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5th Edition of

WORLD NANOTECHNOLOGY CONFERENCE

21-22 SEPT 2022

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BOOK OF ABSTRACTS

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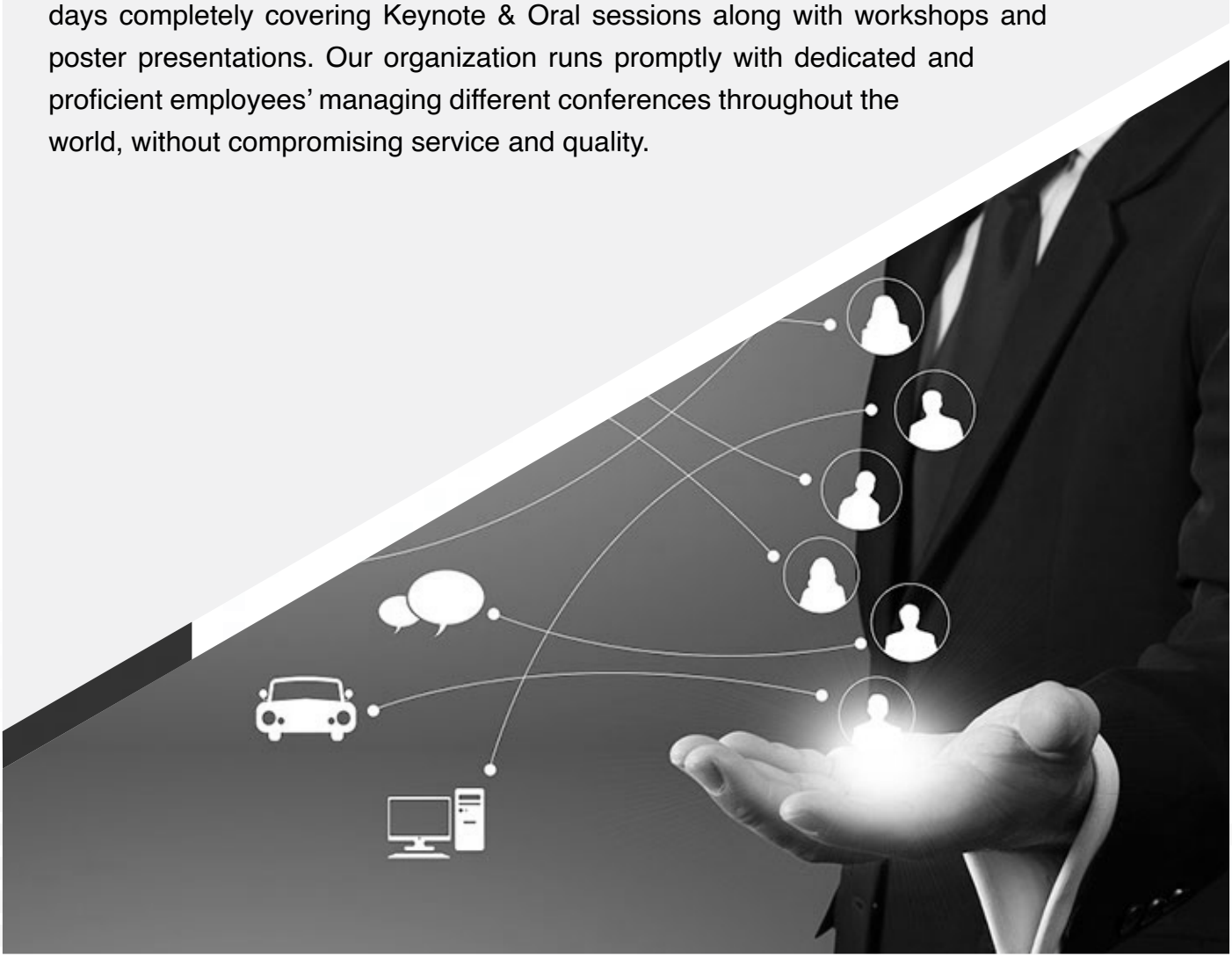
ABOUT MAGNUS GROUP

Magnus Group (MG) is initiated to meet a need and to pursue collective goals of the scientific community specifically focusing in the field of Sciences, Engineering and technology to endorse exchanging of the ideas & knowledge which facilitate the collaboration between the scientists, academicians and researchers of same field or interdisciplinary research. Magnus group is proficient in organizing conferences, meetings, seminars and workshops with the ingenious and peerless speakers throughout the world providing you and your organization with broad range of networking opportunities to globalize your research and create your own identity. Our conference and workshops can be well titled as 'ocean of knowledge' where you can sail your boat and pick the pearls, leading the way for innovative research and strategies empowering the strength by overwhelming the complications associated with in the respective fields.

Participation from 90 different countries and 1090 different Universities have contributed to the success of our conferences. Our first International Conference was organized on Oncology and Radiology (ICOR) in Dubai, UAE. Our conferences usually run for 2-3 days completely covering Keynote & Oral sessions along with workshops and poster presentations. Our organization runs promptly with dedicated and proficient employees' managing different conferences throughout the world, without compromising service and quality.



ABOUT NANOTECHNOLOGY 2022

Magnus Group is pleased to invite you to participate in the Online Event- '5th Edition of World Nanotechnology Conference (Nanotechnology 2022)' during September 21-22, 2022 organized around the theme "From Micro to Nanotechnology: Advances and Applications in Real World". This Nanotechnology 2022 is the International platform which brings together the collection of investigators who are at the forefront in the field of Nanotechnology. The scientific program will include oral presentations of sub-disciplines, keynote sessions led by eminent scientists and poster sessions presented interactively by junior scientists and graduate students. It is the ultimate meeting place for all the experts worldwide for new interdisciplinary scientific collaborations and networking. With its scientific sessions, you are provided assurance to explore the latest technologies and breakthroughs that are specific to your area of work. No doubt the event has a broad scope of topics and continued in parallel sessions relative to the specific area of research.

We are confident that our conference will provide you with an incredible chance to explore new horizons in your field and we hope to see you at our upcoming Nanotechnology-2023 conference during September 25-27, 2023 at Valencia, Spain.

KEYNOTE FORUM

DAY 01

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M H Fulekar[1]*, Ashita Rai[2]

[1]Center of Research for Development, Parul University, Vadodara, Gujarat, India

[2]School of Environment and Sustainable Development, Central University of Gujarat, Gandhinagar, Gujarat, India

Nanoremediation of wastewater using membrane filtration technology

Common Effluent Treatment Plant (CETP) concept has been developed for the treatment of industrial wastewater employing pre-treatment, primary-secondary and tertiary methods to comply with the regulatory standards of discharge. However, the treated effluent discharges into the water-soil environment have been found to contain persistent organic and inorganic pollutants. Nano-based Membrane Filtration Technology has been developed via microfiltration-ultrafiltration-nanofiltration for the remediation of wastewater contaminants using cellulose based nano filter placed in each reactor having different pore size as per designed membrane. Membrane reactors are placed vertically one below the other on stainless steel stand. Each membrane reactor has a provision of interaction with the membrane's porous material, filtration/collection system and passing into another membrane reactor by pressure driven methods for the remediation viz. microfiltration-ultrafiltration-nanofiltration. A membrane is a thin film of porous material that allows water molecules to interact and pass through the pressure-driven system. The membrane nanofilm reactor is an emerging technology for water and wastewater treatment. A recent research study CETP wastewater treatment demonstrated by M H Fulekar and Ashita Rai have efficient and effective treatment and purification significantly faster than other advanced wastewater treatment technologies.

Audience Take Away

- Membrane filter material can be developed based on the type of pollutants and process employed thereof.
- Membrane Filtration Technology can be modified and developed accordingly.
- Water scarcity abatement and achievement of Sustainable Development Goal 6.

Biography

Prof. Madhusudan Hiraman Fulekar, M.Sc. (Chemistry), MPhil. & Ph. D. (Environmental Science), LLB, MBA (HRD), D.Sc. (Life Sciences) submitted. He is an Environmentalist and has worked as a faculty – Delhi Technological University, Delhi and University Department of Chemical Technology, Mumbai. He was also a Professor & Head, Life Sciences (Environmental Biotechnology), University of Mumbai - 2002 to 2011 and as Senior Professor & Dean, School of Environment and Sustainable Development, Central University of Gujarat (2011-2019) & Director Central University of Gujarat. He also acted as Vice-Chancellor (I/C), Central University of Gujarat, Gandhinagar. At present Prof. M. H. Fulekar is working as Senior Professor & Joint Director (R&D), Center of Research for Development, Parul University, Gujarat, India. Prof Fulekar has 37+ years of teaching and research experience. In academics, he has developed various programs M.Sc., M.Phil/PhD, PhD Environment Science and M.Phil/PhD in Nanosciences. Guided 30 PhDs, 22 M.Phils, Published more than 300 papers, 4 Patents (Awarded (2)- Automatic Spore Fractionator for Rhizosphere – VAM and A method for treating Fly ash to extract Ferrous oxides, Silica and Zeolites, In process-2), Published 15 Books and more than 50 Book chapters, Impact factors: 200+, Citation: 5058, h-index: 35, i10-index: 79, Genbank (NCBI-submission)-296. He has visited for International Assignments to various countries: Australia, Singapore, Bangkok, Hong Kong, Nepal, Dubai, USA etc.

Subas Chandra Dinda[1]*, Bibhash Chandra Mohanta[1]

Department of Pharmaceutics, College of Pharmacy, Teerthanker Mahaveer University, Moradabad, India

Paradigm of micro and nano-technology based formulation in targeted/ controlled release drug delivery

Microparticulate drug delivery systems were interesting and promising option to develop an oral controlled release system. Controlled drug delivery dominated over the conventional drug delivery systems in the sense to alter the pharmacokinetic and pharmaco-dynamic parameters of the active therapeutic moieties by adopting novel drug delivery technology or by modifying the molecular structure and/or physiological parameters of the drug through a selected route of administration.

For example: Ionotropic gelation technique was used to entrap aceclofenac into algino-pectinate bioadhesive microspheres as a potential drug carrier for the oral delivery of this anti-inflammatory drug. Microspheres were investigated *in-vitro* for possible sustained drug release and their use *in-vivo* as a gastroprotective system for aceclofenac. Polymer concentration and polymer/drug ratio were analyzed for their influence on microsphere properties. The microspheres exhibited good bioadhesive property and showed high drug entrapment efficiency. Drug release profiles exhibited faster release of aceclofenac from alginate microspheres, whereas algino-pectinate microspheres showed prolonged release.

Within decade it has been observed that the development of drug delivery platform is shifting towards nanotechnology-based formulations for drug targeting. Now nanomedicine concept dominates over micro-encapsulation techniques in designing targeted and controlled release drug delivery systems. **Nanomedicine** is the application of nanotechnology to health care. It has potential impact on the easy and reliable diagnosis, monitoring and treatment of disease. There are lot of research potentials in the field of nanoparticulate systems to be utilized in the drug delivery and drug targeting. Particulate systems like nanoparticles have been used as a physical approach to alter and improve the pharmacokinetic and pharmaco-dynamic properties of various types of drug molecules. They have been used *in-vivo* to protect the drug entity in the systemic circulation, restrict access of the drug to the chosen sites and to deliver the drug at a controlled and sustained rate to the site of action.

For example: A novel drug solubilization platform (so called Nano-suspension prepared by comminution method using High pressure homogenizer; GEA Niro soavi) and further use the nano-suspension as granulating fluid admixed with excipients for further tablet production. The results revealed hydroxy propyl cellulose as a suitable stabilizer compared to others polymer. The dissolution studies of Lacidipine shows complete release of drug within 45 minutes using hydroxy propyl cellulose as stabilizer in comparison to available marketed product. Hydroxy propyl cellulose was better adsorbed with the drug compared to other polymers resulting in better mechanical interaction during comminution, which causes the drug particle size to reach in nano-meter scale.

Nanoparticles may be because of its size and functionalization characteristics able to penetrate and facilitate the drug delivery through the barrier. There are number of mechanisms and strategies found to be involved in this process, which are based on the type of nanomaterials used and its combination with therapeutic agents, such materials include liposomes, polymeric nanoparticles and non-viral vectors of nano-sizes for CNS gene therapy etc.

Different drug delivery systems such as liposomes, microspheres, nanoparticles, nono-gels and nono-biocapsules have been used to improve the bioavailability of the drug in the brain, but microchips and biodegradable polymeric nanoparticulate careers are found to be more effective therapeutically in treating brain tumor. The physiological approaches also utilized to improve the transcytosis capacity of specific receptors expressed across the BBB. It is found that the low-density lipoproteins related protein (LPR) with engineered peptide compound (EpiC) formed the platform incorporating the Angiopep peptide as new effective therapeutics. The lipid-based formulations comprise nano-emulsions, solid-lipid nanoparticles (SLNs), nano-structured lipid carriers (NLCs), liposomes, and niosomal systems, etc. have found more promising antitubercular activity as its intended for targeted drug delivery especially to the infected part. Further mannosylation of liposomes offers tremendous results in TB chemotherapy as it directly binds to mannose receptors available on the surface of alveolar macrophages resulting mycobacterium destruction. SLNs and manosylated SLNs are the advanced form of the lipid formulations, which found to enhance the drug uptake at the infected organ and show significant *in vivo* anti-tubercular activity with reduced toxicity.

Recently it has been found that the use of nanotechnology in the field of pharmaceutical biotechnology helps in improving the drug delivery strategy including the kinetics and therapeutic index to solve the delivery problems of some biotech drugs including the recombinant proteins and oligonucleotides. Use of nanotechnological based formulations and nanomaterials are increasing day-by-day in wide range covering a broad typology of applications, from design and development of targeted drug delivery systems, manufacturing of pesticides, domestic appliances, textiles, to bioremediation engineering. There are therefore concerns about the environmental risks or bioaccumulation related issues that may arise particularly resulting from the application of drug loaded nano-carriers or effect of pesticides that reach the natural ecosystems.

Biography

Dr. Subas Chandra Dinda, who did his Master's degree in Pharmaceutical Technology from Andhra University, India in 1999 and Ph.D. in Pharmacy from Jadavpur University, India in 2008, serving at present as Professor & Head, Department of Pharmaceutics, Teerthanker Mahaveer University, India is found to be having a wide research experience in the frontier of Drug Delivery and Drug Targeting Research covering the area of design and development of Matrix systems, Floating Drug delivery systems, Muco-adhesive microcapsules, and Nano-particle based formulations. He explored several poorly bio-available drugs through muco-adhesive as well as nano-particle based dosage forms and found to be very effective through oral route. He also actively involved in guiding the scholars in the field of Drug Delivery System as well as interdisciplinary research covering the area of Drug Synthesis and Herbal Drug Research under the joint collaboration with the teachers from other University as well. To date some of his research finding claimed patents and published in more than hundreds of peer reviewed journals for the benefit of scientific community. He is serving as **reviewer** of many journals including **ELSEVIER, SPRINGER,** and **SCIENCE DIRECT** publications. To his credit he supervised/awarded more than 18 Ph.D candidates in the field of pharmaceutical sciences for the professional development and having a vast administrative experience in establishing the new pharmacy institutions as well as designed new pharmacy course curricula as the chairperson of Board of Studies/ Council for the development of pharmaceutical sciences at Berhampur University in India as well as Mekelle University in Ethiopia.

Sergey Suchkov[1,2,3]*, Veromika Medvedeva[1,6], Noel Rose[4,7], Aleks Gabibov[5], Harry Schroeder[6]

[1]Sechenov University, Moscow, Russia

[2]A. I. Evdokimov Moscow State Medical & Dental University, Moscow, Russia

[3]EPMA (European Association for Prediction, Prevention and Personalized Medicine), Brussels, EU

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[5]Institute for Bioorganic Chemistry, Russian Academy of Sciences, Moscow, Russia

[6]Division of Clinical Immunology & Rheumatology. Director UAB Program in Immunology, UAB, Birmingham, ALA, USA

[7]Harvard Medical School, Boston, MA, USA

[8]University of World Politics & Law, Moscow, Russia

Antibody-Proteases as translational tools of the newest generation to be applied for biodesign and bioengineering to get precision and personalized healthcare services re-armed

Abs against myelin basic protein/MBP endowing with proteolytic activity (*Ab-proteases* with *functionality*) are of great value to monitor demyelination to illustrate the evolution of multiple sclerosis(MS). Anti-MBP autoAbs from MS patients and mice with EAE exhibited specific proteolytic cleavage of MBP which, in turn, markedly differed between: *(i)* MS patients and healthy controls; *(ii)* different clinical MS courses; *(iii)* EDSS scales of demyelination to correlate with the disability of MS patients to *predict* the transformation prior to changes of the clinical course.

Ab-mediated proteolysis of MBP was shown to be sequence-specific whilst demonstrating five sites of preferential proteolysis to be located within the immunodominant regions of MBP and to fall inside into 5 sequences fixed. Some of the latter (with the highest encephalitogenic properties) were proved to act as a specific inducer of EAE and to be attacked by the MBP-targeted Ab-proteases in MS patients with the most severe (progradient) clinical courses. The other ones whilst being less immunogenic happened to be EAE inducers very rare but were shown to be attacked by Ab-proteases in MS patients with moderate (remission-type) clinical courses.

The activity of Ab-proteases was first registered at the subclinical stages 1-2 years prior to the clinical illness. About 24% of the direct MS-related relatives were seropositive for low-active Ab-proteases from which 22% of the seropositive relatives established were being monitored for 2 years whilst demonstrating a stable growth of the Ab-associated proteolytic activity. Moreover, some of the low-active Ab-proteases in persons at MS-related risks (at subclinical stages of MS), and primary clinical and MRT manifestations observed were coincided with the activity to have its mid-level reached. Registration in the evolution of highly immunogenic Ab-proteases would illustrate either risks of transformation of subclinical stages into clinical ones, or risks of exacerbations to develop.

The activity of Ab-proteases in combination with the sequence-specificity would confirm a high subclinical and predictive (translational) value of the tools as applicable for personalized monitoring protocols. Ab-proteases can be programmed and re-programmed to suit the needs of the body metabolism or could be designed for the development of principally new catalysts with no natural counterparts. Further studies on targeted Ab-mediated proteolysis may provide a translational tool for predicting demyelination and thus the disability of the MS patients.

Biography

Sergey Suchkov graduated from Astrakhan State Medical University and awarded with MD, then in 1985 maintained his PhD at the I.M. Sechenov Moscow Medical Academy and in 2001, maintained his Doctorship Degree at the Nat Inst of Immunology, Russia. From 1987 through 1989, he was a senior Researcher, Koltzov Inst of Developmental Biology. From 1989 through 1995, he was a Head of the Lab of Clinical Immunology, Helmholtz Eye Research Institute in Moscow. From 1995 through 2004, a Chair of the Dept for Clinical Immunology, Moscow Clinical Research Institute (MONIKI. Dr Suchkov has been trained at: NIH; Wills Eye Hospital, PA, USA; Univ of Florida in Gainesville; UCSF, S-F, CA, USA; Johns Hopkins University, Baltimore, MD, USA. He was an Exe Secretary-in-Chief of the Editorial Board, Biomedical Science, an international journal published jointly by the USSR Academy of Sciences and the Royal Society of Chemistry, UK. At present, Dr Sergey Suchkov is a Chair, Dept for Personalized and Translational Medicine, I. M. Sechenov First Moscow State Medical University. He is a member of the: New York Academy of Sciences, USA; American Chemical Society (ACS), USA; American Heart Association (AHA), USA; EPMA (European Association for Predictive, Preventive and Personalized Medicine), Brussels, EU; ARVO (American Association for Research in Vision and Ophthalmology); ISER (International Society for Eye Research); PMC (Personalized Medicine Coalition), Washington, USA.

SPEAKERS

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Ahila S Chidambaranathan
Department of Prosthodontics, SRM Dental College, Ramapuram, SRM University, Chennai, Tamilnadu, India

Applications of nanoparticles in prosthetic dentistry

In recent years, lots of researches have been launched on nanomaterials for biomedical applications. It has been shown that the performances of many biomaterials used in prosthodontics have been significantly enhanced after their scales were reduced by nanotechnology, from micron-size into nanosize. On the other hand, many nanocomposites composed of nanomaterials and traditional metals, ceramics, resin, or other matrix materials have been widely used in prosthodontics because their properties, such as modulus elasticity, surface hardness, polymerization shrinkage, and filler loading, were significantly increased after the addition of the nanomaterials.

Audience Take Away

- Use of nano particles with denture base resin will provide high impact strength denture with anti-candidal effect.
- Use of nanoparticles with provisional PMMA resin will give more flexural strength.
- Use of nanoparticles with maxilla-facial silicone provide mor color stability.
- Use of nano particles coating with titanium had antibacterial and anti-candidal effect which will prevent periimplantitis.
- Use of nanoparticles coating on Titanium will improve osseintegration.

Biography

Dr. Ahila S Chidambaranathan has graduated from Tamilnadu Govt Dental College, Chennai in 1998 and completed post-graduation in Prosthodontics in 2004 at Tamilnadu Govt Dental College, Tn Dr. M. G. R. Medical University, Chennai, India. She had more than 60 publications in Pubmed, Scopus and Web of science indexed journal. She published two test books on “Rapid Viva Review on Clinical and Pre-clinical Prosthodontics”. Also, She received best dental teacher award in Prosthodontics 2019 at World Dental and Oral Health conference and Excellence in Prosthodontics 2020 by Smile nation. Filed two patents at Government of India Patent office. Currently working as Professor, Dept of Prosthodontics, SRM Dental College, Ramapuram and guiding postgraduates.

A. R. Popoola*, C. A. MIluyemi, E. O. Idehen, C. G. Afolabi
Department of Crop Protection, Federal University of Agriculture, Abeokuta, Ogun State, Nigeria

Control of wilt (Fusarium oxysporium f.sp lycopersici) of tomato (Solanum lycopersicum L.) using nanoparticles and nitrates of silver

Tomato (Solanum lycopersicum L.), one of the most economically important vegetable crops in the world issusceptible to Fusarium wilt, a highly destructive vascular disease. Field experiments to determine the efficacy of nanoparticles and nitrate of silver in the control of Fusarium wilt of tomato were carried out at DfID Tomato Research Farm, Federal University of Agriculture, Abeokuta, and Carrick Farm, Iseyin, Nigeria in 2019 and 2021. The field experiments were 2 x 2 x 5 factorials fitted into Randomised Complete Block Design (RCBD) with three replications. The experiment consisted of two tomato accessions, CPTTO/18/106and CPTTO/18/123, four concentrations each of silver nanoparticles and silver nitrate (10 ppm, 30 ppm, 50ppm and 100 ppm). Carbendazim was applied as positive control while the negative control plots received no treatment. Data were collected on disease incidence, disease severity, number of leaves, plant height (cm), number of flowers and yield (tons/hectare). Data were subjected to Analysis of Variance using Statistical Analysis System (SAS) 9.1 package and significant means were separated using the Duncan's Multiple Range Test ($p \leq 0.05$). Mycelial spread was least at 10 ppm on the plate culture, indicating that $AgNO_3$ at 10 ppm in-vitro significantly ($p<0.05$) reduced the growth of the fungi. On the field, tomato treatedwith 10 ppm $AgNO_3$ had no disease incidence, highest leave number (29.67), tallest plant (68.70 cm), highest number of flowers (68.70) and the highest fruit yield (68.39 tha^{-1}) in both 2019 and 2021. Application of $AgNO_3$ at 10 ppm was recommended for the control of Fusarium wilt of tomato in Abeokuta, Nigeria.

Audience Take Away

- Silver nitrates could effectively reduce fungal wilt of tomato and increase yield.
- Where silver nanoparticles are not available, audience could use cheaper silver nitrates forplant disease control and yield improvement.
- This provides a simpler use of silver compounds as antimicrobial agent.

Biography

Prof. Popoola had B.Sc. and M.Sc. Biochemistry (from OAU, Ile-Ife and University of Ibadan, both in Nigeria). He did PhD Applied Microbiology and Plant Pathology at the University of Jos, Nigeria. He had, over the years, applied molecular and nanotechnology in addressing the problems associated with plant health. Prof. Popoola was a visiting scientist at the International Institute for Tropical Agriculture, IITA, Ibadan in 2005. He was also a visiting researcher at the Department of Plant Science (DISPAPA), Napoli University, Italy in 2013. Prof. Popoola was the Principal Investigator in UK's DfID Research Grant on tomato improvement using marker-assisted selection in conjunction with the Kwame Nkrumah University of Science and Technology, Kumasi, Ghana. He was the Immediate Past Director, Biotechnology Centre, Federal Universityof Agriculture, Abeokuta, Nigeria. He has published more than 70 research articles in scientific journals.

Boggarapu Nageswara Rao
Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation (KLEF), Deemed to be University, Green Fields, Vaddeswaram-522502, Guntur, Andhra Pradesh, India

On the limitation of mixing Al_2O_3 nanoparticles to water for improving the performance of heat exchangers

Al_2O_3 nanoparticles of different volume concentrations are mixed to water for making nanofluids. Based on the test data of nanofluids, Corcione empirical relation is recommended for thermal conductivity, whereas the modified Corcione empirical relation for dynamic viscosity. This presentation highlights on the adequacy of different turbulent models in computational fluid dynamics (CFD) through comparison of a shell and tube heat exchanger test data. Nx-CAD Design Modeler is used to generate the flow model. ANSYS (FLUENT) is utilized to perform the flow analysis. There is a need for the designer to select a suitable turbulent model for the intended application. The transition-SST turbulent model is selected through comparison of the measured outlet temperature of the Al_2O_3-water nanofluids in the heat exchanger. Numerical simulations revealed that heat transfer enhancement is possible by increasing the particle concentration to a certain extent. To examine further, the outlet temperature estimates of a circular microchannel heat exchanger are comparable with test data. The agglomeration phenomenon by increasing the particle concentration of the nanofluid may result from the unacceptable flow pattern. The Nusselt number initially enhances little by increasing the particle concentration to a certain extent and decreases upon further increasing of the particle concentration. This presentation clearly demonstrates the limitation on the mixing of nanoparticles to the working fluids of heat exchangers.

Audience Take Away

- Several empirical relations are developed for the properties of nanofluids. This presentation makes the audience to aware of the drawbacks in the existing empirical relations prior to specify in CFD analysis.
- This presentation explains the need for selection of a suitable turbulent model in CFD through comparison of heat exchanger test data.
- Numerical simulations indicate the possibility of heat transfer enhancement by increasing the particle concentration to a certain extent. The agglomeration phenomenon by increasing the particle concentration of the nanofluid may result from the unacceptable flow pattern.

Biography

Dr. Boggarapu Nageswara Rao has completed his M.Sc. (1975) & Ph.D. (1982) in Mathematics from IIT Bombay, India. Currently he is working as Professor at Koneru Lakshmaiah Education Foundation, India. He also worked as Scientist/Engineer at ISRO/ VSSC Trivandrum for 33 years. He is the author/co-author of 315 articles in journals. He has successfully supervised 20 PhD projects. He is serving as reviewer in number of journals. He is a member of the Aeronautical Society of India (AeSI); Indian Society of Theoretical and Applied Mechanics (ISTAM); and Indian Society for Non-Destructive Testing (ISNT).

Djalila Boudemagh[1]*, Saliha Zerdoum[2,3], Tahani Achouak Chinar[4], Souhila Khellaf[1,5]

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Impact of nanotechnology on the human health and environment

Significant research has been done in the past several years to manufacture nanoproducts Nanoscience and nanotechnology can be defined as the sciences and technologies of nanoscopic systems. The fact that nanotechnology is substantially cross-, inter-, and multi-disciplinary sets it apart from other fields of technological study. Despite the novel uses and bright future of nanotechnology, there are worries about its immediate and long-term implications on environmental and human health. Nanoparticles can harm the environment and the human body more than bulk particles because they have larger surface areas than bulk compounds the general population ignores the possible danger of nanoparticles present in consumer items and the environment. In our contribution, we will provide an overview of nanoparticles and their applications. Also, we will discuss the positive and negative impacts of nanotechnology on human health and the environment.

Biography

Djalila Boudemagh is an Associate Professor of chemistry at Ferhat Abbas University in Algeria for 20 years. She studied Chemistry at the Constantine University, Algeria and graduated in chemistry (1994) and Master degree in Chemistry at Mentouri Constantine-1 University (2000). She received her PhD degree in 2010 at Joseph Fourier University, Grenoble, France. She obtained the position of an Associate Professor at the Ferhat Abbas University. She taught in different departments of Chemistry, Process Engineering Biology, and Medicine for 20 years.

Ganesh Gollavelli
Department of Humanities and Basic Sciences, Aditya Engineering College, Surampalem, Jawaharlal Nehru Technological University Kakinada, Kakinada, AP, India

Smart graphene for potable water technology

Synthesis of smart nanomaterials with multi-functionality is highly indispensable to full-fill the need of nanotechnology based applications. In this talk, I would like to discuss about a facile in-situ solid-state microwave induced process to fabricate smart graphene magnetic (SMG) adsorbent for water technology. The SMG structure was well characterized by the spectroscopic and microscopic techniques. The bare SMG possess excellent magnetic property and efficient adsorption capacity for Cr (VI), As (V), Pb (II) and other heavy metals and organic pollutants up to 1 ppb level. The presence of these pollutants are considered to be the most toxic and carcinogenic in the ecological system. The SMG was very efficient to remove 99.9% and shown good recycling capability. The *in vivo* toxicology studies against zebrafish shows its biocompatibility in aquatic system and toxicity towards gram positive and negative bacteria. Apart from this the material has been demonstrated for anti-infectious and anticancer agent. The discovery of green and SMG has a unique capability in environmental and nanomedicine applications has been disclosed.

Audience Take Away

- Learn about 2D carbon materials and its surface chemistry and its green synthesis.
- They can synthesis and characterize the graphene. The audience could able to collaborate with the speaker if they want to establish the same research. The current synthesis method is simple and green. It provides a simple solution for water technology and in Theranostics as an adsorbent and photo-drug to kill cancer and bacteria with very low toxicity.

Biography

Dr. Gaensh Gollavelli studied Chemistry at Andhra University India and graduated as M.Sc in 2006. He then joined the research group of Prof. Yong-Chien Ling's Analytical and Green Chemistry laboratory, National Tsing Hua University, Taiwan. He received his Ph. D degree in 2012 at the same institution. After 3 years postdoctoral fellowship in Taiwan at National Tsing Hua University and National Chiao Tung University, he obtained the position of an Assistant Professor in Addis Ababa Science and Technology University, Ethiopia and currently he is working as an Associate Professor at Aditya Engineering College, Jawaharlal Nehru Technological University Kakinada. He has published 11 research articles in SCI (E) journals and few book chapters.

Nagba Yendoube Gbandjaba[1,2,4*], Noreddine Ghalim[2], Kafui Kpegba[1], Rachid Saile[3], Abdelouahed Khalil[4]

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[4]Faculte de Medecine, Universite de Sherbrooke, Sherbrooke (QC), Canada

Oxidative stress biomarkers measurement and paraoxonase 1 status in moroccan healthy, diabetic and hemodialysis subjects

Paraoxonase 1 (PON 1) enzyme is known to have protective effects on lipid peroxidation. Vitamin E is a chain breaking antioxidant which prevents the cyclic propagation of lipid peroxidation. The aim of the study was to investigate the PON 1 phenotype distribution and to measure oxidative stress biomarkers (Vitamin E/CT, MDA) in healthy, diabetic and hemodialysis patients.

Three hundred subjects (healthy, diabetic and chronic renal failure patients) aged between 40 and 80 years were recruited for the study. Participants were distributed in three groups of 100 subjects each. In each group, subjects were distributed in two groups, as a function of their age: middle-aged subjects, 40<age<60 years (n=147) and elderly subjects, 60≤age<80 years (n=153).

Plasma Vitamin E levels was significantly different in diabetic ($p<0.01$) and chronic renal failure patients ($p<0.001$) when compared to the healthy group. The difference in Vitamin E-Total Cholesterol ratio was also significant ($p<0.001$) when subjects were divided as a function of their health and age (middle-age vs elderly). Total plasma MDA concentration decreases with age in hemodialysis patients ($r= — 0.10$; $p=0.40$) and in healthy subjects ($r= — 0.02$; $p=0.36$). The distribution of PON 1 phenotype in healthy, diabetic and hemodialysis patients was in this order: AA > AB > BB. Adjusted odds ratio comparing the AA variant with the BB variant of PON1 were 1.97 [95 % confidence interval (CI): 0.63-6.21] in hemodialysis patients. In diabetic patients, the adjusted odds ratio comparing the AA variant with the AB variant of PON1 were 1.37 [95% CI: 0.62-3.04].

Decrease in plasma PON1 phenotype distribution may be a marker indicated the susceptibility to cardiovascular diseases complication in healthy, diabetic and hemodialysis patients.

Audience Take Away :

- First, audience will have an big idea about what is exactly oxidative stress and its kind of biomarkers.
- Second, it will be shown what is Paraoxonase 1 (PON 1) and its Arylesterase (ARE) activities? The combinating PON1/ARE activities ratio formula used to assign a phenotype of each participant should be easily understood.
- Third, we will share the results from the PON1 phenotype distribution in Morocco.

Biography

Gbandjaba Nagba Yendoube, World Academic Champion-2017 in Macromolecules, has completed his PhD in Biochemistry from Hassan II University Casablanca Morocco in 2013. He also won the PASRES Prize in 2016 and has joined the University of Lome in Togo as the 2nd Vice President in charge of Communication in the Laboratory of Organic Chemistry and Natural Substances (Lab COSNat). As a student, he develops a good collaboration with Sherbrooke University, Research Centre on Ageing, Sherbrooke (Qc), Canada and the International Pasteur Institute of Morocco. Dr. Gbandjaba is also called the "whistle blower". His research focuses on the development of oxidative stress biomarkers involved in cardiovascular diseases related to successful ageing. Dr. Gbandjaba has published more than 55 pertinent papers in reputed journals, has been serving as reviewer and editorial board member for top rated International journals indexed in Scopus, Web of Science (clarivate), SCI and DOAJ. Dr. Gbandjaba regularly deliver training about how to write and publish a good scientific papers in The West African Chemical Society (SOACHIM) annual meeting for young and senior researchers. After following succesfully the 2019 Associate Programme in Hague, The Netherlands, Dr. Gbandjaba serves as a valuable contact and resource person in the national implementation of the Chemical Weapon Convention (CWC) in Togo for OPCW.

Gunars Bajars[1*], Beate Kruze[1], Inara Nesterova[1], Gints Kucinskis[1]

[1] Institute of Solid State Physics, University of Latvia, Riga, Latvia

Development of nanostructured cathode materials for sodium ion batteries

Energy storage systems made from abundant and environmentally friendly materials are essential for the transition to a sustainable economy. Although lithium-ion batteries (LIBs) are the most popular battery technology today, the increasing demand and low availability of lithium and the use of cobalt and other rare metals raise questions about the sustainability and long-term viability of LIBs power source as the only energy storage solution. The high abundance of sodium and relative similarity to LIBs allow sodium ion batteries (SIBs) to be considered as an alternative to stationary energy storage devices. However, many issues have hindered the widespread adoption of SIB technology, including the relatively low energy density compared to LIBs. Lower energy density electrodes such as $Na_2FeP_2O_7$ are generally cycle stable, while many higher energy density electrodes such as $Na_{0.67}MnO_2$ have shorter lifetimes. In this presentation we show several possible solutions to tailor the composition, structure and morphology of cathode materials thus improving an electrochemical performance of SIBs made of these materials.

The promising cathode material $Na_2FeP_2O_7$ was studied to improve its electrical conductivity, which is often low in the case of sodium pyrophosphates. Solution synthesis was used to prepare pristine $Na_2FeP_2O_7$ and $Na_2FeP_2O_7$/C composite cathode materials for SIBs, using glucose as a carbon source. It is demonstrated that the addition of carbon increases the capacity of electrode with an excellent rate capability. The optimal content of carbon in electrode material was found to be 4.8%. Electrochemical measurements were carried out in 1 M $NaClO_4$ salt in propylene carbonate as electrolyte and show that the addition of 5 wt.% fluoroethylene carbonate solid electrolyte interphase stabilizing additive greatly benefits the rate and cycling performance of $Na_2FeP_2O_7$/C.

$Na_{0,67}MnO_2$ is another compound that is widely studied as cathode materials in sodium ion batteries. Currently polyvinylidene fluoride (PVDF) is the most popular binder choice. In our study, a novel tetrabutylammonium (TBA) alginate binder is used to prepare a $Na_{0,67}MnO_2$ electrode for sodium-ion batteries with improved electrochemical performance. The ageing of the electrodes has been characterized. TBA alginate-based electrodes are compared to PVDF and Na alginate-based electrodes and show favorable electrochemical performance, with gravimetric capacity values higher than measured for the electrode prepared with PVDF binder. TBA alginate-based $Na_{0,67}MnO_2$ electrodes also display good rate capability and improved cyclability and their solid–electrolyte interface is similar to that of PVDF-based electrodes. Overall, we have shown that binder and electrolyte selection can significantly improve the electrochemical properties of electrode materials for SIBs.

The financial support of projects No. 1.1.1.2/VIAA/1/16/166 “Advanced materials for sodium Ion batteries” and No. lzp-2020/1-0391 “Advanced polymer – ionic liquid composites for sodium-ion polymer batteries” is greatly acknowledged. Institute of Solid-State Physics, University of Latvia as the Center of Excellence has received funding from the European Union’s Horizon 2020 Framework Program H2020-WIDESPREAD-01–2016-2017-Teaming Phase 2 under grant agreement No. 739508, project CAMART.

Audience Take Away

- Design of facile synthesis methods for nanostructured composite cathode materials for SIBs.
- Development of electrochemical properties of synthesized cathode materials by design of their composition, structure and morphology thus improving the electrochemical performance of SIBs made from these materials.
- Improvement the electrochemical properties of electrolytes by adding the solid electrolyte interphase stabilizing additives.
- Development of more sustainable electrode materials for SIBs by use of environmentally friendly raw materials and technologies.

Biography

Dr. Gunars Bajars (research articles-77, h-index=7, total citations – 587) studied Chemistry at the University of Latvia (UL) and graduated as MS in 1979. Then he joined the Institute of Solid State Physics, UL, where he is working in a position of Leading Researcher. He received doctoral degree in Physical Chemistry in 1992. The main topics of his interests include electrochemistry (electrolysis, electrodeposition, photocatalysis and sensors), solid state ionics and electrochemical storage devices (lithium and sodium ion battery materials). G.Bajars is an expert in European Commission Batteries Europe Platform WG3 Advanced Materials, Innovation Fund and Horizon Europe projects.

Huan-Li Zhou[1*], Xiao-Yang Zhang[1], Tong Zhang[1]

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Room-temperature valley exciton modulation by surface plasmon interference

Exploiting extra degrees of freedom may extend the capacity of information carriers, which provides a hedge against Moore's law in integrated chips. Quantum interference is a powerful approach to study the nano/molecular scale physics, chemistry and electronics. Manipulating valley electrons and photons in 2-dimensional van der Waals heterostructures has attracted numerous attentions. Previous reports based on direct excitation where the out-of-plane illumination projects a uniform single-mode light spot. However, because of the optical diffraction limit, the minimal spot size must be a few micrometres, which inhibits the precise manipulation and control of excitons at the nanoscale level. Meanwhile, direct irradiation introduced local heating which was destructive for probe materials. To solve these problems, we introduced the in-plane coherent surface plasmonic interference (SPI) field to remotely excite and modulate the valley states. Compared to the out-of-plane light, a uniform in-plane SPI field suggests a more compact spatial volume and an abundance of mode selections for a single or an array of device modulation. The valley degrees of freedom switching between ~±20% were observed experimentally in our achiral plasmonic waveguide-cavity geometry, which were triggered by the phased-controlled SPI field. In addition, the active regain can be compressed into few nanometres by embedding hexagonal boron nitride-tungsten disulphides-hexagonal boron nitride (hBN-WS_2-hBN) heterostructure into a compact plasmonic nanogap nanocavity. This study was aimed at understanding the interaction between complex SPI modes with valley excitons and leading to a new class of optical valleytronic devices for the next generation of faster computing chips.

Audience Take Away

- Proposing remotely triggered method, which can modulate anisotropy valley response in an achiral waveguide geometry by a coherent in-plane illumination condition.
- Establishing a quasi-steady model to calculate the degree of valley polarization of PL emission according to local plasmonic mode distribution.
- Demonstrating a bottom-up fabrication strategy to design and construct the multi-layer heterostructure devices.

Biography

Huan-Li Zhou is now a PhD student at the School of Electronic Science and Engineering, Southeast University (China). His research interests include the modulation of optical and optoelectronic properties at nanoscales through structure and interface engineering of nano-materials.

Kumarasamy Jayakumar[1, 2*], Karthikeyan Chandra Sekaran[1]

[1]Kirand Institute of Research and Development PVT LTD, Tiruchirappalli, Tamil Nadu, India
[2]Department of Agriculture and Engineering, Volcanic Research Organization, Rishon LeZion, Israel

Design and integration of oxide nanomaterials based on electrochemical CO_2 reduction

Carbon dioxide (CO_2) concentrations in the atmosphere have been attributed to the acceleration of global warming. Electrochemical CO_2 to liquid fuels potentially addresses future energy demands and is highly desirable for the establishment of a sustainable civilization. Various studies indicate that using electrochemistry to turn CO_2 into hydrocarbon molecules. Additionally, it reduces the effectiveness of renewable energy utilization to fight climate change and use lead to a long-term and useful technology. The crystalline structure of the porous metal oxide has been functioning as a high-efficiency catalyst, proving that the low current density and absence of selectivity of the transition metal catalyst render it ineffectual. Strategies based on heterogeneous nanostructures material surfaces enable tunable adsorption aspects of various processes and intermediates to tremendous potential, significantly increasing catalytic performance while improving ethanol product selectivity. In order to consider structures for the various issues that can affect processes, chemistry, chemical, mechanical and electrical engineering, environmental science, economics, and government policy must coordinate. Due to several advantages of structural rigidity for catalyst performance, load bearing capacity increases electrolysis. They are concerned about improving the current densities of high-selective products and the long-term structural stability of the catalyst with most of the essential ethanol products. Hydrogen evolution and reactions involving new pathways and an appropriate level of detail are more productive. Electrocatalysis requires extensive understanding of reaction mechanisms, including both theoretical and experimental features. Additional technological improvements under these prospective studies will require complementary solutions capable of mitigating cost requirements higher than the sum of the parts and a feedback loop between multiple system design initiatives. This symposium will highlight the role of nanomaterials and energy-environmental application research.

Biography

Dr. Kumarasamy Jayakumar, Post-doctoral researcher, Department of Agriculture and Engineering, Volcanic Research Organization, Rishon LeZion, Israel. In addition, he received his Master of Science from Annamalai University in India in 2007. He received an M.Phil. in Chemistry from Madurai Kamaraj University, Madurai, Tamil Nadu, India in 2008 and a Ph.D. degree from Alagappa University, Karaikudi, Tamil Nadu, India in 2015. He was a post-doctoral researcher at Pusan National University in Busan, South Korea, from March 2015 to August 2015, and at Nanjing University in Nanjing, China, from 2017 to 2019. He also reviewed national and international journals that were read by a lot of people and gave oral presentations at national and international conferences in India, Singapore, Europe, the UK, and China. In the past five years, he has led to the publication of over eight research articles in worldwide and highly-cited journals. However, the electrochemical published research received 150 citations, had a h-index of eight, and was cited in a single book chapter.

Saurabh Awasthi
Adolphe Merkle Institute, University of Fribourg, Fribourg, Switzerland

Single-particle level characterization of protein aggregation

Protein aggregation is the hallmark of neurodegenerative disorders such as Alzheimer's disease (AD), Parkinson's disease (PD), etc. Early-stage aggregates, i.e., oligomers, are the key toxic species implicated in neurodegeneration, and these early aggregation species are challenging to characterize using conventional methods based on ensemble analysis. The critical challenges in using the conventional approaches such as X-ray crystallography, Nuclear magnetic resonance, and Small-angle x-ray scattering to characterize oligomers are their metastable nature andhigh heterogeneity with regard to both the size and shape in solution. More importantly, since only certain sized and shaped oligomeric species are toxic, the biophysical characterization of oligomers is of great interest in the quest to better understand the structure-toxicity relationship. We demonstrate that resistive pulse sensing using solid-state nanopores (a small, nanometer size hole) enables single-particle characterization of amyloid oligomers in solution in alabel-free manner. Moreover, this approach can resolve the complete aggregation pathway, starting from early-stage low-n oligomers to intermediate-size aggregates and late-stage protofibrils/fibrils. Resistive- pulse sensing allows the determination of the aggregation kinetics of different protein variants. Single-particle characterization of individual oligomeric species will improve the general understanding of the structure-toxicity relationship of such aggregates andfacilitate the drug development to target them.

Audience Take Away

- This presentation will provide an understanding of single-particle level characterization of protein aggregation using solid-state nanopores. Such an approach can be applied to study biophysical properties of proteins in a label-free manner to determine their size, and shape.
- Such an approach can be used to study the complex heterogeneous samples without need of pre-purification. The key advantage of the nanopore-based approach is the possibility of multiparametric analysis such as;
    1. Size and shape estimation.
    2. Concentration (high-sensitivity (upto pM to fM).
    3. Low-sample volume requirements (few µl).
    4. In-solution characterization.

Biography

Saurabh Awasthi is a Group Leader at the Adolphe Merkle Institute, University of Fribourg, Switzerland. He received his PhD from the SASTRA University in 2016 for his work on advanced glycation end products induced structure- function changes in proteins. His current research involves the use of biophysical methods to determine the molecular understanding of the disease by characterizing individual protein molecules and amyloid aggregates. One focus area isthe single-particle analysis of protein aggregation associated with Parkinson's and Alzheimer's disease.

Souhail Dhouib
Higher Institute of Industrial Management, University of Sfax, Tunisia

Optimizing the holes drilling path problem via dhouib-matrix methods

Optimizing the movement of the robot arm in drilling holes leads to increase the productivity through saving time, cost and energy. In the literature, there are different methods that ensure the process of optimization and very recently we have invented the concept of Dhouib-Matrix (DM) which also does. DM gathers several optimization methods (exact, heuristics and metaheuristics). In this presentation, we consider the holes drilling path problem as a Travelling Salesman Problem where the salesman is the robot arm, the cities are the holes and the shortest route cycle for the salesman will be the shortest robot arm movement. Actually, we propose three optimization techniques: 1) the deterministic heuristic Dhouib-Matrix-TSP1 (DM-TSP1) 2) the local search method Far-to-Near (FtN) 3) the novel multi-start metaheuristic Dhouib-Matrix-4 (DM4). The performance of the proposed methods is proved on several standard Printed Circuit Board (PCB) instances (from TSP-LIB). Figure 1 graphically illustrates the drilling path for the *u159* problem using DM4.

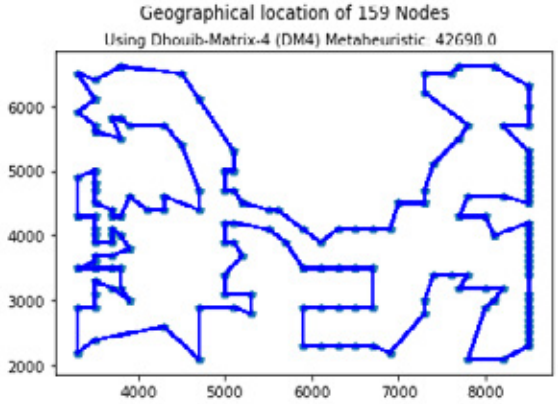


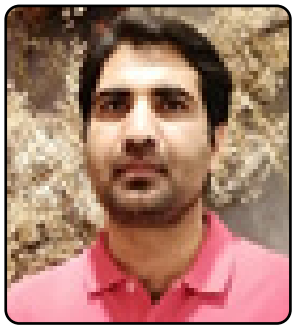
Figure 1 Graphical Presentation of drilling path on PCB

Audience Take Away

- New optimization methods.
- Find a practical solution to increase the productivity of drilling holes.
- Will improve in time, accuracy and cost.

Biography

Souhail Dhouib is a full Professor at the University of Sfax, Tunisia. His teaching and research interests are related to the areas of Decision Science, Computer Science and Management Science. He is the inventor of Dhouib-Matrix concept which gathers several optimization methods: heuristics (Dhouib-Matrix-TSP1, Dhouib-Matrix-AP1, Dhouib-Matrix-TP1 etc.) and metaheuristics (Far-to-Near, Dhouib-Matrix-3, Dhouib-Matrix-4 etc.).



Waqar Ahmed
Takasago i-Kohza, Malaysia-Japan International Institute of Technology, Universiti Teknologi Malaysia, Kuala Lumpur, Malaysia

Experimental study on heat transfer improvement in a circular passage using Metal Oxide and Ethylene Glycol based well stable nanofluids

Zinc Oxide @ Glycol based nanofluids was prepared using the ultra-sonochemical technique and 2 step methods. The heat convection characteristics of as prepared nanofluids were observed for a closed single conduit in turbulent flow regimes. The prepared nanofluids were characterized for UV-vis, FTIR, XRD, FESEM, and TEM analysis to confirm the accurate synthesis of ZnO nanoparticles. Analytical data related to heat transfer properties of the synthesized nanofluids for the heat exchanger, incorporated with the conduit test section were collected. The addition of ZnO solid nanoparticles in the Ethylene Glycol enhanced the value of thermal conductivity and other thermo physical characteristics of the nanofluids. Supreme thermal conductivity was recorded at 45 C for using 0.1 wt.% of Zinc Oxide @ Glycol based nanofluids. Adding more wt.% of the ZnO solid nanoparticles in the Ethylene Glycol increased the thermal conductivity subsequently with variations in temperature from 20 to 45ºC. Furthermore, Nusselt numbers of Zinc Oxide @ Glycol based nanofluids were calculated at different wt.% of ZnO present in Ethylene Glycol base fluid. The occurrence of ZnO nanoparticles into the Ethylene Glycol base fluid intensify the Nusselt (Nu) number by 51.5%, 43.79%, 38%and 24.06% for 0.1 wt.%, 0.075 wt.%, 0.05 wt.% and 0.025wt.% concentrations, respectively. Varying wt.% of ZnO(0.1 wt.%, 0.075 wt.%, 0.05wt.%). The absolute average heat transfer of Zinc Oxide @ Glycol based nanofluids using at the highest concentration of 0.1 wt.% was enhanced compared to the Ethylene Glycol base fluid. The magnitude of absolute average heat transfer was increased from 600 W/m^{2}k for the EG@DW mixture to 1292 W/m^{2}k for Zinc Oxide @ Glycol based nanofluids. Correspondingly, the heat transfer development at the other three(0.075 wt.%, 0.05 wt.%, and 0.025 wt.%) was observed as 600–1167, 600–1010 and 600–970 W/m^{2}k, respectively, which is superior to pure Ethylene Glycol base fluid.

Audience Take Away

- To study the preparation of nanofluids using solid nanoparticles.
- Study of varying thermal properties and stability of nanofluids.
- How nanofluids could be the suitable choice for heating and cooling in industry.
- Study the effects of the varying shape of the heat exchanger on heat transfer improvement.

Biography

Waqar Ahmed had done his Ph.D. degree in Materials Physics (Distinction + GOT Excellence award with 10 ISI papers +1 Patent) from the University of Malaya world QS ranking 65 in 2021. As a Ph.D. researcher at the Institute for advanced studies at the University of Malaya, he have led his research activities to synthesize the metal oxides, graphene, carbon nanotubes, and their binary and ternary composite for energy-related varying applications like (Energy storage, sensors, energy transportation, heat, and mass transfer, heating and cooling of electrical and electronic systems) which helps in solidified my interest in the area of materials and nanofluids.

Xiao-Mei Xue[1,3*], Xiao-Yang Zhang[1,2,3], Tong Zhang[1,2,3]

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[2]Joint International Research Laboratory of Information Display and Visualization, School of Electronic Science and Engineering, Southeast University, Nanjing, 210096, China

[3]Suzhou Key Laboratory of Metal Nano-Optoelectronic Technology, Suzhou Research Institute of Southeast University, Suzhou, 215123, China

A resonator based on silicon nitride waveguide for integrated optical gyroscope

Sagnac effect based resonant integrated optical gyroscopes (RIOG) that integrated multiple discrete building blocks at micro and nano scale attracts considerable attentions in the fields of the inertial navigation, robots, medical diagnosis, and consumer electronics due to the advantages of the high precision and the low cost, size, weight, and power. The sensitivity improvement is always the pursuit of the gyroscope, which is fairly related to the performance of the core sensing element resonator. Generally, an effective approach to ameliorate the resonator is to decrease the losses in resonator mainly including propagating loss and bending loss. Notably, silicon nitride (Si_3N_4) waveguide with ultra-low propagating loss and nanoscale size for core layer is an outstanding platform to construct high dense integrated optical components and circuits, which is expected to be applied in gyro for the improvement of performance. Here we proposed and studied an integrated resonator based on Si_3N_4 optical waveguide and further constructed the resonant optical gyroscope. Specifically, the structural parameters such as diameter, coupling ratio, and propagating loss were investigated and optimized to achieve high performance resonator and RIOG. The results indicated that the demonstrated resonator was provided with the quality factor of 1.27×10^8, and RIOG can realize excellent limited sensitivity. Moreover, the practical performance of the resonator based on Si_3N_4 depends on the fabrication process. Preliminary experiments including the preparation and the measurement of the Si_3N_4 based resonator were carried out to build the foundation for the development of the RIOG based on Si_3N_4 waveguide. The proposed RIOG possesses great potential for the further performance improvement of the gyroscope.

Audience Take Away

- Propose an integrated optical resonator with high quality factor
- Exhibit an integrated resonant optical gyroscope with good performance
- Show the preliminary preparation and measurement of the Si_3N_4 based resonator

Biography

Xiao-Mei Xue is now a PhD student in the School of Instrument Science and Engineering, Southeast University, China. Her research focuses on the integrated nanophotonic devices based on silicon nitride waveguide and surface plasmon polaritons waveguide.

KEYNOTE FORUM

DAY 02

5TH EDITION OF

WORLD NANOTECHNOLOGY CONFERENCE

21-22 SEPT

Thomas J. Webster

School of Health Sciences and Biomedical Engineering, Hebei University of Technology, Tianjin, China

Can nano biomaterials save global warming?

Although not receiving much attention, the manufacturing and use of biomaterials has caused a significant environmental impact. Whether from the use and discard of polymeric catheters to the plastics used during in vitro testing, it is clear that biomaterial use, synthesis, and research is responsible for global warming. The same can also be said for metals, where many of today's metallic biomaterials (titanium, stainless steel, etc.) leave a large environmental footprint. This presentation will discuss how nanotechnology is being used to reduce the environmental impact of today's biomaterials. Specifically, it will introduce how cells can be used to make nanoparticles without resorting to the use of toxic chemicals used during conventional nanoparticle synthesis. It will also discuss how natural materials are being used as next generation improved biomaterials. The invited talk will also cover how such "green nanomedicine" is not only reducing the impact on the environment but is also creating more effective biomaterials to promote tissue growth, reduce infection, and inhibit inflammation.

Audience Take Away

- How nanotechnology is being incorporated into biomaterials.
- How nano biomaterials can be manufactured with minimal to no impact on the environment.
- How nano biomaterial synthesis differs from traditional material synthesis which leaves a large environmental footprint.
- How nano biomaterials not only reduce the impact on the environment but also improves tissue growth, inhibits infection, and reduces inflammation.

Biography

Thomas J. Webster's (H index: 111; 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. 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); and is a fellow of over 8 societies.

D. R. Patil*, Snehal D. Patil, Harshal A. Nikam

Bulk and Nanomaterials Research Laboratory, Department of Physics, R. L. College, Parola, Dist. Jalgaon, MHS, India

Engineering of bulk and nanomaterials for smart sensing of gas, light and food freshness

There is a strong interest and need in the development of wide band gap (~ 3.4 eV) semiconductor sensors, for the detection of toxic, hazardous, combustible and inflammable gases. They are utilized for security, safety, food freshness, light detection and ranging, medical diagnosis and monitoring environmental pollution. Nowadays, available traditional type semiconducting gas sensors have major problems. Many international leading industries viz. Figaro Engineering Inc, Sierra Monitors Inc, IST, etc., already fabricated the gas sensor models. However, few of them have limitations of sensing the gases below Threshold Limit Value, high cost, difficulties in availability, etc. Most of the researchers are taking efforts in developing the sensor models. For large applicability to Laymen, features of the sensors must be improved, viz. high response at trace level of the gas (ppm, ppb or even sub-ppb level), quick response-recovery profile, longer life time, long-term stability, high selectivity to a particular gas among the mixture of gases, low cross sensitivity, sensor location judgment, low cost, low power consumption, portable in size, etc. These features mainly depend on and co-related with crystallite size, thickness of sensor, nature of additives and their concentrations, microstructures and nanostructures, temperature, etc. The efforts are made in the said direction to develop the smart sensors from bulk and nanomaterials, viz. ZnO, Bi_2O_3, SnO_2, MnO_2, ZrO_2, etc.

Also, nowadays, people have very busy schedule and they prefer the foods and junk foods in readily available packets. The packets are not stored as per the directions of food storage technology. As a result, the foods are degraded in somewhat proportions. On consumption of such degraded foods, people may suffer from diarrhoea, indigestion, stomach disorders, vomiting, acidity, headache, body ache, food poisoning, etc. So, it is today's need to detect the degree of degradation of such readily available foods in the markets.

Nanostructured material composites were synthesized by disc type ultrasonicated microwave assisted centrifuge technique. The electrical behavior, gas sensing and food freshness of such nanocomposites have been investigated in our laboratory. The efforts are made to develop the sensors monitoring food freshness at low cost. The quick response and fast recovery are the main features of this sensor.

Audience Take Away

- Audience will be able to learn about the engineering of bulk and nanomaterials, its applications in the field of gas sensing in detail and concept regarding light detection and food freshness detection in short.
- Audience will introduce the pollution control, if they know well about the gas sensing, they will be made aware about the hazardous effects of toxic and polluting gases. Audience will be alert in their job from getting knowledge from this presentation. Sure, other faculties or researchers will be able to use this technology in their study, teaching and research. I will help them those who want to do the further work at totally free of cost.

Biography

Dr. D. R. Patil is the Recognized Research Guide and Director Head of the Bulk and Nanomaterials Research Laboratory, Parola, India, Life Member of Indian Science Congress Association Kolkata, Indian Association of Physics Teachers Dehradun, Society for Materials Chemistry BARC Mumbai, Crystal Research Society, Chennai, Asian Council of Scientific Editors Dubai, Full Member of American Nano Society, etc. His topics of interest are: semiconducting and ceramic gas sensors, photoconducting and photo luminescent materials, nanomaterials, thin and thick film Physics, food freshness, disease diagnosis, etc. He is working as a reviewer for the most reputed journals from Elsevier, ACS, etc. as well as for few international events. Numbers of research scholars across India are working in his laboratory under his supervision. He delivered more than 70 scientific talks in various national and international events. He is fully engaged in research activities in nanotechnology. He is working as the regional editor of the journal "Current Nanotoxicity and Prevention", USA, Senior Editor of IJRST, India, and TPC member and Reviewer of various international events at USA, Italy, South Korea, Spain, India, etc.

Hai-Feng Ji

Department of Chemistry, Drexel University, Philadelphia PA 19104, USA

Red and black phosphorus nanomaterials

Dr. Hai-Feng Ji will present a summary of some optoelectronic applications of red and black phosphorus nanomaterials. The synthesis, characterization, stability improvement of the materials will also be discussed.

Biography

Dr. Hai-Feng (Frank) Ji is currently a professor of Department of Chemistry, Drexel university. His research interests focus on MEMS devices, nanomaterials for energy and environmental applications, drug discovery, nanopillars and phosphene for energy applications, and surface chemistry. He is currently a co-author of 200 peer-viewed journal articles and book chapters. He has an H-index of 40. He is an editorial board member of several chemistry journals.

SPEAKERS

DAY 02

5TH EDITION OF

WORLD NANOTECHNOLOGY CONFERENCE

21-22 SEPT

Peilong Hong[1*] and Willem L. Vos[2]

[1]School of Optoelectronic Science and Engineering, University of Electronic Science and Technology of China (UESTC), Chengdu 611731, China

[2]Complex Photonic Systems (COPS), MESA+ Institute for Nanotechnology, University of Twente, P.O. Box 217, 7500 AE Enschede, The Netherlands

Toward manipulating light scattered by a single nanoparticle: a scattering-eigenchannel analysis

The control of the nanoparticle scattering is key for many applications such as lasing and nonlinear optical interaction at the nanoscale. In this talk, I will discuss the possibility to manipulate light scattered by a single nanoparticle through wavefront shaping via theoretical and numerical analysis. Wavefront shaping was previously used to control interference of light through opaque random media composed by a large number of scattering nanoparticles, but it is still an open question that whether wavefront shaping is also available for controlling light scattering of a single nanoparticle. To answer this question, we employ scattering matrix to describe the scattering process of a single nanoparticle. By further analysing the scattering eigenchannels of the scattering matrix, we find that a single nanoparticle hosts more than one strongly scattering eigenchannel. This intriguing finding indicates that wavefront control on the incident light is capable of manipulating scattered light from a single nanoparticle. Besides, we also find that these scattering eigenchannels are related to different resonant leaky modes of the nanoparticle. Moreover, by analysing the spectra of these highly scattering eigenchannels, both the short range and the long range correlations are found playing an important role in the spectra. Our analysis on the scattering eigenchannels offers new perspectives on the manipulation of light scattering by a single nanoparticle, showing that wavefront shaping is efficient for the manipulation of nanoparticle scattering and relevant applications.

Audience Take Away

- A single nanoparticle hosts multiple scattering eigenchannels, of which some exhibit strongly scattering.
- Light scattering of a single nanoparticle can be manipulated by wavefront control on the incident light.
- By selectively exciting the strongly scattering eigenchannels, light is coupled into different resonant leaky modes of a single nanoparticle.

Biography

Dr. Peilong Hong received his BS and PhD degree from the NanKai University in 2009 and 2014, respectively. His current research interests include modulation of optical field, optical imaging, and nonlinear nanophotonics. He has published more than 20 research articles in peer-reviewed journals.

Lina Fu[1]*, Haiyin Zou[2], Lixia Huang[3], Ying Li[4], Guang Yang[5]

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[3]Hubei Key Laboratory of Purification and Application of Plant Anti-Cancer Active Ingredients, School of Chemistry and Life Sciences, Hubei University of Education, Wuhan, Hubei, China

[4]Center for AIE Research, College of Materials Science and Engineering, Shenzhen University, Shenzhen, Guangdong, China

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In situ preparation and characterization of bacterial cellulose/chitosan composites

Bacterial cellulose (BC), more recently referred to as bacterial nanocellulose (BNC), or microbial cellulose (MC), has been reported as an ideal scaffold for wound repair and tissue regeneration. BC, a natural three-dimensional nano-biomaterial fabricated via microbial fermentation with a fiber diameter around 14 nm, distinguishes itself from cellulose derived from other sources mainly by its purity, crystallinity, mechanical strength, three-dimensionality, high water holding capacity, and good biocompatibility. BC is found to be an effective transdermal carrier and drug delivery system, as well as bioscaffolds in the repair and regeneration of skin, blood vessel, cornea, heart valve, urethra, nerve, bone, cartilage, and knee menisci. Chitosan (CS), as a native alkali polysaccharide with non-toxic, biodegradable, and biocompatible properties, is well known to deliver drugs, proteins, and genes. An *in situ* preparation method was used to biosynthesize BC/CS composites. The results revealed that chitosan could be wrapped in a network of BC during its biosynthesis. The *in situ* composites formed cohesive gel structures in scanning electron microscopy (SEM) images. Differential scanning calorimetry (DSC) results indicated that the recrystallization temperature shifted to a lower temperature in the composites than that in plain BC. X-ray diffraction (XRD) analysis indicated that the highest degree of crystallinity occurred when the medium contained 2% chitosan. The *in situ* nanocomposites of BC/CS are promising for delivery systems in biomedical and pharmaceutical applications. From biosynthesized nanofibers using fermentation to synthesized nanofibers using micro/nano fabrication, our research aims to heal damaged skin tissues and applies in tissue engineering and nanomedicine.

Audience Take Away

- The *in situ* composites of BC/chitosan were obtained forming a homogeneous and cohesive gel structure, by adding different chitosan to culture media.
- Due to the antimicrobial property of chitosan, the BC production decreased slightly with the increasing concentration of chitosan.
- The highest crystallinity was obtained in the *in situ* BC/2% CS composites.
- Via ionic conjugation of various therapeutic molecules, the *in situ* composites have a great potential for drug/growth factor delivery systems for wound healing.

Biography

Under the supervision of Prof. Guang Yang, Dr. Fu studied Microbiology at the Department of Biomedical Engineering, Huazhong University of Science and Technology, China, and graduated as a Ph.D. in 2012. After a three-year postdoctoral fellowship supervised by Prof. Wankei Wan at the Department of Chemical and Biological Engineering, Western University, Canada, she then joined the Holland Regenerative Medicine Program, the University of Nebraska Medical Center, U.S.A. Dr. Fu worked at Duke University, U.S.A. as a Research Analyst and the University of British Columbia, Canada as a Research Associate. She obtained a lecturer position at Huanghuai University in 2021.

Pooja Yadav

Jawaharlal Nehru Aluminium Research Development and Design Center, Wadi, Nagpur, India

Alumina based nanomaterials

High purity alumina (HPA) is a processed premium non-metallurgical alumina product characterized by its purity level- i.e. 99.9% (3N), 99.99% (4N), and so on. Recently world demand for high purity alumina has gained incredible traction, owing to growing technological advancements and increasing demand from applications namely LED bulbs, electronic displays, automotive, and medical.

The present work focuses on preparing the α-phase of 3N pure nano-alumina from aluminum foil using an alkoxide process. The high-purity aluminum alkoxide is synthesized from aluminum foil and alcohol, and hydrated alumina is produced by hydrolysis of alkoxide, and finally, high purity alumina is obtained by calcination. XRD studies showed that α-alumina was obtained by calcining hydrated alumina at a high temperature of 1200^{o}C after the rearrangements of oxygen packing. Ideally, the α-phase of alumina was obtained after calcination of hydrated alumina via different intermediate phases. The complete phase transition to the thermodynamically stable phase of alumina (α-phase) strictly depends on the control of hydrolysis conditions as well as uniformity of temperature distribution during calcination. Micrographs of 3N powder showed nano-size particles resulting in higher surface area and this kind of mesoporous structure could be suitable for various applications i.e adsorption and catalysis. The cost-benefit analysis for the preparation of alumina by both routes revealed that the alkoxide method proves to be an economical route to get highly pure alumina with controlled conditions of hydrolysis, drying, and calcination.

Audience Take Away

- Alumina preparation by alkoxide method.
- Nano alumina preparation method.
- Applications of nano alumina in various fields.

Biography

Dr. Pooja Yadav has done her B.Sc., M. Sc., and Ph.D. in Electronics from RTM Nagpur university. She is engaged in both teaching and research, she has more than 13 years of teaching experience in the UG and PG departments. She has got the Women Scientist award from DST and DSKPDF award from UGC for her research work. She has published more than 57 research papers in international journals & conferences. She has one international patent published in her account. She has assisted in two books published with ISBN numbers. She has worked in four major research projects funded by DST, BARC, ICMR, etc. Presently she is working on High Purity Alumina preparation in JNARDDC, Nagpur.

Dedhila Devadathan
Department of Physics, Sree Narayana College/(University of Kerala), Kollam, Kerala, India

Metal oxide nanoparticles and nanocomposites as photocatalysts and adsorbents

Industrialization and urbanization have seriously led a high threat to public health and environment. Industrial effluents contain huge waste including organic dyes and heavy metal ions which generally has hazardous effects. So, it was essential to find a new way to remove these harmful materials from reaching environment. The various conventional technologies currently employed in the removal of effluents in industrial water are classical and do not lead to complete removal of these pollutants. The novel treatment methods that are more effective when compared to other conventional methods led to the development of photocatalysis and adsorption. Of all the known methods, photocatalysis has proved to be one of the most effective methods for the removal of organic dyes and adsorption for the removal of heavy metal ions. Metal oxide nanoparticles and their nanocomposites are found to be interesting for their remarkable properties and also a good candidate for these applications. Nowadays fabrication of composite structures and devices with materials capable of enhancing the properties of the component materials and also show new synergetic properties when compared with the combined materials are becoming important. In this presentation various synthesis routes used for the preparation of metal oxides and their nanocomposites will be discussed. Comparison of the structural and optical characterization of the nanocomposites with the counter parts and also the application of these nanoparticles and nanocomposites as photocatalyst and as adsorbents will be discussed. In case of photocatalytic studies, the various factors affecting the process such as contact time, concentration of dye solution and photocatalyst dose will be discussed and in case of adsorption studies the factors affecting the process such as contact time, pH, concentration of adsorbates, adsorbent dose, agitation speed and temperature were also investigated and compared which will be discussed here. Studies showed better results for the nanocomposites when compared to their counter parts.

Audience Take Away

- Preparation of metal oxide nanoparticles and nanocomposites.
- Comparing the structural and optical characterizations of nanocomposites with counter parts.
- How these nanoparticles and nanocomposites can be employed as photocatalysts?
- How these nanoparticles and nanocomposites can be employed as adsorbents?
- Comparing the results of nanocomposites and nanoparticles as photocatalyst and as adsorbents.

Biography

Dr. Dedhila Devadathan has completed her Master of Philosophy from Madurai Kamaraj University, Madurai, Tamil Nadu, India, also qualified GATE and NET. Currently working as Assistant Professor in Physics, Department of Physics, Sree Narayana College, Kollam, Kerala. She did her research under guidance of Dr. R. Raveendran and got doctorate degree from University of Kerala. She has presented research works in number of national and international seminars and conferences and also published many research papers. Currently students are doing research under her guidance. Her research interest includes areas of Nanoscience, Materials Science, Conducting Polymers, etc.

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Dopamine sensor based on coreshell polyparaphenylene diamine/titanium dioxide/multiwalled carbon nanotube nanocomposite

Polymer nanocomposites based on conducting electroactive polymers with nanoparticle fillers have acquired a lot of interest in recent years due to their highly desired multifunctional properties. In the diagnosis of many mental illnesses, an accurate and sensitive assessment of dopamine as a biomarker for ailments like Parkinsons, is critical. As dopamine coexists with other high-concentration biomolecules in biological samples, determining it remains difficult. In this regard, a novel nanocomposite has been synthesized and analysed. P-phenylenediamine was polymerized, and composites were prepared by adding TiO_2 and multiwalled carbon nanotube into the polymer with magnetic stirring. Analytical techniques such as UV-Vis, FT-IR, and FE-SEM were used to characterize these nanocomposites. For in vivo detection of dopamine, the novel electrochemical biosensor based on poly paraphenylenediamine and titanium dioxide decorated multiwalled carbon nanotubes was coated on GCE, and the constructed sensor was found to have sensitivity with a linear range of 4.76×10^{-6} – 3.81×10^{-11}M and a limit of detection as low as 9.45×10^{-12}M.

Keywords: Nano composites, para phenylenediamine, titanium dioxide, Multiwalled cabon nanotube, dopamine.

Audience Take Away

- Audience will get to know how the composite was analysed and used as sensor.
- The presented work is highly useful and provides a good method of detecting Dopamine levels.
- The audiences are exposed to the various techniques of characterization.

Biography

Dr. Jessica Fernando studied Chemistry at V. O. Chidambaram College, Thoothukudi. She then joined the same institution as Assistant Professor. She received her PhD degree in 2016 at the same institution. She has published a few papers and doing research in electrochemistry.

Anil Ramdas Bari[1]* and Prapti Anil Bari[2]

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[2] Kavayitri Bahinabai Chaudhari North Maharashtra University, Jalgaon, Maharashtra, India

Nanocrystalline ZnO: Chemical sensor

Ultrasonic atomization technique is used for the preparation of nanostructured ZnO powders. These powders were characterized using XRD, SEM, TEM and elemental analysis using EDAX. Furthermore this nanostructured ZnO powder is used to prepared thick films using screen-printing techniques. Thick film is used as sensor to test the conventional gas and simulant of highly toxic chemical warfare agents. It was observed from XRD and TEM that the powder consisted of nanocrystallites with sizes less than 20 nm. It was confirmed from TEM analysis that the crystallites were nearly spherical in shape. The thick film sensor showed maximum response to NH_3 and DMMP.

Audience Take Away

- Conventional gases and Simulants of highly toxic Chemical Warfare Agents.
- Preparation of Nano Powder using Ultrasonic Atomization Technique.
- Fabrication of thick film Sensor.
- Gas and CWA sensing performance.

Biography

Dr. Anil Ramdas Bari has completed his PhD at the age of 30 years from Kavayitri Bahinabai Chaudhari North Maharashtra University, Jalgaon. He is the Head of Department of Physic, IQAC/NAAC Coordinator and NSS Programme Officer of Arts, Commerce and Science College, Bodwad. He has published more than 50 papers in reputed journals and presented more than 80 research papers in seminars, conferences and workshops and over 100 on online mode. He attained more than 120 online webinars. He has been serving as an editorial board member of reputed journals. He has participated as an Organizing Committee Member in the Scientific Committee of 17 conferences and associations as well as served as a reviewer in a wide range of National and International Journals. He has been given Keynote Speech at 03 the International Conferences. He has chaired the sessions of the International Conferences and member of various scientific societies. He has organized 04 online national conference /seminar and workshops. His Scopus h-index is 12, Google Scholar h-index is 16 and Google Scholar i10-index is 21. Profile is listing under category Research Excellence in RSquareL by Global Academician & Researcher Network (GARNet) RSL ID: RSL 032and Recognized as Fellow Member of RSquareL by Global Academician & Researcher Network (GARNet). He is an Executive Member of the Board of Studies, Maharashtra State Bureau of Textbook Production and Curriculum Research (Balbharti), Pune. He is an Academic Counselor: Indira Gandhi National Open University, New Delhi. He has been awarded with Platinum Medal and Ledaership Certificate by Samabhand Foundation for noteworthy efforts in promoting the SPIT FREE INDIA MOVEMENT through NSS to prevent the spread of COVID-19. Under my Leadership Our College is awarded One District One Green Champion Award by Mahatma Gandhi National Council of Rural Education, Department of Higher Education, Ministry of Education, Government of India., 13th August 2021. Best Teacher Award is given by Chalo Kuch Niyara Karte Hai Foundation, India on 5th Sept. 2022.

J. Bagyalakshmi
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Evaluation of antidiabetic activity of aqueous extract of bark of *pterocarpus marsupium* silver nanoparticles against streptozotocin and nicotinamide induced type 2 diabetes in rats

Diabetes Mellitus is fast gaining the status of a potential epidemic in India with more than 62 million diabetic individuals currently diagnosed with the disease. It is predicted that by 2030 diabetes mellitus may afflict up to 79.4 million individuals in India, while China (42.3 million) and the United States (30.3 million) will also see significant increases in those affected by the disease. Most plants contain carotenoids, flavonoids, terpenoids, alkaloids, glycosides and can often have anti-diabetic effects. The main purpose of this research work was to formulate silver nanoparticles with *Pterocarpus marsupium* Roxb. And evaluate against streptozotocin and nicotinamide induced type 2 diabetes in Wistar rats. This research work was pursued using green chemistry since it is an eco-friendly & environmentally accepted procedure. *Pterocarpus marsupium* silver nanoparticles are subjected to *in vitro* and *in vivo* anti-diabetic study to confirm anti-diabetic activity. The results suggested that Pterocarpus marsupium silver nanoparticle has more favorable reduction in lipid level in STZ and nicotinamide - induced diabetic rats, compared with glibenclamide as well as regeneration of ß-cells of pancreas.In conclusion it may be stated that, there occurs a significant ($P<0.01$) decrease in the hyperglycemic state after the administration of Pterocarpus marsupium silver nanoparticle which reduce the severity of oxidative and acuity of hyperglycemia, a process that closely linked to glucose oxidation and formation of free radicals.

Biography

Dr. J. Bagyalakshmi is at present serving as Professor at College of Pharmacy, Department of Pharmaceutics, Sri Ramakrishna Institute of Paramedical Sciences, Coimbatore, Tamil Nadu, India. She has completed B.Pharm (1989-1993), M.Pharm (1994-1996) and was awarded Ph.D in 2008 at Annamalai University, Chidambaram, India. Her area of research includes, Green synthesis of nanoparticles and its interaction studies, Transdermal therapeutic systems, Gastro retentive delivery systems, Colon targeting, Bilayer tablet formulation, Residue determination of dimethoate in fruits, vegetables, Estimation of synthetic colorants in selected food stuff, *In-Vitro* Drug-Drug, drug- food Interaction studies & pharmacokinetic interaction studies. She is a member of the Editorial board of various journals like International journal of Pharmacy and Chemistry, Data Mining: Approaches to Drug Discovery. She has published around 55 research articles in various reputed National and International Journals including two review articles. She bagged "The Best Paper Award" for scientific paper entitled "Study of pharmacokinetic evaluation of rosiglitazone in the presence of other oral hypoglycemic antihypertensive and hypolipidemic drugs" at the Poster Session of Indian Congress of Pharmacy and Pharmaceutical Sciences, 2010. She has participated in more than 60 Conferences and Presented Posters in International Conferences and undergone training in Formulation Department in Hindustan Antibiotics Ltd., Pimpri, Pune and One day training on "Shimadzu LCMS-MS" - Spinco towers, Customer support center, Chennai. She has delivered talks in her area of expertise and organized several pharmacy conferences in various capacities. She has been an invited speaker in World congress on Pharmacology-2019 Drug Discovery and Development held at J .Tata Auditorium, Indian Institute Of Science, Bengaluru. She had attended several workshop like National workshop on Cosmetic standard, regulation and control; a growing need; Sponsored by WHO – India, Country Office, 16th Nov 2007 and Two day workshop on "Smart lifelong learning in pharmacy" organized by Indian Association of Colleges of pharmacy, Chennai, Savera Hotel, Mylapore, Chennai, Sep 21st & 22nd, 2016. She is a life member of Indian Pharmaceutical Association, Life Member – Indian Pharmacy Graduates Association, New Delhi, (No: 990), Life Member – APTI (No: TN/LM-255).

Dr. Sushil Kumar Upadhyay

Assistant Professor, Department of Biotechnology, MMEC, Maharishi Markandeshwar (Deemed to be University), Mullana-Ambala (HR)-133207, India

Nanotechnology: Scopes in strategic combating of COVID-19 pandemic

The coronavirus disease-2019 (COVID-19) is a global pandemic which has not been seen in recent history, leaving behind deep socioeconomic damages and huge human losses with the disturbance in the healthcare sector. There are number of NP-based diagnostic systems have been reported for coronaviruses (CoVs) and specifically for SARS-CoV-2. However, extensive studies are still necessary and required for the nanoparticle (NP) based therapy. The present discussion has highlighted the different traditional therapeutic techniques, along with the potential contribution of nanomedicine against the severe acute respiratory syndrome corovirus-2 (SARS-CoV-2). Repositioning of the drugs such as remdesivir and chloroquine, is a rapid process for the reach of safe therapeutics, and the related clinical trials have determined effects against COVID-19. Various protein based SARS-CoV-2 vaccine candidates have successfully entered clinical phases, determining positive results. The possible nanovaccines usually focused on the antigenic properties of spike (S) protein and might be possible to become approachable, feasible and promising techniques in lowering the net viral burden.

Audience Take Away

- Potential therapeutic nonotechniques in combating the SARS-CoV-2, in terms of diagnosis and cure.
- The repositioning of the potential available drugs for the safe and swift determined therapeutics against COVID-19.
- Various spike (S) protein based SARS-CoV-2 vaccine in the form of nanovaccines have successfully entered in clinical phases with determinate positive results.

Biography

Dr. Sushil Kumar Upadhyay is Assistant Professor Biotechnology at Maharishi Markandeshwar (Deemed to be University), India with 14+ years of rich teaching-cum-research experience in Parasitology, Nanobiotechnology & Microbiology. Dr. Upadhyay has received about 2 dozens of awards including Bharat Jyoti award, Bharat Shiksha Gaurav Puraskar, Best Teacher award, Paryavaran Shri Samman, Paryavaran Ratna Puraskar, Vigyan Ratna Puraskar and felicitated many Fellow awards as FISEC, FSESc, FSSc, FSLSc, FISCA, FZSI, FAGEM, FHSI, FMERC, FBS, FSEZR, FIAZ, FGESA, FI2OR, FGT, FSAN, FSASS, FAELS, FSOE, FSSN, FABRF, FISDS (Japan), FLS (London) in yesteryears. Dr Upadhyay has served as Special Officer WCCB GoI, Global Goodwill Ambassador India (Humanitarian), Sustainable Cosmos Ambassador GTS in past years. His research skill is excellent, published 9 patents, 32 books and 145 research articles in high impact journals, and actively participated in around 285 conferences also. His contribution for economic empowerment to youths at grassroots level for livelihood and sustainability by mission “lab to land transfer of science and technology” and vision “earn as you learn” is also remarkable and can’t be ignored. Dr. Upadhyay is an ideal teacher and his hard work inspires students to achieve their goal be ‘SMART’ [S=Specific, M=Meaningful, A=Achievable, R=Relevant, T=Time-bound].

Bashir Jarrar
Jerash University, Jordan

Potential risk of gold nanoparticles to human health

Background: Gold nanoparticles (Au NPs) are used in many applications together with avariety of industrial purposes with potential risk to human health.

Objective: The present study aimed to find out the histological, histochemical and ultrastructural alterations that might be induced by Au NPS in the vital organs.

Methodology: Wistar Albino rats (*Rattus norvegicus*) were subjected to 10 nm Au NPs ata daily dose of 2 mg/kg. Liver, kidney, heart and lung biopsies from control and Au NPs- treated rats under study were subjected to histocytological examinations.

Findings: In comparison with the control animals, the renal tissue of Au NPs-treated rats demonstrated glomerular congestion, interstitial inflammatory cells infiltration, renal tubules hydropic degeneration, cloudy swelling, necrosis and hyaline casts precipitation. In addition, subjection to Au NPs induced the following hepatic alterations: Hepatocytes cytolysis, cytoplasmic vacuolation, hydropic degeneration and nuclear alterations together with sinusoidal dilatation. Moreover, the heart of the treated rats demonstrated myocarditis, cardiac congestion, hyalinosis, cardiomyocytes hydropic degeneration, myofiber disarray and cardiac congestion. The lung of Au NPs-treated rats also exhibited the following pulmonary alterations: electasis, emphysema, inflammatory cells inflammation, thickened alveolar wall, pulmonary interstitial edema, congestion, hypersensitivity, fibrocytes proliferation and honeycombing.

Conclusion: Exposure to Au NPs can induce histological, histochemical and ultrastructural alterations in the vital organs that may alter the function of these organs. Additional efforts are needed for better understanding the potential risk of Au NPs to human health.

Biography:
Prof. Bashir M. Jarrar is working at Jerash University, Jordan. He has specialization in Nanobiology and Environmental Eco-nanotoxicity fields.

D. Rogala-Wielgus[1*], B. Majkowska-Marzec[1] and A. Zieliński[1]

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Mechanical properties of coatings composed of several nanostructures deposited on Ti and Ti13Nb13Zr alloy

The multi-wall carbon nanotubes (MWCNTs) coatings with nanostructural additions, such as nanocopper and titania, were electrophoretically deposited on Ti Grade II and Ti13Nb13Zr alloy substrate for the biomedical applications purpose. To study the chemical and phase composition, roughness, wear resistance, plastic and elastic properties an optic microscopy, scanning electron microscopy, X-ray electron diffraction spectroscopy and nanoindentation were applied. The best mechanical, plastic, and elastic properties in terms of biomedical application were achieved for the MWCNTs coating with titania layer deposited on Ti Grade II substrate, while the coating composed of MWCNTs and nanocopper turned out to be more brittle when deposited on Ti alloy than on Ti grade II. Generally, both the addition of nanocopper and titania improved the mechanical properties of the base MWCNTs coating deposited on Ti grade II, but for Ti alloy, which served as a substrate for MWCNTs coatings, the additions just improved the capability of the MWCNTs coating to accommodate substrate deflection under applied load. This could be explained by the fact that more homogenous coatings are generally formed on pure metals than on its alloys, which chemical and phase composition is more complex.

Audience Take Away

- How the substrate used impact the MWCNTs coatings mechanical properties?
- What are the mechanical properties of MWCNTs coatings with nanocopper?
- What are the mechanical properties of MWCNTs coatings with titania?
- How does nanoindentaion studies are used to assess, both the mechanical properties and the plastic and elastic properties?

Biography

Dorota is a Ph.D. student in the field of Material Engineering at the Gdańsk University of Technology, Biomaterials Group, Poland. She has graduated B. Eng. in Nanotechnology at faculty of Applied Physics and Mathematics and an M.Sc. in Material Engineering at the Faculty of Mechanical Engineering. Her research is focused on studying mechanical and biological properties of coatings based on elemental carbon, mostly carbon nanotubes electrophoretically deposited on titanium and its alloys substrate.

Stéphanie Andrade[1,2*], Joana A. Loureiro[1,2] and Maria C. Pereira[1,2]

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Transferrin-modified nanoparticles for Alzheimer's disease therapy with natural compounds

Alzheimer's disease (AD) is an incurable neurological disease and the primary cause of dementia, characterized by amyloid β (Aβ) fibril deposits. Caffeic acid (CA) has shown the ability to prevent Aβ fibril formationand disaggregate mature Aβ fibrils. However, its chemical instability and low bioavailability limit CA's in vivo therapeutic activity. To overcome these limitations, liposomes containing CA were prepared. The surface of the nanoparticles (NPs) was modified with transferrin (Tf), intending the dual-targeting of CA to the blood-brain barrier and neuronal cells. The optimized brain-targeted drug delivery system (DDS) had a mean size of 140 nm, a polydispersity index lower than 0.2, and zeta potential values close to 0 mV, making it appropriate for brain delivery. Tf-modified NPs showed a suitable encapsulation efficiency and physical stability under storage conditions for 2 months. Furthermore, in simulated physiological conditions, the DDS enabled the sustained release of CA for 5 days. The therapeutic activity of the DDS was investigated in terms of anti-amyloidogenic properties using an in vitro modelof AD. The findings reveal that CA-loaded Tf-modified NPs can prevent Aβ fibrillation and disrupt preformed fibrils. Thus, the developed brain-targeted DDS may be a promising strategy to prevent and treat AD.

Audience Take Away

- The talk will shed light on the underlying mechanism of AD, its symptoms as well as its repercussions.
- The talk will inspire the audience to incorporate natural compounds into their diets, as these molecules have shown great potential for preventing and treating AD.
- The presented research can be adapted to numerous fields, so future collaborations are welcome.

Biography

Ms. Stéphanie Andrade earned her MS degree in Biomedical Engineering from the University of Porto's Faculty of Engineering (FEUP) in 2015. Since 2014, she has been a member of Prof. Dr. Maria do Carmo Pereira's research group(Nano4MED) at LEPABE, Portugal. She began her Ph.D. in Chemical and Biological Engineering in 2017 from FEUP, and she recently submitted her doctoral thesis, which she will defend soon. Her doctoral research was conducted at LEPABE and at The University of Texas Health Science Center at Houston, USA. She has more than 20 publications in prestigious refereed books and journals in several fields.

Jennifer Khirallah*, Hanan Bloomer, Gregory Newby, Hyunjoon Rhee, Maximilian Eimbinder, David Liu, Qiaobing Xu, Zheng-Yi Chen, Yamin Li

Tufts University, United States

In vivo CRISPR base editing of Angptl3 via lipid nanoparticle delivery

The angiopoietin-like 3 (*Angptl3*) gene encodes for ANGPTL3, a principal regulator of lipoprotein metabolism that is secreted by hepatocytes. Loss of function (LOF) variants of *Angptl3* are associated with decreased levels of cholesterol, plasma lipoproteins, and triglycerides. Notably, these LOF variants have demonstrated protection from coronary artery disease (CAD) and atherosclerosis. Therefore, *Angptl3* has become a target of interest for the treatment of human lipoprotein metabolic disorders and patients with dyslipidemia at risk for CAD. The recent advent of CRISPR-Cas base editors has allowed for the precise conversion of one DNA base to another at a target locus. Adenine base editors can be applied to disrupt slicing at a therapeutic loci, thereby knocking out gene function. In this study, we designed two single guide RNAs (sgRNA4 and sgRNA5) that disrupt the splice acceptor/donor in *Angptl3* when codelivered with ABE8e. We encapsulated the ABE8e mRNA and one of the two sgRNAs in one of two liver-targeting (306-012B and lipid 88) lipid nanoparticles (LNPs) and performed intravenous injection in wild type C57BL/6 mice. After seven days, whole liver tissue was collected for genome sequencing. The most promising results from this study showed the successful base editing from sgRNA4/ABe8e in 306-012B which achieved an average of 35.85% and 44.3% on target base editing after one and two doses, respectively, sgRNA4/ABe8e in lipid88 achieved 39.01%, and sgRNA5/ABE8e in lipid88 achieved 63.52%. Future work will analyze the plasma levels of the ANGPTL3 protein, cholesterol, and triglycerides to gain a better understanding on the therapeutic effect of the loaded nanoparticle.

Biography:

Jennifer Khirallah is a 3rd year PhD candidate in the Biomedical Engineering Department at Tufts University in Medford, MA. She works in the Xu lab which specializes in developing lipid nanoparticles for small molecule delivery. She received her Bachelor's degree in Biomedical Engineering at Boston University. She was awarded the National Science Foundation Graduate Research Fellowship.

POSTERS

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Larissa A. Maiorova[1,2]*, Salnikov D. S.[1], Koifman O. I.[1,3], Bykov V. A.[4], Bobrov Yu. A.[4]
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First nanoparticles of vitamin B_{12} derivatives

Vitamin B_{12} and its derivatives are important biomolecules of porphyrin nature that work in supramolecular assemblies as cofactors performing vital functions in living organisms**.** They catalyze many molecular transformations in the cell metabolism (DNA synthesis and regulation), in carbon-skeleton rearrangements, and migration of functional groups.

We present the first nanostructures of vitamin B_{12} derivatives. They are nanoparticles of a unique type with strong noncovalent intermolecular interactions, functional properties, and activity that their constituent molecules do not possess. The nanoparticles were prepared by self-assembling of Aquacyanocobyrinic Acid Heptabutyl Ester under specially arranged conditions at the air-water interface into two-dimensional nanoaggregates. Characteristics of the structure and properties of nanostructured monolayers at the air-water interface were determined with the method of quantitative analysis of compression isotherms. The obtained data were used to select conditions favorable for the formation thin films on solid supports and to study them. AFM data indicate that the size of the 3D nanoaggregates in the plane of the substrate matches the theoretical estimate for the size of their 2D precursors. Photophysial study of nanoparticles demobstrate that they extend light absorption broadly covering visible and near infrared light, and their Soret and Q bands are strongly blue-shifted relative to the initial monomer solution.

The results in this study are of interest because they approved a nanotechnological route for the formation of nanoparticles of biological compounds with novel properties and promising applications.

Biography

Prof. Larissa A. Maiorova, Head of the Laboratory of Langmuir-Blodgett technology and leading researcher at the Institute of Macroheterocyclic Compounds within the Ivanovo State University of Chemistry and Technology, and leading researcher at the Institute of Pharmacoinformatics, Federal Research Center "Computer Science and Control"of Russian Academy of Sciences, Moscow, Russia. She studied Physics at the Ivanovo State University, received her PhD degree (in Phys. and Math.) in 2003 at the Shubnikov Institute of Crystallography, Russian Academy of Sciences, Moscow (Laboratory of small angle scattering of Prof. Feigin L.A.) and Doctor of Science degree (in Phys. and Math.) in 2012.

Volodymyr Logvin[1] and Oleksii Logvin[1*]

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Development of an algorithm and a program for processing signals from the profilometric sensor

It is known that the magnitude of micronanogeometric parameters of surface irregularities significantly affects the quality of industrial products, that is, the totality of properties that determine the ability of these products to meet certain requirements of state standards. These properties, called operational properties, include endurance, durability, vibroresistance, corrosion resistance, rigidity, accuracy, static and dynamic imperviousness, aesthetics, etc.

That is, the most important economic problem of the optimal management of theefficiency and quality of industrial products can be solved by managing exploitation indicatorsthrough optimization and continuous operational control of micronanogeometric parameters.To solve this problem, staff at the SMPE «Micron» created a nano-tech science-intensive basic measurement complex – «Profile-04» for the on-line diagnostics of micronanogeometric parameters (roughness) work surfaces of various parts during their making, exploitation or repairing.

One the main stages of this project is creating of the profilometrical smart-piezosensorfundamentally new design type "plug and produce" with the creation mathematical software (of algorithms and computer codes) for processing signals coming from this sensor.

To computerize the first domestic profilometer introduced by the staff SMPE «Micron» at the «Electrotyazhmash» plant, the mentioned employees, under the agreement with this plant also developed a special profiloadapter that has ready-made programs for analog-to- digital conversion signal of the profilometer in any mode and its further processing using developed algorithm on any computer.

The Profile-04 algorithm to program consists of the following main sections:

A — «Components»; B — «Distortions»; C — «Correction»; D — «Parameters».

To implement the developed algorithm, the organization of data in a computer was thought out, i.e. what kind namely variables, arrays, structures will correspond to the designations used in this algorithm, what auxiliary arrays are needed, etc.

In other words, the algorithm before programming itself was first modeled in the MathCAD system, and also recorded by a pseudo-code in the form of a structural-functional block-scheme of the algorithm using the programming terms "cycle", "branching", etc.

For example, when developing pseudo-code using the so-called step-by-step drill-downmethod, the record it turns out much more convenient for subsequent programming and joint complex debugging.The algorithm under consideration has a continuation in the form of optimization, in order to minimize the errors and time of calculating the micronanogeometric parameters of the real surfaces being processed, to obtain maximum correspondence of the results of calculations these parameters with roughness samples, to expand the number of calculated standard and various industry, departmental, factory and other parameters, as well as to perform auxiliary functions: «Statistics», «Abbot curve», «Increase-decrease» (zoom), «Print», «Help» and the like, in both automatic both and manual modes.

Thus, we plan to continue the modernization of the first domestic analogue profilometer-profilograph to the level of the corresponding microprocessor nanotechnology for resuscitation of its full-fledged production.

Audience Take Away

- Mathematical signal processing profilo-metrical piezo-sensors using the period-gram-analysis with stepwise-change of discreteness computation.
- Makes it possible, in particular, getting of array data which maximally answer by real ordinates of the profileof investigated surface.
- Provides operative change number of measured parameters.
- This research could be used by other teachers to expand their research or teaching.
- This research provides a practical solution to a problem that could simplify or make a technologist and designer's job more efficient, as well as provide new information to assist in a design problem.

Biography

Volodymyr Logvin graduated in 1981 Kharkiv Polytechnical University in «Hoisting machinery and equipment», in 1989 and 1996, respectively – postgraduate and doctoral Institute of Mechanical Engineering Problems of the NationalAcademy of Sciences of Ukraine, in 1990 he defended his thesis by specialty «Heat Engines», from 1981 to 2002 worked as a research fellow at IPMash National Academy of Sciences of Ukraine, founded the company SMPE «Micron» is its director from 1991 to the present. The results of his work are presented 47 publications in national andinternational publications, including 12 inventions and two industry standards, implemented in Russia and Ukraine.

Brilliant Windy Khairunnisa
International Relations, Sunan Ampel State Islamic University, Surabaya, Indonesia

The future of nanotechnology in the international relations perspective

In this century, nanotechnology has been recognized as a potential knowledge that people competing to learn about it to be beneficial for the world, especially for their own country. Nanotechnology is identified as a potential thing to increase the quality of a nation in the field of economy, society, and politics due to its novelty in the technology world. Nevertheless, a country could not gain its purpose by working by itself without any cooperation with other countries especially if nanotechnology does not come from its nation. In this case, diplomacy has its role toact in developing and gaining national interest in terms of nanotechnology. The purpose of this presentation is to demonstrate the future of nanotechnology in the international relations perspective including economics, social, and political fields by the qualitative explorative method. In addition, it found that nanotechnology would be beneficial forthe country to increase its economy, and political quality, as well as for society as a tool to decrease poverty through its technology cooperation among countries. On the other hand, nanotechnology in the future would be a great issue todiscuss in international meetings with the main goal to collect and collaborate for the best future technology which also would be beneficial to almost all countries in the world.

Audience Take Away

- From this presentation, the audience will learn about how nanotechnology works in the future from the international relations perspective.
- This research would benefit especially for policymakers to make nanotechnology one important thing toconsider in deep discussion until it could be a tool to reach its national interest.
- This research would provide new information that is still rare to discuss in terms of nanotechnology which isin the international relations perspective.

Biography

Brilliant Windy Khairunnisa is regularly doing research on International Relations topics since 2019. She haspublished 8 research articles in some journals in the last two years.

Carole Emilie Baddour
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Towards the growth of carbon nanotubes inside cylindrical stainless steel geometries

Researchers have been investigating carbon nanotube synthesis on stainless steel because it is a readily available substrate which contains an abundance of one of the popular transition metals used as a catalyst. The aim of this study is to extend a growth method developed by the author to cylindrical geometries, specifically to grow carbonnanotubes inside a cylinder. This method allows the bulk metal surface to act as both the catalyst and support for the CNT growth and eliminates the requirement of adding an additional catalyst in the process. As a proof of concept, the procedure was optimized and the ideal conditions were determined using a cylinder that is cut in half along its longitudinal axis. Carbon nanotubes were successfully grown uniformly inside the half cylinder by thermal chemical vapor deposition using acetylene as a carbon source and nitrogen as a carrier gas. These results are promising, and thenext step is to apply the ideal conditions to uncut cylinders.

Audience Take Away

- The benefit of using stainless steel as a substrate and catalyst for carbon nanotube growth.
- A facile method to grow carbon nanotubes on various geometries of stainless steel.
- The applications of carbon nanotubes grown inside cylinders.

Biography

Dr. Baddour is an Assistant Professor in the Department of Mechanical and Electrical Engineering at Wilkes University in Wilkes-Barre, Pennsylvania USA. She received her PhD from McGill University in Montréal, Québec, Canada and her Master's and Bachelor's degrees from the University of Western Ontario in London, Ontario, Canada.Her broad research interests are in nanomaterials and their applications. She won Wilkes University's Innovative and Non-Traditional Teaching Award in 2020. She is passionate about students, teaching, research, professional development, and she is the ABET coordinator for Mechanical Engineering.

Participants List

UPCOMING CONFERENCES

6th Edition of World Nanotechnology Conference

April 24-26, 2023 | Orlando, Florida, USA | Hybrid Event

https://worldnanotechnologyconference.com/

7th Edition of World Nanotechnology Conference

September 25-27, 2023 | Valencia, Spain | Hybrid Event

https://nanotechnology.magnusconferences.com/

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