequency agility is furthered by materials such as barium-strontium-titanate (BST), yttrium iron garnet (YIG), and innovative fluids, allowing for the electrical modulation of material properties. These technological advancements are poised to significantly enhance the efficiency and adaptability of antenna systems, heralding a new era of innovation in communication and sensing technologies. They ensure that the infrastructure of tomorrow is equipped to meet the complex and evolving demands of our digital world, facilitating seamless connectivity and enabling transformative applications across various domains.

Biography

Nasimuddin (M'2003-SM'2009) received his B.Sc. in 1994 from JMI, India, and his M.Tech. and Ph.D. in 1998 and 2004, respectively, from DU, India. Dr. Nasimuddin has worked as a Senior Research Fellow (1999-2003) at DU, India. He has worked as an APD Research Fellow (2004-2006) at Macquarie University, Australia. Currently, he is working as a principal scientist at the Institute for Infocomm Research, A*STAR, Singapore. He has published 235 journal/conference papers and 3 granted patents on microstrip-based microwave antennas/components. He has edited two books, contributed a chapter, and ranked in the top 2% of World Scientists in 2023.

DAY 01

ORAL PRESENTATIONS

OCTOBER 2024

30-31

Sujit Kumar Bandyopadhyay

Variable Energy Cyclotron Centre
India

Multifunctional Nanostructured Materials: A new dimension in Materials Science

Abstract:

Multifunctional materials are of today's quest. Miniaturization, i.e. development of these materials in the form of nanomaterials is of primary need considering their application in devices. Moreover, if these are obtained in nanostructured form, they can bring wonders. Recently, a we have adopted for developing multiferroic BiFeO3 (BFO) with simultaneous antiferromagnetic, ferroelectric & ferroelastic behaviour in form of nanostructures like nanorods, nanowire etc. by employing Anodised Alumina (AAO) template with various pore sizes from 20nm with solution route followed by controlled vacuum filtration and sintering. Diameters of nanorods are in the range of 20-100 nm as observed by FESEM. Capacitance assayed by cyclic voltammetry (CV) and charge discharge processes reveals a very high value of specific capacitance of 450F/gm. Capacitance has been estimated by extrapolating the charge collected at the electrode to that at scanning rate of infinity which is relevant for the charge collected at the nanorods protruding out of the template. Charging and discharging times are quite constant over a large number of cycles. This large value of specific capacitance can be attributed to the nanostructure form of BFO nanorod. The high value of specific capacitance of BFO nanorods brings forth its use as electrode in storage energy devices. Also, a high value of polarization as well as a significant magnetic susceptibility are observed in multiferroic Bismuth Ferrite (BFO) in the form of nanorods protruding out. The high values of polarization and magnetic susceptibility are attributed to the structured form of BFO nanorods giving rise to the directionality. There is no leakage current in P-E loop examined at various fields and frequencies. Magnetocapacitance measurements reflect a significant enhancement in magnetoelectric coupling also.

Biography

Sujit Kumar Bandyopadhyay has completed his PhD in the year 1998 from Jadavpur University, Kolkata and post doctoral studies from Atomic Institute of Vienna. He has published more than 85 publications in reputed journals. He is regular referee in Journal Materials Physics and Chemistry.

Keren Delmar

Israel Institute of Technology
Israel

Pickering emulsions stabilized by Shellac-Based nanoparticles

Abstract:

This study explored the potential of modified shellac nanoparticles (NPs) for stabilizing Pickering emulsions. We modified shellac with two types of Jeffamine®: Jeffamine® M600 and Jeffamine® ED2003, producing two NP types, Sh-M600 and Sh-ED2003, with sizes ranging from 127 to 183 nm. These NPs were used to form oil-in-water (o/w) emulsions with isopropyl myristate (IPM). Emulsion stability was assessed under both ambient and accelerated conditions. Emulsions stabilized by Sh-M600 NPs with up to 40% oil content remained stable for 6 months, whereas those stabilized by Sh-ED2003 NPs showed remarkable stability, sustaining 65% oil content over the same period and under harsh accelerated conditions without phase separation. Cryo-SEM imaging confirmed NP accumulation at the interface for all emulsion types, while interfacial tension measurements showed reduced values in the presence of NPs, supporting NP adsorption. The calculated adsorption energies revealed the superiority of Sh-ED2003 over Sh-M600, contributing to enhanced emulsion stability. Furthermore, rheology measurements revealed that the apparent viscosity of emulsions stabilized by Sh-ED2003 NPs was consistently greater than that of emulsions stabilized by Sh-M600 NPs across all oil percentages. We suggest that differences in viscosity are influenced by the molecular weight of Jeffamine® linked to shellac chains within NPs, which contributes to the observed differences in stability. This study highlights the potential of tailored NPs for robust emulsion stabilization, underscoring their relevance across diverse applications.

Biography

Keren Delmar has completed her B.Sc. in Biochemical engineering cum laude from the Technion, Israel Institute of Technology and then proceeded to complete her M.Sc. in NanoScience & Nanotechnology Summa cum laude from the Technion focusing on controlled release of hydrophobic drugs from nanocarriers embedded in hydrogels and published two articles regarding this subject. After graduating she worked as a project manager in the R&D department at Dexcel Pharma and developed drug products for the US market. Today she is completing her PhD in the chemical engineering dept. and teaching undergraduate students of this department polymer courses

Carlos Caro

University of Malaga
Spain

Zinc-Iron magnetic Nanoparticles for tumor Theranostics

Abstract:

Iron Oxide Nanoparticles (IONPs) possess the potential to significantly impact cancer treatment through their theranostic capabilities, serving as contrast agents (CAs) for magnetic resonance imaging (MRI) and facilitating magnetic hyperthermia (MH). Moreover, doping IONPs with other elements can enhance these capabilities. In this talk, the synthesis and characterization of innovative magnetic nanoparticles (MNPs), comprising both single-core and alloy ZnFe NPs, exhibiting improved magnetic properties and enhanced magnetic-to-heat conversion efficiency, will be exposed. Interestingly, our findings challenge conventional nucleation and growth theories, which fail to predict the final size and shape of IONPs and, consequently, their magnetic characteristics, highlighting the need for further investigation into this nanomagnetism phenomenon. Leveraging the enhanced properties of these novel NPs, we achieved successful tumor therapy through MH following intravenous administration and tumor accumulation via the enhanced permeability and retention (EPR) effect. Importantly, these results were achieved using a single low dose of MNPs and a solitary exposure to clinically applicable alternating magnetic fields (AMF). Thus, to the best of our knowledge, we present the first successful application of intravenously administered MNPs for MRI-tracked MH tumor therapy in passively targeted tumor xenografts, employing a single NPs low dose and only one AMF exposure at frequencies suitable for clinical use.

Biography

Caro has completed his PhD at the age of 29 years from Pablo de Olavide University and postdoctoral studies from IBIMA Plataforma-BIONAND. He has published more than 40 papers in reputed journals, 3 book chapters and 8 patents. Moreover, he has been serving as a guest editor of Pharmaceutics.

Carmela Bonavolonta

CNR ISASI
Italy

Investigation of graphene single layer on P-type and N-type Silicon Heterojunction Photodetectors

Abstract:

Photodetectors are of great interest in several technological applications thanks to their capability to convert an optical signal into an electrical one through light-matter interactions. In particular, broadband photodetectors based on graphene/silicon heterojunctions could be useful in multiple applications due to their compelling performances. Here, we present a 2D photodiode heterojunction based on graphene single layer deposited on p-type and n-type Silicon substrates. We report on the electro-optical properties of the device that have been measured in dark and light conditions into a spectral range from 400 nm to 800 nm. The comparison of the device's performance in terms of responsivity and rectification ratio are presented. Raman spectroscopy provides information on the graphene single layer quality and its oxidation. The results showcase the importance of the doping of the silicon substrate to realize an efficient heterojunction that improves the photoresponse reducing the dark current.

Biography

Carmela Bonavolontà received in 2002 Bachelor's Degree in Physics and in 2005 her PhD in Chemistry, Materials and Production Engineering from the University of Naples "Federico II" (Italy). From October 2023 she is a researcher assistant at the Institute of Applied Sciences and Intelligent Systems (CNR-ISASI), Pozzuoli (Italy). The current research topics include the development and characterization of broadband photodetectors based on Graphene/Silicon heterojunctions. C.B. is a member of National Quantum Science and Technology Institute (NQSTI). She is author of volumes and more than 100 scientific articles on international peer reviewed journals and several contributions to national and international conferences.

Roman M. Fortunatus

University of Fribourg
Switzerland

Release and In-Depth characterisation of β-carotene nanocarriers in simulated gastrointestinal fluids for oral delivery

Abstract:

β-carotene (βC) is a carotenoid, a precursor of vitamin A, and has antioxidant activity. Its utilization as a functional ingredient is limited due to its poor water solubility, chemical instability, and low bioavailability. βC has been encapsulated in different nanocarriers, including liposomes, emulsions, or nanocapsules, to protect and deliver it. However, limited studies have been dedicated to characterising these nanocarriers within food matrices following gastrointestinal digestion to demonstrate whether the advantages of nanoencapsulation could be achieved. Herein, we fabricate and thoroughly characterise poly(lactic-co-glycolic acid) PLGA nanoparticles (NPs) and liposomes loaded with βC in a simulated food matrix upon exposure to simulated gastrointestinal fluid using well-established Nano techniques. Depending on the extinction of the carrier system within the complex medium, dynamic light scattering (DLS), Taylor dispersion analysis (TDA), nanoparticle tracking analysis (NTA), and transmission electron microscopy techniques were used to characterise the size (distribution) and shape of these nanocarriers in the simulated intestinal and gastric fluids. Our HPLC results show that PLGA NPs have high incorporation efficiency with high βC preservation upon long-time storage compared to liposomes. However, βC release studies from liposomes were faster (85% after 36 h) than PLGA NPs (25% for 168 h) within simulated gastrointestinal fluids. Furthermore, TDA has better resolved the size of the NPs incubated in a complex medium than conventional light scattering techniques such as DLS or NTA. These results will provide information on proper techniques for the characterisation of NPs in complex mediums necessary to evaluate the bioavailability of encapsulated bioactive compounds.

Biography

Roman M. Fortunatus is a PhD student at the Adolphe Merkle Institute, University of Fribourg, with research focused on improving the bioavailability of β-carotene using nanotechnology techniques. He obtained his MSc in food science and human nutrition at the University of Florida in 2014. Roman is also an assistant lecturer at the University of Dar es Salaam, where his renowned research on food analysis, food product development, and consumer preferences has been published in peer-reviewed journals.

Misbah Mumtaz

University of Sheffield
UK

Electrochemical cycling stability of Zr, Nb and Mo Doped Lithium Nickel Oxide Cathodes for LIBs

Abstract:

An alternative to LiNixCoyAl1−x−yO2 (NCA, x > 0.8) and LiNixMnyCo1−x−yO2 (NMC, x ≥ 0.5) cathode composition is LiNiO2. The presence of Cobalt poses complications to these cathode chemistries with regards to its exorbitant cost, environmental damage during its mining, and ethical concerns during its acquisition. A series of compositions with formulae LiNi1−xNbxO2 (0≤x≤0.80) and Li1+yNi(3-5y)/3Mo2y/3 were made by solid state route. Due to the process of doping we anticipated a change in the crystal lattice. The focus of the investigation was morphological and electrical studies after doping. The major characterization techniques used were XRD, EDX, SEM, and electrochemical testing. XRD results revealed that the Zr, Nb and Mo doping resulted in a regular layered structure along with lower cation-ion mixing. The process of doping tailored microstructure, which was revealed smooth grain and grain boundary formation via SEM studies. SEM indicated that the Zr, Nb and Mo doped composition has prominent impact on the growth of primary particles. For the Zr/Nb doped compositions grain growth, with size variation in the grain boundaries was observed besides the quasi-secondary shape. The impact of the altered morphology on the electrochemical properties was tested using ½ and full coin cells at ambient conditions. The electrochemical performance of the LNO and Nb doped LNO (1 and 2)% was characterized at (3.0 - 4.3) V using a 2032 coin-type half-cell with a Li metal anode. The electrochemical data revealed 258.7 mAh g−1 first charge capacity compared to 207.6 mAh g−1 for LNO. Nb doped cathodes revealed 92 % better retention capacity after the first 50 cycles. Zr/Nb-doped cathodes have cycled noticeably better than LNO. The kinetic hindrance peak below 3.6 V is an additional redox couple that is only present in LNO. This variation in the lattice due to doping is beneficial for the electrochemical performance helping stabilise the lattice. It is observed that Nb doped compositions exhibited less polarization as compared to LNO in dQ/dV vs. Voltage plots. This feature assisted in smooth transition of H2 to H3 phase during the electrochemical cycling process. The proposed Nb (1 and 2)% doped compositions have delivered superior energy density and stable cycling ability unlike conventional cathodes. The long cycling of Nb doped 1% for 500 cycles shows improved performance against microcracks in the cathode.

Biography

Misbah Mumtaz PhD in 2015 under supervision of Prof. Naveed Kausar Janjua (Quaid-i-Azam University, Islamabad Pakistan) and Prof. John Irvine (University of St Andrews, UK). I have worked on various synthesis routes i.e., pechini, citric acid, solution, and precipitation to synthesis olivine's, layered oxides, spinel, and rock salt compositions. I worked in Pakistan Institute of Engineering and Applied Sciences(PIEAS) Nilore, Islamabad as assistant professor for 3.5 years. I have more than 8 years of experience in academia and industry funded projects in UK and Pakistan. I have worked on JLR and Nissan cathode compositions for electric vehicles. Presently I am looking for new chemistries related to lithium nickel oxide composition under FutureCat project funded by Faraday Institution.

Delia Teresa Sponza

Dokuz Eylul University
Turkey

Biodegradation of microplastics namely polystyrene, polyester polyurethane, and polyethylene with metal organic framework based uio-66-oh@mf-3 nanocomposite

Abstract:

The accumulation of microplastics in various ecosystems has now been well documented and recent evidence suggests detrimental effects on various biological processes due to this pollution. Accumulation of microplastics in the natural environment is ultimately due to the chemical nature of widely used petroleum-based plastic polymers, which typically are inaccessible to biological processing. One way to mitigate this crisis is adoption of plastics that biodegrade if released into natural environments. In this work, we generated microplastic particles namely polystyrene, polyester polyurethane, and polyethylene and demonstrated their rapid photooxidation. To visualize biodegradation of polystyrene, polyester polyurethane, and polyethylene as real-world products and UiO-66-OH@MF-3 nanocomposite direct visualization and scanning electron microscopy (SEM), XRD, FTIR analysis were performed. The effects of some operational conditions (nanocomposite concentration, microplastic concentration, time, UV power) on photodegradation yields of polystyrene, polyester polyurethane, and polyethylene were investigated.

Biography

Delia Teresa Sponza is currently working as a professor at Dokuz Eylül University, Department of Environmental Engineering. Scientific study topics are; Environmental engineering microbiology, Environmental engineering ecology, Treatment of fluidized bed and activated sludge systems, Nutrient removal, Activated sludge microbiology, Environmental health, Industrial toxicity and toxicity studies, The effect of heavy metals on microorganisms, Treatment of toxic compounds by anaerobic / aerobic sequential processes, Anaerobic treatment of organic chemicals that cause industrial toxicity and wastewater containing them, Anaerobic treatability of wastewater containing dyes, Treatment of antibiotics with anaerobic and aerobic sequential systems, Anaerobic and aerobic treatment of domestic organic wastes with different industrial treatment sludges, Treatment of polyaromatic compounds with bio-surfactants in anaerobic and aerobic environments, Treatment of petrochemical, Textile and olive processing industry wastewater by sonication, Treatment of olive processing industry wastewater with nanoparticles and the toxicity of nanoparticles. She has many international publications with an H index of 42 and 6000 citations.

DAY 01

POSTER PRESENTATIONS

OCTOBER 2024

30-31

Marina Patricia Arrieta

Polytechnical University
Spain

Mechanical recycling of 3D printing Nanocomposites: Repurposing PLA waste loaded with ceramic particles for sustainable agricultural films

Abstract:

The escalating use of 3D printing underscores the urgent need to address the environmental repercussions tied to filament waste disposal. Printable filaments, crafted from various thermoplastics or composites with metals and ceramics, drive the quest for polymer nanocomposites to enhance 3D-printed part performance, particularly via fused deposition modeling (FDM). Notably, polylactic acid (PLA), esteemed for good mechanical performance, printability, biocompatibility, and biodegradability, reigns among the favored 3D printing polymers, serving diverse applications from toys, biomedical applications, to food packaging. In this study, 3D-printed PLA filament waste loaded with ceramic particles were mechanically recycled and further used to produce films for agricultural applications. Residues from two nanocomposites: graphite, graphene, and magnesium in the first, and Titania in the second, were blended with virgin PLA. To favor the dispersion of the nanoparticles in the nanocomposite within the recycled and virgin PLA matrix, maleinized linseed oil (MLO) was used as plasticizer. A PLA-MLO masterbach was prepared and was then blended with 30, 40, and 50 wt.% of each PLA-nanoparticles waste by extrusion and further processed into films through calendering lamination.

Differential scanning analysis revealed that graphite, graphene, and magnesium did not affect PLA's thermal transitions. In contrast, films with Titania displayed a double melting peak, suggesting that the material crystallized in different structures probably due to component separation within the film. All the samples were completed disintegrated under composting conditions after 7 days. This comprehensive strategy not only tackles environmental concerns tied to 3D printing waste but also proposes a pragmatic solution for repurposing recycled PLA into films for agricultural applications.

Biography

Marina P Arrieta completed his PhD in 2014 from Universistat Politècnica de València, Spain. She currently leads the POLCA research group of the Polytechnical University of Madrid. She does research in the field of Synthesis and Processing of biopolymers and the revalorization of food industries by-products for the development of sustainable (nano)composites with multifunctional properties intended for food packaging or agricultural applications. She has published more than 80 papers (h-index: 36) in JCR journals with more than 4700 citations. She has participated in several competitive research projects, being Principal Investigator in 6 of them. Scientific identifier: ORCID 0000-0003-1816-011X

Mohamed Elhassan

French National Institute of Health and Medical Research
France

Lipophilic molecular rotor to assess the viscosity of oil core in Nano-Emulsion droplets

Abstract:

Characterization of nanoscale formulations is a continuous challenge. Size, morphology and surface properties are the most common characterizations. However, physicochemical properties inside the nanoparticles, like viscosity, cannot be directly measured. Herein, we propose an original approach to measuring dynamic viscosity using a lipidic molecular rotor solubilized in the core of nano-emulsions. These molecules undergo conformational changes in response to viscosity variations, leading to observable changes in fluorescence intensity and lifetime, allowing them to sense the volume properties of nanoscale formulations. The lipophilic molecular rotor (BOPIDY derivatives) was specifically synthesized and characterized as oil viscosity sensing in large volumes. A second part of the study compares these results with rBDP-Toco in nano-emulsions. The objective is to evaluate the impact of the formulation, droplet size and composition on the viscosity of the droplet's core. The lipophilic rotor showed a universal behavior, whatever the oil composition, giving a master curve. Applied to nano-formulations, it discloses the viscosity in the nano-emulsion droplets, enabling the detection of slight variations between reference oil samples and the nano-formulated ones. This new tool opens the way to the fine characterization of complex colloids and multidomain nano and microsystems, potentially applying hybrid materials and biomaterials.

Biography

Mohamed Elhassan completed his master's degree from the University of Gezira, Faculty of Pharmacy, Sudan. He is currently a lecturer in the Department of Pharmaceutical Technology at the Faculty of Pharmacy, University of Gezira, Sudan. Mohamed is now pursuing his PhD at INSERM, UMR 1260, Regenerative Nanomedicine (RNM), Université de Strasbourg, France.

DAY 01

KEYNOTE PRESENTATIONS

OCTOBER 2024

30-31

Saima Kousar

Institute of Space Technology
Pakistan

Unique development of Cu- Ionic treated TiO2 for UV and Visible light active photocatalysts

Abstract:

Copper oxide (CuO) and titanium dioxide (TiO2) can be combined to create a nanocomposite that shows promise for use in photocatalysis, and photoenergy applications. Lately, magnetic oxide particles (MOPs) have attracted interest due to their effectiveness in energy applications; when combined, TiO2 exhibits exceptional performance and distinctive characteristics. TiO2's broad band gap makes it ideal for solar cells, but at higher temperatures, it becomes susceptible to electron-hole pair recombination, which reduces its efficiency. CuO acts as a supporting agent for TiO2, promoting electron transport during photocatalysis, to lessen these disadvantages. In order to create TiO2/CuO decorated particles on an industrial scale and for improved energy applications, this work focuses on modifying the Successive Ionic Layer Adsorption and Reaction (SILAR) technique. This approach is less expensive than Atomic Layer Deposition (ALD). In the 21st century, numerous drugs and techniques have emerged to combat harmful microbial species, with nanotechnology yielding diverse antimicrobial nanomaterials to prevent diseases and toxic effects. This study focuses on synthesizing a nanocomposite, TiO2/CuO, through pseudo-SILAR, wherein CuO is deposited onto TiO2. Characterization techniques including FE-SEM, EDS, and XRD confirm the deposition extent and crystalline nature, while XPS and UV-Visible analysis further elucidate the composite's properties Photocatalytic evaluation demonstrates superior performance of TiO2/CuO, with 90% RhB dye degradation in 120 minutes, outperforming pure TiO2 (10%).

Biography

Saima Kousar is currently pursuing my Master of Science (MS) degree in Material Science and Engineering at Institute of space Technology, Islamabad Under the mentorship of Dr. Abdul Basit Saim, I am is conducting research in the interdisciplinary field of materials science, focusing on the development and characterization of advanced nanomaterials for various applications. My research interests lie in the synthesis, modification, and evaluation of nanocomposites for environmental remediation, energy harvesting, and biomedical applications. With a passion for exploring innovative solutions to complex engineering challenges, I actively contributes to cutting-edge research initiatives aimed at addressing pressing global issues. My dedication to academic excellence and my commitment to advancing the field of materials science make a promising young researcher poised to make significant contributions to the scientific community.

Paulo Cesar De Morais

Catholic University of Brasilia
Brazil

Modulating magnetic behavior of ultrafine ferrite nanoparticles by surface coating thickness

Abstract:

This talk will focus on the description of surface functionalized ultrafine CoFe2O4 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 CoFe2O4 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 CoFe2O4 NPs it is also presented for comparison. All investigated CoFe2O4 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 CoFe2O4 NPs. The out of phase part (c″) 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

Paulo Cesar 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.

Thomas J. Webster

Hebei University of Technology
China

The Impact of Nanomedicine: 30,000 Orthopedic Nano implants with no failures and still counting

Abstract:

Nanomedicine is the use of nanomaterials to improve disease prevention, detection, and treatment which has resulted in hundreds of FDA approved medical products. While nanomedicine has been around for several decades, new technological advances are pushing its boundaries. For example, this presentation will present an over 25 year journey of commercializing nano orthopedic implants now in over 30,000 patients to date showing no signs of failure. Current orthopedic implants face a failure rate of 5 – 10% and sometimes as high as 60% for bone cancer patients. Further, Artificial Intelligence (AI) has revolutionized numerous industries to date. However, its use in nanomedicine has remained few and far between. One area that AI has significantly improved nanomedicine is through implantable sensors. This talk will present research in which implantable sensors, using AI, can learn from patient's response to implants and predict future outcomes. Such implantable sensors not only incorporate AI, but also communicate to a handheld device, and can reverse AI predicted adverse events. Examples will be given in which AI implantable sensors have been used in orthopedics to inhibit implant infection and promote prolonged bone growth. In vitro and in vivo experiments will be provided that demonstrate how AI can be used towards our advantage in nanomedicine, especially implantable sensors. Lastly, this talk will summarize recent advances in nanomedicine to both help human health and save the environment.

Biography

Thomas J. Webster's (H index: 125; Google Scholar) degrees are in chemical engineering from the University of Pittsburgh (B.S., 1995; USA) and in biomedical engineering from RPI (Ph.D., 2000; USA). He has served as a professor at Purdue (2000-2005), Brown (2005-2012), and Northeastern (2012-2021; serving as Chemical Engineering Department Chair from 2012 - 2019) Universities and has formed over a dozen companies who have numerous FDA approved medical products currently improving human health in over 30,000 patients. His technology is also being used in commercial products to improve sustainability and renewable energy. He is currently helping those companies and serves as a professor at Brown University, Saveetha University, Hebei University of Technology, UFPI, and others. Dr. Webster has numerous awards including: 2020, World Top 2% Scientist by Citations (PLOS); 2020, SCOPUS Highly Cited Research (Top 1% Materials Science and Mixed Fields); 2021, Clarivate Top 0.1% Most Influential Researchers (Pharmacology and Toxicology); 2022, Best Materials Science Scientist by Citations (Research.com); and is a fellow of over 8 societies. Prof. Webster is a former President of the U.S. Society for Biomaterials and has over 1,350 publications to his credit with over 55,000 citations. He was recently nominated for the Nobel Prize in Chemistry. Prof. Webster also recently formed a fund to support Nigerian student research opportunities in the U.S.

DAY 02

KEYNOTE PRESENTATIONS

OCTOBER 2024

30-31

Guy Mechrez

Volcani Institute
Israel

Highly tunable Pickering emulsion/polymer Systems: From colloids to functional surfaces

Abstract:

Pickering emulsions are stabilized by nanoparticles (NPs) that self-assemble at the oil-water interface, acting as physical barriers. These emulsions can form as either oil-in-water (o/w) or inverse emulsions. Both inorganic NPs, such as silica and titania, and NPs from natural sources, such as virus-like particles (VLPs), can serve as Pickering stabilizers. At the interface, the wettability of the particles determines their placement within the water and oil phases.

This study introduces a novel, highly tunable platform based on incorporated polymers in Pickering emulsions. The polymer component is either dissolved in the dispersed or continuous phase or covalently conjugated to the Pickering stabilizer. Silica and titania nanoparticles were used as stabilizers and functionalized with different polysiloxane oligomers to adjust their surface properties. Natural stabilizers, including VLPs, were also utilized. Various polymers, such as polydimethylsiloxane (PDMS) and polyacrylate, were dissolved in the dispersed or continuous phase of the emulsions.

Eco-friendly Pickering emulsions were formulated based on paraffin-in-water emulsions stabilized by silica or titania nanoparticles functionalized with (3-Aminopropyl)triethoxysilane. The controllable droplet size, along with the high colloidal stability of the Pickering emulsions, enabled the individual compartmentalization of fungal biopesticides (Metarhizium brunneum) through simple mechanical mixing. These Pickering emulsions, with individually compartmentalized biopesticides, exhibited significantly higher pest control activity against Spodoptera littoralis larvae compared to controls. The titania-based emulsions effectively protected the individually compartmentalized cells from UV radiation. Stabilizing the same paraffin-in-water emulsions with plant-based VLPs resulted in a fully biocompatible emulsion.

Subsequently, a new two-mode approach for epitope presentation of SARS-CoV-2 was developed using these fully biocompatible emulsions. Covalent attachment of SARS-CoV-2 S1-peptide epitopes to the VLP surface and subsequent assembly of VLP/epitope conjugates at the oil/water interface of the paraffin-in-water emulsions significantly enhanced the intensity of SARS-CoV-2 epitope presentation. Our in-vivo assay in mice showed that the αSARS-CoV-

2-S1 IgG titers in mouse antisera, taken from mice exposed to the studied emulsions, were an order of magnitude higher compared to epitopes administered with an adjuvant. These results confirmed the efficacy of the new formulation. This novel VLP-based Pickering emulsion platform is a fully synthetic approach that can be readily applied to vaccine development for a wide range of pathogenic epitopes.

Biography

Guy Mechrez is a leading researcher in polymer science, nanomaterials, soft matter, and colloidal science. He earned his Ph.D. from the Technion, focusing on CNT/polymer nanocomposites. After completing his Ph.D. in 2014, he managed the Coating and Materials R&D team at Shamir Optical Industry. Since 2015, he has been at the Volcani Institute, Agricultural Research Organization (ARO) in Israel, leading research on particle-stabilized emulsions and polymer nanocomposites. His work addresses challenges in food and agriculture, including ethylene sensing, biopesticide encapsulation, and self-cleaning greenhouse surfaces.

Shiguo Sun

Northwest A&F University
China

Development on the cancer therapeutic drug delivery systems based on mesoporous nano silica

Abstract:

Cancer is one of the most dangerous diseases to date. To meet the fast development of diverse nanosystems for various cancer therapies, noninvasive and biocompatible mesoporous silica nanoparticle (MSN)-based drug delivery systems (DDSs) have developed rapidly. In recent years, a series of drug delivery systems based on the MSNs were developed in our group, including being a plain loading and delivery vehicle, for biodegradable dual-responsive drug delivery, triple-stimuli responsive system construction, synergistic combinatorial cancer therapeutic system building, and width-consistent mesoporous silica nanorods with a precisely controlled aspect ratio for multi-therapeutic application etc. Hopefully, all these can shed new light on the future design and application of nanosystems for synergistic combinatorial therapy, and offer an overview for researchers related.

Biography

Shiguo Sun has completed his PhD from Dalian University of Technology, China and postdoctoral studies from Royal Institute of Technology, Sweden. He is a professor and doctoral supervisor at the College of Chemistry & Pharmacy, Northwest A&F University, China. He has published more than 150 papers in reputed journals. His research interests include Systematic Targeting Pharmaceutics (STP); Visible Sensor Guided Drug Delivery and Targeting; Fluorescent Probe and Imaging; Visible Detection of Organelle, Tumor and Virus etc.

Ichiro Imae

Hiroshima University
Japan

Electrochemical control and quantification of carrier density of π-conjugated polymers

Abstract:

In this lecture, I will introduce a technique to control and quantify the carrier density injected into π-conjugated polymers by an electrochemical method called potential step chronocoulometry (PSC). Using potential-step chronocoulometry (PSC), the doping levels of π-conjugated polymers were controlled by the applied voltage and precisely quantified. In concert with the electrochemical oxidation of the polymers, the doping levels gradually increased and finally reached around 20–30%, suggesting that one positive charge is formed on every three to five monomer units. The maximum value of the doping levels was affected by the electron-donating natures of the polymers. The plot of log(doping level) vs. electrode potential fits a straight line in the low doping region, and saturated. The saturated values were changed depending on the chemical structures of the π-conjugated polymers. We found for the first time that in the logarithmic plot of the Seebeck coefficient and the doping level, a good linear relationship was obtained in a wide doping range from 1 to 20%, and the slope values were changed depending on the chemical structures of the π-conjugated polymers.

Biography

Ichiro Imae received the Bachelor, Master and Doctor degrees (Engineering) from Osaka University (Osaka, Japan) in 1992, 1994, and 1997, respectively. During his doctor course, he worked as a Research Fellow of Japan Society for the Promotion of Science (JSPS) from 1994 to 1997. In 1997, he joined with Japan Advanced Institute of Science and Technology (JAIST) (Ishikawa, Japan) as an Assistant Professor. Since 2006, he is an Associate Professor of Hiroshima University, Hiroshima, Japan. Also, he worked as an Adjunct Lecturer of Muroran Institute of Technology and a Visiting Professor of Huazhong University of Science and Technology in 2018.

Viral Patel

Charusat University
India

Nanocrystal: a novel approach to overcome skin barriers for improved topical drug delivery

Abstract:

Skin is an important route of drug delivery for the treatment of various dermatological conditions. The advent of nanotechnology is paving the roadmaps for topical drug delivery by providing sustained release as well as maintaining a localized effect, outweighing the toxicity concern. This review highlighted the morphology of skin, its barrier nature as well as drug penetration pathways after topical application of formulations. The existing methods to improve topical drug delivery, by infringing or permeating the skin barriers, are discussed. This context concretes the foundation to accentuate the need for the development of nanocrystal-based topical formulation. The mechanism of drug release, immediate as well as sustained release, after topical administration of drug nanocrystals is also elaborated. The special emphasis is given on the breakthrough achieved, in topical drug delivery using drug nanocrystals, so far in the plethora of literature, patents, and products, under clinical trial as well as in the market. The current research on nanocrystals for topical drug delivery is highlighting the breakthroughs achieved so far. The output of these research envisages that topical nanocrystals based formulations can be a novel strategy for the drugs which are facing solubility, bioavailability and toxicity concerns.

Biography

Viral has completed her PhD from Institute of Pharmacy Nirma University, Ahmedabad, India. She started her professional carrier as research scientist by affiliating to Baxter Pharmaceuticals India Private Limited at its R&D center located in Ahmedabad. Later, to fulfil her quest for research she joined Ramanbhai Patel College of Pharmacy as Assistant Professor. She has been recipient of many research grants, the prestigious one being DST-INSPIRE grant from Department of Science and Technology, Govt. of India. She is proud editor of a book and has many research and review articles published in reputed journals to her credit. She has guided 12 post graduate students and 11 undergrad students for their dissertation research work. She is associated with reputed journals of Elsvier, Springer Nature, Taylor & Francis, Wiley, Frontiers, etc., as an esteemed reviewer.

Osman Adiguzel

Firat University
Turkey

Shape reversibility and the role of deformation temperature in memory behavior of shape memory alloys

Abstract:

Shape memory effect is a temperature dependent phenomenon exhibited by certain alloy systems called shape memory alloys. These alloys take place in the class of advanced smart materials, with the response to the variation of temperature and external conditions. This phenomenon is initiated with thermomechanical processes on cooling and deformation and performed thermally on heating and cooling, with which shape of the material cycles between original and deformed shapes in reversible way. Therefore, this behavior is called thermoelasticity. Strain energy is stored in the material and releases on heating by recovering the original shape. The origin of this phenomenon lies in the fact that the material changes its internal crystalline structure with changing temperature Thermoelasticity is governed by crystallographic transformations thermal and stress induced martensitic transformations. Thermal induced martensitic transformation occurs on cooling with cooperative movements of atoms by means of lattice invariant shears in <110 > -type directions on the {110} - type planes of austenite matrix, along with lattice twinning, and ordered parent phase structures turn into the twinned martensite structures, and the twinned structures turn into the detwinned structures by means of stress induced martensitic transformation, with stressing material in the martensitic condition. These alloys exhibit another property called superelasticity, which is performed by stressing and releasing material in elasticity limit at a constant temperature in parent phase region, and shape recovery is performed simultaneously upon releasing the applied stress, by exhibiting elastic material behavior. Superelasticity is performed in non-linear way; stressing and releasing paths are different in the stress-strain diagram, and hysteresis loop refers to energy dissipation. Superelasticity is also result of stress induced martensitic transformation and ordered parent phase structures turn into detwinned martensite structure with stressing. The twinning occurs with internal stresses, while detwinning occurs with the external stresses. Shape memory effect is performed in a temperature interval after first cooling and stressing processe, whereas superelasticity is performed mechanically in a constant temperature in parent phase region, just over the austenite finish temperature. Deformation at different temperature exhibits different behavior beyond shape memory effect and superelasticity. Copper based alloys exhibit this property in metastable β-phase region, which has bcc-based structures. Lattice invariant shear and twinning is not uniform in these

alloys and gives rise to the formation of complex layered structures. The layered structures can be described by different unit cells as 3R, 9R or 18R depending on the stacking sequences on the close-packed planes of the ordered lattice. The unit cell and periodicity are completed through 18 layers in direction z, in case of 18R martensite, and unit cells are not periodic in short range in direction z. In the present contribution; x-ray and electron diffraction studies were carried out on two solution treated copper based CuZnAl and CuAlMn alloys. Electron and x-ray diffraction exhibit super lattice reflections. Specimens of these alloys were aged at room temperature, and a series of x-ray diffractions were taken at different stages of aging in a long-term interval. X-Ray diffraction profiles taken from the aged specimens in martensitic conditions reveal that crystal structures of alloys chance in diffusive manner, and this result refers to the stabilization.

Biography

Adiguzel graduated from Department of Physics, Ankara University, Turkey in 1974 and received PhD- degree from Dicle University, Diyarbakir-Turkey. He studied at Surrey University, Guildford, UK, as a post-doctoral research scientist in 1986-1987, and studied were focused on shape memory effect in shape memory alloys. He worked as research assistant, 1975-80, at Dicle University and shifted to Firat University, Elazig, Turkey in 1980. He became professor in 1996, and he has been retired on November 28, 2019, due to the age limit of 67, following academic life of 45 years. He supervised 5 PhD- theses and 3 M. Sc- theses and published over 80 papers in international and national journals; He joined over 120 conferences and symposia in international and national level as participant, invited speaker or keynote speaker with contributions of oral or poster. He served the program chair or conference chair/co-chair in some of these activities. In particular, he joined in last six years (2014 - 2019) over 60 conferences as Keynote Speaker and Conference Co-Chair organized by different companies. Also, he joined over 180 online conferences in the same way in pandemic period of 2020-2023. Dr. Adiguzel served his directorate of Graduate School of Natural and Applied Sciences, Firat University, in 1999-2004. He received a certificate awarded to him and his experimental group in recognition of significant contribution of 2 patterns to the Powder Diffraction File – Release 2000. The ICDD (International Centre for Diffraction Data) also appreciates cooperation of his group and interest in Powder Diffraction File.

Paulo C. De Morais

Catholic University of Brasilia
Brazil

Cell viability assays under radiofrequency application and challenged by nanomaterials

Abstract:

This keynote talk will explore the use of the Hill model to assess the Benchmark dose (BMD), the lethal dose 50 (LD50), the cooperativity (E) and the dissociation constant (K) while analyzing cell viability data using nanomaterials. The presentation is addressed to discuss the antitumor potential while combining radiofrequency (RF) therapy in and selected nanomaterials. In particular, it will be discussed the use of nanocomposites, for instance comprising graphene oxide (GO) surface functionalized with polyethyleneimine (PEI) and decorated with gold nanoparticles (GO-PEI-Au). Data collected from the cell viability assays using different tumor cell lines (e.g. LLC-WRC-256 and B16-F10) will be presented and discussed. The findings will demonstrate that while the tested nanocomposite (e.g. GO-PEI-Au) may be biocompatible against different cancer cell lines in the absence of radiofrequency (nRF), the application of radiofrequency (RF) enhances the cell toxicity by orders of magnitude, pointing to prospective studies with the tested cell lines using tumor animal models.

Biography

Paulo Cesar 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

DAY 02

ORAL PRESENTATIONS

OCTOBER 2024

30-31

Moumita Chakraborty

G. B. Pant University of Agriculture & Technology
India

Elicitation of E-waste (acrylonitrile-butadiene styrene) enriched soil bioremediation and detoxification using Priestia aryabhattai MGP1

Abstract:

In current digital era, managing e-waste has become universal concern. From the viewpoint of persisting lacuna of e-waste managing methods, the current study is designed to fabricate an eco-friendly e-waste treatment with native soil bacteria employing an enrichment culture method. In the presence of e-waste, indigenous soil microbes were stimulated to degrade e-waste. Microbial cultures were isolated using enrichment medium containing acrylonitrile-butadiene styrene (ABS) as the primary carbon source. Priestia aryabhattai MGP1 was found to be the most dominant e-polymer degrading bacterial isolate, as it was reported to degrade ABS plastic in disposed-off television casings. Furthermore, to increase degradation potential of MGP1, Response Surface Methodology (RSM) was adopted which resulted in optimized conditions (pH 7, shaking-speed 120 rpm, and temperature 30 ″ C), for maximum degradation (18.88%) after 2 months. The structural changes induced by microbial treatment were demonstrated by comparing the findings of Field emission scanning electron microscopy (FESEM) images and Fourier Transform Infrared (FTIR) spectra confirming the disappearance of ″ C″ H peaks along with C–H, C=C and C ″ N bond destabilization following degradation. Energy-dispersive X-ray (EDX) analyzers of the native and decomposed e-polymer samples revealed a considerable loss in elemental weight % of oxygen by 8.4% and silica by 0.5%. Magnesium, aluminium and chlorine which were previously present in the untreated sample, were also removed after treatment by the bacterial action. When seeds of Vigna radiata were screened using treated soil in the presence of both e-waste and the chosen potent bacterial strain, it was also discovered that there was reduced toxicity in terms of improved germination and growth metrics as a phytotoxicity criterion. Nanoparticles were applied to investigate its effect on the biodegradation ability of the best suited bacterial strain.

Biography

Moumita Chakraborty, Ph.D., is an alumna of G.B. Pant University of Agriculture & Technology, Pantnagar, Uttarakhand; having completed her doctoral studies in Environmental Science in 2023. Her research focused on "In-vitro studies on nanoparticle-mediated biodegradation of electronic waste by native bacteria," shedding light on innovative solutions to tackle the pressing issue of electronic waste management. With a background spanning four years in research and development, Moumita has honed her expertise in a myriad of analytical techniques, including UV-spectrophotometry, FTIR, and FESEM-EDX. Currently serving as a Senior Environment Executive at Kryfs Power Components Ltd., Moumita leads with passion and dedication in a project under the RDSS scheme, generously funded by the esteemed Asian Development Bank.

Bijendra Singh

Central University of Gujarat
India

Photogalvanic insolation device for accumulation, conversion & utilization solar radiation through Photoimgeable dyes fast green and Toludine blue with EDTA

Abstract:

Photoimgeble dye Fast green ,Toludine blue and reductant EDTA used for developed a new insolation and conversing system in this system EDTA playing role as a reducing agent for photoigeble dyes FG & TB in alkaline medium.Designed new system based on photochemical conversion for accumulated insolation and utilized of sun radiation through FG-TBEDTA.Effect of different parameter dye,rductant ,pH,light intensity,area of Pt electrode,i-v ,diffusion length was studied on this new system for electrical output.The photogalvanic performance for insolation is determined for this device shown CE,FF & storage capacity .Photopotential & Photocurrent generated by this system were 980.0mV & 116.0µA respectively.Photogalvanic device can be utilize in dark till 34 min.

Biography

Bijendra Singh has completed his PhD at the age of 35 years from Central University of Gujarat ,India and M.Phil. from School of Chemical Sciences, Central University of Gujarat ,India. He has published more than 25 papers in reputed journals.

Hira Ijaz

Fachhochschule: Institute Of Applied Science And Technology, Pakistan

Formulation and in vitro Evaluation of pH-Sensitive Cross-linked Copolymer for Controlled Delivery of Perindopril Erbumine (PE)

Abstract:

A novel xanthan gum-co-acrylic acid superabsorbent hydrogel composite was formulated by free radical polymerization reaction of acrylic acid on xanthan gum. Effect of variables like dynamic swelling ratio, equilibrium swelling ratio, drug loading and drug release was investigated. Swelling ratio increases with decrease in crosslinker concentration. Drug release studies were conducted in pH 7.4 and 0.1N HCl. In acidic environment, drug release was low whereas it was sustained release in alkaline. XG4 showed significant swelling and drug release up to 24 hr. Physicochemical evaluation also confirmed it was optimized formulation. Hence XG4-co-AA was optimized for once daily dose of Perindopril Erbumine.

Biography

Hira Ijaz has completed his PhD (Pharmaceutics) in November 2020. I have served as Lecturer at Department of Pharmacy, University of Agriculture Faisalabad as assistant Professor in Department of Pharmacy, The University of Faisalabad. Currently, Working as Assistant Professor Pharmaceutics at Department of Pharmaceutical Sciences, Pak-Austria Fachhochschule: Institute Of Applied Science And Technology. I have received Young Scientist Award in 2022. My fields of interest include polymerization, solubility enhancement and drug product development by designing hydrogel micro-particles, microneedle patches, microgels, solid dispersions, inclusion complexes, orodispersible tablets and hydrogels etc. My current projects include development of various carrier systems from natural polymers for anticancer drug delivery

Georgios N. Tsigaridas

National Technical University of Athens
Greece

On the electromagnetic interactions of dirac and weyl particles

Abstract:

This presentation focuses on the electromagnetic interactions of Dirac and Weyl particles, showing that under special conditions they can exhibit extraordinary behavior. Specifically, we have shown that all Weyl particles, and under certain conditions Dirac particles, can exist in the same quantum state under a wide variety of electromagnetic 4-potentials and fields, infinite in number, which are explicitly calculated. We have also shown that Weyl particles can exist in different states in zero electromagnetic field, either as free particles, or in localized states. The localization, as well as the energy, of the particles can be fully controlled using simple electric fields, which can be easily realized in practice. Obviously, these results are particularly important regarding possible practical applications of Weyl particles, both considering solid-state physics in materials supporting these particles, as well as laser physics, using ions trapped by laser beams, which can simulate the behavior of Weyl particles. Some other results of particular importance, especially regarding practical applications, are the following: We have shown that the state of free Weyl or massless Dirac particles is not affected by the presence of a spatially constant, but with arbitrary time-dependence, electric field applied along their direction of motion, or a plane electromagnetic wave, e.g., a laser beam, of arbitrary polarization, propagating along the direction of motion of the particles. These results are expected to find interesting applications in several fields of science and technology, such as nanoelectronics, nanophotonics, solid state physics, etc., providing new pathways for further development in these fields, both in theory and applications

Biography

Georgios N. Tsigaridas has completed his PhD on nonlinear optics at the Department of Physics, University of Patras, and he is currently assistant professor at the Department of Physics, National Technical University of Athens, Greece. He has published more than 35 papers in reputable journals, covering several fields of laser physics and nonlinear optics. He is currently working on the electromagnetic interactions of Dirac and Weyl particles. This research has produced some exciting and unexpected results, leading to seven publications in reputable journals. The most important of these results will be presented in this conference

Valeriy Pogorelov

Kyiv National Taras Shevchenko University
Ukraine

Peculiarities of cluster structure and unique properties of Supercooling water and Monohydric alcohols

Abstract:

Intermolecular hydrogen bonding, which is formed between water molecules, causes a variety of liquid water' unique properties. This manuscript presents the experimental FT IR and FT Raman studies' results of water trapped in Ar matrix at temperatures from 10 to 50 K as well as condensed water at temperatures from 100 to 370 K. It is shown that temperature evolution for FTIR-spectra of water trapped in cryo Ar-matrices can be considered as an experimental model of the water structure transformation during the phase transition from gas phase to condensed confined water. The FTIR spectra comparison of water in Ar-matrices with the corresponding spectra of bulk water allows us to conclude that bulk water structure consists of clusters of different sizes. These clusters are elementary volume units of hydrogen-bonded networks. The comparison of the water vibrational spectra change with temperature in Ar matrix and in condensed phase allows us to conclude that intermolecular H-bonding can be seen in the water intracluster vibrational spectra. They are absent in the isolated water molecules spectra.

The following conclusions can be drawn based on the analysis of the FTIR and FTRaman spectra of water in the temperature range +550 C - -500C, the following conclusions are made:

1) When liquid water is frozen in the range of 00C— -100C, the number of five molecular clusters (pentamers) decreases and the number of six molecular clusters (hexamers) increases. With a certain predominance of the hexamers' concentration in water, liquid water solidifies - a liquid-solid phase transition. In the temperature range of 00C - water is in a supercooled state.

2) When solid water (ice) is heated, the solid-liquid phase transition occurs at a temperature of 00C without intermediate supercooling.

3) In the Raman spectra of water, molecular polycluster substructures appear only in the liquid phase. Their number decreases when liquid water is heated. These substructures caused the broadband background in Raman spectra liquid water absent in the crystalline phase.

Biography

Pogorelov Valeriy studied Physic (Molecular Spectroscopy) at the Kyiv National Taras Shevchenko University, Ukraine and graduated as PhD in 1966. He obtained the position Full Professor at same University in 1986. His scientific interests are Raman Spectroscopy, vibrational and orientational molecular relaxation, structure and spectroscopy partially ordered liquids, peculiarities of cluster structure of water and 10 first alcohols.

Anastassia N. Rissanou

National Hellenic Research Foundation
Greece

A computational study on the affinity assessment of Self-Assembling dipeptides with the anticancer Peptide-Drug bortezomib

Abstract:

The investigation of potential self-assembled peptides as carriers for the delivery of the anticancer drug Bortezomib, using all-atom molecular dynamics simulations, is the topic of the present study. A series of dipeptides with a similar chemical formula to Bortezomib with hydrogel-forming ability are being investigated for their propensity to bind to the drug molecule. Dipeptides are divided into two classes, the protected FF (Fmoc-FF and Z-FF) and the LF-based (Cyclo-LF and LF) ones. The thermodynamic stability of the complexes formed in an aqueous environment, as well as key morphological features of the nanoassemblies are investigated at the molecular level. Binding enthalpy between Bortezomib and dipeptides follows the increasing order: LF < Cyclo-LF < Fmoc-FF < Z-FF under both van der Waals and electrostatic contributions. Protected FF dipeptides have higher affinity for the drug molecule, which will favor its entrapment, giving them an edge over the LF based dipeptides. By evaluating the various measures, regarding both the binding between the two components and the eventual ability of controlled drug release, we conclude that the protected FF class is more suitable for drug release of Bortezomib. The selection of the optimal candidates based on the present computational study will be a stepping stone for future detailed experimental studies, involving the encapsulation and controlled release of Bortezomib both in vitro and in vivo.

Biography

Anastassia Rissanou is Assistant Researcher at the Theoretical and Physical Chemistry Institute, of the National Hellenic Research Foundation, Athens, Greece. She has basic education in Physics and long expertise in modeling of soft materials. Systems of interest are polymers, colloids, biological molecules such as peptides, proteins, RNA/DNA, as well as hybrid nanostructured materials of the aforementioned matrices with organic or inorganic nanofillers. She is skilled in various simulation methods in atomistic and coarse-grained level, as well as multiscale simulation techniques. She has many publications in high-impact international journals and participations in many national and international conferences.

Hind Abdellaoui

Mohammed VI Polytechnic University
Morocco

The impact of microplastics on the Environment and health: Reduction and Remediation approaches

Abstract:

Microplastics, plastic particles smaller than 5 mm, pose a serious environmental and public health problem. These particles are found everywhere, from oceans to soils, and even in the air we breathe. Their impact on the environment is considerable: they contaminate marine ecosystems, disrupt food chains and harm biodiversity. Marine animals ingest these microplastics, leading to toxic effects that can pass back to humans through seafood consumption. On human health, microplastics are associated with potential risks, including inflammation, endocrine disruption and other toxic effects that are still largely unknown. This presentation will take an in-depth look at the sources and effects of microplastics on the environment and health. We will explore the latest research on contamination mechanisms and ecotoxicological impacts. Next, we will discuss innovative strategies to reduce the presence of microplastics, such as improving wastewater filtration techniques, banning single-use plastics, and developing biodegradable materials. We will also showcase remediation approaches, such as bioremediation technologies using microorganisms to break down microplastics, and large-scale ocean cleanup efforts. Finally, the presentation will highlight policy initiatives and international collaborations needed to strengthen microplastics regulation and research. Case studies will illustrate the successes and challenges of mitigation and remediation efforts, providing a holistic perspective on combating this environmental scourge.

Biography

Hind Abdellaoui, Ph.D. in Mechanical Engineering, specializes in composite and nanocomposite materials. She is the co-founder of Moroccan Nanotech Corporation (MONACOR), a green engineering startup, and has over nine years of teaching experience in Mechanical Engineering, Entrepreneurship, and Quality Management (ISO 9001). With a decade of R&D experience in composites, nanocomposites, natural fibers, and manufacturing processes, Dr. Abdellaoui is also well-versed in the incubation and startup ecosystems. Her enthusiastic, entrepreneurial mindset and strong initiative have significantly contributed to her professional achievements.

DAY 02

POSTER PRESENTATIONS

OCTOBER 2024

30-31

M Dolores Samper Madrigal

University Research Institute of Materials Technology
Spain

Cocoa shell Waste-Derived nanoparticles for enhanced biodegradable film

Abstract:

In this study, the environmental issue arising from extensive plastic consumption has driven research towards developing biodegradable materials sourced from renewable resources. Biodegradable films based on PLA were produced by incorporating nanoparticles derived from cocoa shell waste, employing two distinct methods to assess the modification of film properties.

In the first method, nanoparticles were extracted through infusions of cocoa shell waste, involving prior drying, grinding, and reflux heating. The resulting infusion was filtered, lyophilized, yielding the nanoadditive in powder form. The second method involved a kombucha culture with cocoa shell and sucrose, followed by fermentation, washing, filtering, and sterilization to obtain the nanoreinforcement in powder form. Nanoparticles were incorporated at 1% and 3% weight concentrations in a blend of 75% PLA - 25% PHB, with the addition of borage seed oil as a plasticizer-compatibilizer. Film fabrication was accomplished using a twin-screw microextruder. Characterization results of the film formulations indicated a non-significant decrease in tensile strength values with nanoparticle incorporation, along with a reduction in oxygen transmission rate and alterations in transparency. These findings highlight the potential application of these films in the biodegradable packaging sector.

Biography

M Dolores Samper has completed his PhD at the age of 32 years from Universistat Politècnica de València. She is She is secretary of the University Research Institute of Materials Technology (IUTM). She has published more than 40 papers in reputed journals. She has participated in more than 20 competitive research projects, being Principal Investigator in 4 of them. Scientific identifiers: Orcid: 0000-0002-5102-

DAY 02

ACCEPTED PRESENTATIONS

OCTOBER 2024

30-31

Ali Ulaş Malcıoglu

Assan Hanil Otomotiv Sanayi ve Ticaret A.S
Turkey

Investigation of biomass derived materials effect on mechanical properties in the inner shelf vehicle part

Abstract:

The automotive industry, which has been directly affected by concerns about lightweight and CO2 emission reduction, has led many scientific studies about sustainability topics in recent years. The development of bio-based parts in the automotive industry with a focus on sustainability is increasing as a result of the advantages they offer. The motivation of this article is to examine the mechanical strength alteration of polypropylene materials with diverse talc and jute fiber ratios in the interior inner shelf part compared to the existing 20% talc polypropylene. Based on this, jute fiber was compounded with engineering plastics in order to form a biomass-derived material. Appropriate mechanical and aesthetic features were targeted by developing two distinct bio-based polymers with talc-free jute fiber compound and talc-added jute fiber compound for the inner shelf interior target part that occurs in light commercial vehicles. Tensile tests were performed on the existing material and bio-based materials following compounding. Regarding the finite element analysis (FEA); modal analysis, local deflection and thermal analysis were conducted considering the stress and displacement distributions and natural frequency. In line with the analyses, the existing material and the developed materials were compared. Besides; hardness, odor, and scratch test were performed in order to investigate the talc and biomass effect on curtain holder products. In addition to this, prototype production was carried out and the surface quality was investigated. Considering the FEA and product tests it was determined that talc added jute fiber compound exhibited appropriate mechanical features and encountered boundary conditions.

Biography

Ali Ulaş Malcıoğlu has a passion for materials science and has expertise in this field. Mr. Malcıoğlu, who is Ph.D. materials engineer, works at Assan Hanil Automotive as Advanced Research Manager for 4 years. Associated with his 8 years of experience in R&D, he gained competence in the fields of, material characterization, aluminum alloys, polymer materials, composite materials, and defect analysis and also maintained his studies in this direction. In addition, he took part in many projects based on weight reduction, composite materials and material characterization and successfully completed the projects from an academic and technical point of view.

Ang-Yang Yu

Henan University
China

Theoretical Insights into the Energy Levels of Quantum Dots

Abstract:

Quantum dots (QDs) are fundamental luminescent materials with wide applications in biotechnology, sensing, medical diagnostics and electronics. The luminescent QDs, including CoS and FeS QDs with emission tunable in a broad range, have been obtained in experiments recently. In my own work, energy levels of the QDs with different compositions, sizes and shapes were investigated by employing an eight-band k•p theory. It is known that determination of the HOMO and LUMO levels of the QDs is of great technical and fundamental importance in rational design of the devices with the QDs as building blocks. Thus, HOMO and LUMO levels of the quantum dots have also been determined based on the eight-band k•p model. In addition, the lifetime of resonant state of QDs is related to the energy width of the resonant level due to the uncertainty principle. Therefore, the lifetime of resonant state is calculated in order to estimate the limit of operation speed in resonant tunneling systems. Theoretical calculations are believed to be helpful for designing optimal resonant-tunneling devices in the near future.

Atia Chaimaa

Hassan 1st University
Morocco

Phosphate Washing Sludge in Morocco: A Literature Review on Characterization and Sustainable Applications

Abstract:

Phosphate washing sludge (PWS) is a byproduct produced during the phosphate ore washing process. Its properties and characteristics vary depending on the phosphate basins and washing plants, and they can also change based on storage area and time.

Morocco, holding the world's largest phosphate reserves, generates significant amounts of phosphate waste annually. Unfortunately, these wastes are not currently valorized, posing environmental risks due to heavy metal accumulation and aesthetic degradation, which can impact the ecological system.

This work presents a comprehensive review of the valorization applications of PWS in cementitious materials, including cement, concrete, mortar, aggregates, and geopolymers. It details the sources of PWS, its diverse characteristics, and the methods of its valorization. Furthermore, it highlights the best results found, demonstrating the impact of this waste on the final properties of cementitious products. This research aims to contribute to sustainable waste management and the development of innovative construction materials.

Biography

ATIA Chaimaa is currently completing her 1st year of a PhD, which began in November 2023, focusing on the valorization of phosphate washing sludge in the production of high-performance and sustainable cementitious materials. She holds a master's degree in chemical engineering and materials science. Chaimaa has participated with a literature review poster at the 11th edition of the PhD Student Day at University Hassan First in Settat, Morocco.

Christopher Oluwatobi Adeogun

South China University of Technology
Nigeria

THE PHYSICS BEHIND NANOTECHNOLOGY & MATHEMATICAL MODELING

Abstract:

Experimental studies of infinite (unrestricted at least in one direction) quantum particle motion using probe nanotechnologies have revealed the necessity of revising previous concepts of their motion. Particularly, quantum particles transfer quantum motion nonlocality energy beside classical kinetic energy, in other words, they are in two different kinds of motion simultaneously. The quantum component of the motion energy may be quite considerable under certain circumstances. Some new effects were predicted and proved experimentally in terms of this phenomenon. A new prototype refrigerating device was tested, its principle of operation being based on the experimental studies of infinite (unrestricted at least in one direction) quantum particle motion using the effect of transferring the quantum component of the motion energy.

Biography

Christopher is an expert in Space Physics and Software Engineering, specializing in Telecommunications. He is a University Lecturer and Consultant, with research interests in Space Physics, Theoretical Physics, and Nanotechnology. He teaches courses such as Electrodynamics and Astrophysics and has numerous publications. His current research focuses on Nuclear Structure Properties and Space Nanotechnology. As a Backend Software Engineer, he has designed applications for banks and private firms. He leads a tech company partnering with major U.S. organizations. Dr. Christopher was the sole Nigerian speaker at the 2023 International Conference on Nuclear Structure Properties in Turkey. He has over 500 Google Scholar citations, was nominated for the Cambridge Sustainability Leadership Program in 2023, and won the Best Research Paper award from ISROSET in 2021.

Ehsan Tabesh

York University
Canada

MXene-Based Superabsorbent Polymer Microparticle (MX/SAPs) for biological Target Enrichment in Water Samples: Optimization and Characterization

Abstract:

Water solutions frequently contain diverse pollutants, including biological contaminants, which pose significant challenges for assessing water quality. Accurate detection and analysis require efficient separation, enrichment, and isolation of specific targets, such as bacteria, from these complex matrices. Absorption-based techniques have a promising potential for concentrating and isolating bacteria, facilitating subsequent detection processes. This study introduces a novel composite of MXene (Ti3C2Tx) and acrylic acid-based superabsorbent polymers (MX/SAPs) designed to markedly enhance bacterial concentration efficiency in water samples, boosting detection sensitivity. Characterization techniques includes scanning electron microscopy (SEM), Fourier transform infrared spectroscopy (FTIR), and thermogravimetric analysis (TGA). The efficiency of MX/SAP composites in bacterial enrichment was evaluated through concentration fold change (CFC) and recovery percentage (RP) measurements under varied experimental conditions: crosslinking density (Cr%), acrylic acid concentration (AA%), particle size, and MXene content. Each experiment involved adding 50 mg/mL MX/SAPs to 10 mL of solution for 10 minutes, followed by comparing bacterial concentrations before and after treatment. Increasing Cr% from 0.2% to 2.0% resulted in a decrease in CFC from 3.3 to 1.6, coupled with an improvement in RP from 60% to 80%. Elevating AA% from 10% to 50% increased CFC from 1.5 to 2.2 and RP from 60% to 90%. Particle size variation from 90 µm to 270 µm decreased CFC from 2.0 to approximately 1.5, while RP increased from 70% to 90%. Incorporating 1% MXene boosted CFC from 1.5 to 2.0 and RP from 80% to 95%, with further increments to 3% MXene yielding CFC of 2.2 and RP nearing 100%. Optimizing parameters—1.13% Cr, 50% AA, 140 µm particle size, and 1% MXene—resulted in a bacterial CFC of 5.0 and RP of 100%.

Biography

Ehsan Tabesh is a fourth-year PhD student in the Mechanical Engineering department at York University, Toronto, Canada. His academic journey commenced with degrees in Materials Science and Engineering at both the undergraduate and master's levels. Currently, his research focuses on hydrogels, superabsorbent polymers, and microfluidics, with applications in environmental and biological contexts. His research primarily centers on designing and fabricating microfluidic devices tailored for characterizing hydrogel microparticles. His contributions include advancements in superabsorbent polymer microparticles, biomimetic aerogel scaffolds, and nanocomposite coatings aimed at biomedical applications. These efforts are directed towards improving technologies for water quality assessment and enhancing biomedical materials. His work reflects a commitment to addressing global challenges through innovative engineering solutions, emphasizing the integration of materials science with environmental and biomedical engineering disciplines

Guillermo Valdes Mesa

Havana University Center Biomaterial
Cuba

The convergence of technologies, generates convergence in the regulations

Abstract:

The convergence of nanotechnologies generates synergies among different technologies to say, nanotechnologies, neurotechnology, computers and biotechnology, these technologies must converge(7) itheir regulations, the application of medical devices in nanotechnologies should lead us to a link between the technical committee TC 210 and ISO technical committee 229 link that does not exist in our work in this moment In this do an analysis of the management of risk from an optical NC-ISO 14971(1). Studying the global trend in this respect as imported for manufacturers medical Devices worldwide. The convergences of technologies is a consequence of atomic precision, where the boundary between the biotic and abiotic mute blur the interaction. The interaction between nanotechnologies, biotechnology and informatics and communications (NBIC) generates a synergy of unusual consequences of all is known that the industry of semiconductor(5)s is the one of greater precision that is atomic, the new medical devices that will be applied in the teranocis will dose Physical principles that will be governed under the laws of quantum mechanics(4), but there are two problems that have not been solved even though they are one the non-existence of quantum biology and the transition from quantum to classical mechanics. On the other hand, the redefinition of the international system of units based on the universal constants that will be implemented by 2018 has a deficiency that is the second that redefirms implies redefinition of the meter the chain of traceability proposed for nanometrology presents a serious difficulty when putting the microcopy of atomic force wing of effect tunnel situation that is changing the verification of the Wiedemann-Franz law (8) at atomic level yields a result where the phononic component is taken into account, a result that launches STM to the cusp of the chain of traceability above inclusive of interferometry

Biography

Born in Havana, Cuba in 1962, graduated in Physics in 1985, working for the Microelectronics Industry, as head of final control investigations degradation production of electronic components, working for the Electronics Industry, department of reliability, characterization work performed Luma-Chroma plate worker Research Institute of Metrology, work Challenges of Metrology in Cuba in the era of nanotechnology. Work published in the ISO TC 229, ISO TC229 / IEC 113, required for conformity assessment of research and nano-scale productions Tool page. Master of Science.

Misbah Mumtaz

University of Sheffield
UK

Electrochemical Cycling Stability of Zr, Nb and Mo Doped Lithium Nickel Oxide Cathodes for LIBs

Abstract:

An alternative to LiNixCoyAl1−x−yO2 (NCA, x > 0.8) and LiNixMnyCo1−x−yO2 (NMC, x ≥ 0.5) cathode composition is LiNiO2. The presence of Cobalt poses complications to these cathode chemistries with regards to its exorbitant cost, environmental damage during its mining, and ethical concerns during its acquisition. A series of compositions with formulae LiNi1−xNbxO2 (0≤x≤0.80) and Li1+yNi(3-5y)/3Mo2y/3 were made by solid state route. Due to the process of doping we anticipated a change in the crystal lattice. The focus of the investigation was morphological and electrical studies after doping. The major characterization techniques used were XRD, EDX, SEM, and electrochemical testing. XRD results revealed that the Zr, Nb and Mo doping resulted in a regular layered structure along with lower cation-ion mixing. The process of doping tailored microstructure, which was revealed smooth grain and grain boundary formation via SEM studies. SEM indicated that the Zr, Nb and Mo doped composition has prominent impact on the growth of primary particles. For the Zr/Nb doped compositions grain growth, with size variation in the grain boundaries was observed besides the quasi-secondary shape. The impact of the altered morphology on the electrochemical properties was tested using ½ and full coin cells at ambient conditions. The electrochemical performance of the LNO and Nb doped LNO (1 and 2) % was characterized at (3.0 - 4.3) V using a 2032 coin-type half-cell with a Li metal anode. The electrochemical data revealed 258.7 mAh g−1 first charge capacity compared to 207.6 mAh g−1 for LNO. Nb doped cathodes revealed 92 % better retention capacity after the first 50 cycles. Zr/Nb-doped cathodes have cycled noticeably better than LNO. The kinetic hindrance peak below 3.6 V is an additional redox couple that is only present in LNO. This variation in the lattice due to doping is beneficial for the electrochemical performance helping stabilise the lattice. It is observed that Nb doped compositions exhibited less polarization as compared to LNO in dQ/dV vs. Voltage plots. This feature assisted in smooth transition of H2 to H3 phase during the electrochemical cycling process. The proposed Nb (1 and 2) % doped compositions have delivered superior energy density and stable cycling ability unlike conventional cathodes. The long cycling of Nb doped 1% for 500 cycles shows improved performance against microcracks in the cathode.

Biography

I did my PhD in 2015 under supervision of Prof. Naveed Kausar Janjua (Quaid-i-Azam University, Islamabad Pakistan) and Prof. John Irvine (University of St Andrews, UK). I have worked on various synthesis routes i.e., pechini, citric acid, solution, and precipitation to synthesis olivine's, layered oxides, spinel, and rock salt compositions. I worked in Pakistan Institute of Engineering and Applied Sciences (PIEAS) Nilore, Islamabad as assistant professor for 3.5 years. I have more than 8 years of experience in academia and industry funded projects in UK and Pakistan. I have worked on JLR and Nissan cathode compositions for electric vehicles. Presently I am looking for new chemistries related to lithium nickel oxide composition under FutureCat project funded by Faraday Institution

Moteb Qahess M Alotaibi

Prince Sattam Bin Abdulaziz University
Saudi Arabia

Geometrical Stabilities and Electronic Structures of Rh5 Nanoclusters on Rutile TiO2 (110) for Green Hydrogen Production

Abstract:

Addressing the urgent need for sustainable energy sources, this study investigates the intricate relationship between Rhodium (Rh5) nanoclusters and TiO2 rutile (110) surfaces, aiming to advance photocatalytic water splitting for green hydrogen production. Motivated by the imperative to transition from conventional fossil fuels, the study employs density functional theory (DFT) with DFT-D3 and HSE06 hybrid functional to analyse the geometrical stabilities and electronic structures of Rh5 nanoclusters on TiO2 rutile (110). TiO2, a prominent photocatalyst, faces challenges such as limited visible light absorption, leading researchers to explore noble metals like Rh as cocatalysts. Our results show that bipyramidal Rh5 nanoclusters exhibit enhanced stability and charge transfer when adsorbed on TiO2 rutile (110) compared to trapezoidal configurations. The most stable adsorption induces oxidation of the nanocluster, altering the electronic structure of TiO2. Extending the analysis to defective TiO2 surfaces, the study explores the impact of Rh5 nanoclusters on oxygen vacancy formation, revealing stabilisation of TiO2 and increased oxygen vacancy formation energy. This theoretical exploration contributes insights into the potential of Rh5 nanoclusters as efficient cocatalysts for TiO2 -based photocatalytic systems, laying the foundation for experimental validations and the rational design of highly efficient photocatalysts for sustainable hydrogen production. The observed effects on electronic structures and oxygen vacancy formation emphasize the complex interactions between Rh5 nanoclusters and TiO2 surface, guiding future research in the quest for clean energy alternatives.

Biography

Moteb Qahess Mansour Alotaibi **is an Assistant Professor in the Department of Physics at the College of Science and Humanity Studies in Alkharj. He holds a PhD in Nanoscience from Lancaster University (2023), an MSc in Condensed Matter Physics from Ottawa University (2019), and a BSc in Physics from Prince Sattam bin Abdulaziz University (2013). His research interests include hydrogen energy production, quantum transport in molecules, photocatalysis, and thermal barrier coatings. Dr. Alotaibi has been an active member of the Student Accommodation Committee since 2013 and coordinates conventions, external partnerships, and social responsibility initiatives within the Physics department. Additionally, he serves as the Chair of the Academic Committee, demonstrating his dedication to academic excellence and community engagement.**

Niharika

Metro college of health sciences & research
India

Targeted drug delivery systems to cancer: concepts, events, and biological processes involved in drug targeting.

Abstract:

The magic bullet theory brought out by Paul Ehrlich has been developed by nanomedicine. By directly delivering the drug moiety to the targeted body area (organ, cellular, and subcellular level of a particular tissue), targeted drug delivery reduces the amount of drugs needed for therapeutic efficacy while overcoming the general toxic effect of conventional drug delivery. In order to accomplish this goal, the idea of the magic bullet developed and encouraged research for over a century, which resulted in the development of many nanoscale devices that make up modern nanomedicine. Many carrier systems, including as polymers, cellular/subcellular systems, and colloidal (vesicular and multiparticulate) carriers, are being employed and studied. The aim of presentation will to addresses the need for and advantages of targeting, with its basic principles, strategies, and carrier systems.

Biography

Niharika is an Associate Professor at Metro College of Health Sciences and Research in Greater Noida, Uttar Pradesh, India. She holds a Ph.D. and M.Pharm in Pharmaceutics and has nine years of teaching and research experience in Diploma, Bachelor's, and Postgraduate programs. Dr. Niharika has numerous notable publications in SCI and Scopus international journals. During her Ph.D., her work on "Design and Characterization of Acrylic Pressure Sensitive Adhesive-Based Transdermal Therapeutic System" earned her recognition from the Department of Polymer Sciences at IIT Kharagpur. Her research interests include Transdermal Drug Delivery, Gastroretentive Drug Delivery, Polymer Science, and Targeted Drug Delivery.

Pelagie kamgang syapnjeu

University of Yaounde 1
Cameroon

Bio-based ceramic membranes used for water disinfection

Abstract:

Bio-based ceramic membranes were elaborated from kaolinite clays, coconut husks and eggshells to retain E. coli bacteria present in water intended for human consumption. Their characterization and removal performances are investigated in this work. These bio-ceramic membranes were obtained by heating the formulation containing clay, coconut husk and eggshell at 900 °C and 1000 °C, at different temperature rates, to give S1, S2 and S3 materials. Thermogravimetric analysis (TGA), differential scanning calorimetry (DSC), mercury porosimetry and scanning electron microscopy (SEM) were used to characterize these membranes. Water flux density, bacterial removal and biofouling were also assessed. Water flux density was shown to depend on material porosity. Bacteria retention was 90% (with 1 logremoval) for S1, 80% (with 0.7 log-removal) for S2 and 100% (with 3.3 log-removal) for S3. Membranes S1 and S2 presented reversible biofouling, while no fouling was evidenced for S3 in the tested conditions. This work shows that the best bio-ceramic membrane in terms of bacterial removal and flux density was S3. Its water flux density was 2123 L/h/m2 at an initial pressure of 0.2 bar. This material is particularly interesting because its production protocol is quite simple, fast and without the addition of chemical additives. Moreover, it can be used to efficiently remove bacteria from drinking water.

Biography

Pelagie Kamgang Syapnjeu has completed his PhD at the age of 34 years from University of Yaounde 1-Cameroon/European Institute of Membrane, Montpellier-France. She has published 03 papers in reputed journals

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