PEERS ALLEY
M E D I A

5th Edition of

Advanced Chemistry World Congress

March 25-26, 2024

Amsterdam, Netherlands

Theme:

Exploring chemical advancements and ground-breaking technologies to address global challenges in energy, urbanization, environment, and human health. Unveiling current trends and future research prospects in chemistry and beyond.

Adv. Chemistry 2024

https://advanced-chemistry.peersalleyconferences.com/

2 DAYS WITH MORE THAN 45 SESSIONS, KEYNOTES & ORAL PRESENTATIONS

INNOVATIVE FEATURED SPEAKERS **12+**

20+ HOURS OF NETWORKING EVENTS

INTERNATIONAL SPEAKERS **60+**

125+ EDUCATIONAL SESSIONS

WHO SHOULD ATTEND?

- **Scientists, Chemists and Chemical Engineers working in Pharmaceutical and Bulk Chemical Industries**

- **Scientists, Corporate Management, Managers for development of Pharmaceutical and Fine Chemicals R & D Units and Manufacturing activities**

- **Scientists, Chemists & Engineers belonging to the fields of Organic, Inorganic, Analytical, Natural Products, Medicinal, High-throughput and Process Chemistry**

- **Scientists and Researchers in the area of Fragrance Industry, Agrochemical and Petrochemistry**

- **Materials Scientists**

- **Nanotechnologists**

- **Biotechnologists**

- **Scientists in Information Technology, Theoretical Chemistry and Flow synthesis instruments including Automation & Engineering**

- **Academicians, Faculty, Clinical Services Managers, Healthcare Workers, Druggist, Drug Developers, Chemical Research Laboratories, Drug Development Companies, Research Institutes and Members, Chemicals Supply Chain Companies, Chemistry Startups, Chemicals Manufacturers and Chemical Industries, Training Institutes and Students**

PRESENTATION FORUM

KEYNOTE FORUM / MINI-PLENARY SESSIONS

Presentations under Keynote Forum or Mini-Plenary Sessions includes abstracts with remarkable research value selected by the program committee. These significant speeches are delivered by globally recognized honorable speakers and it is open to all registrants.

DISTINGUISHED SPEAKERS FORUM (ORAL ABSTRACT SESSIONS)

In this forum, speakers and experts of the research field gets an opportunity to showcase their noble research work that involves comprehensive research findings. These formal oral presentations include a wide range of talks covering basic research to advanced research findings in accordance to the theme and scientific sessions of the conference.

STUDENT FORUM

POSTER SESSION

This session is particularly introduced to encourage more number of student participation at international conferences, however it is not restricted only to students since it is also available for the participants with language barrier. There are specific guidelines to be followed to prepare the poster. Poster topic should be selected only from relevant scientific sessions with in-depth technical details.

YOUNG INVESTIGATORS FORUM

An exclusive opportunity for students and young investigators to present their research work through a formal oral presentation. Young Investigators Forum provides a global platform for young researchers and scholars to showcase their valuable contribution to the scientific world and to get acknowledged by the global scientific community of experts. It is an excellent opportunity to recognize young scientific assets with promising research ideas. These oral presentations are of shorter time duration with 10-15 minutes of informative and precise presentations in relevant scientific sessions.

EDUCATIONAL WORKSHOPS/ RESEARCH WORKSHOPS/ CORPORATE WORKSHOPS/MINI-SYMPOSIA

With an aim of transferring knowledge among the participants, workshops are introduced as a part of international conferences. These interactive and occasionally practical sessions gives an opportunity for participants to engage in detail discussion. Workshops are mostly scheduled for 60 to 90-minutes. It may range from learning about a specific topic relevant to international education, products and research which sometimes involves practical demonstration. It helps in enhancing skills, knowledge and understanding of the research field in depth through interactive discussions.

HIGHLIGHTS OF THE DAY SESSIONS

"Highlights of the Day Sessions" is introduced to discuss and focus a ray upon previous day ORAL ABSTRACT presentations by experts to summarise the key findings. It helps in getting better insights into the various dimensions of the topic.

MEET THE PROFESSOR @ NETWORKING SESSIONS

This session involves open discussion between the experts and session attendees, it gives enough time for getting answers to specific questions and doubts. It is an opportunity for attendees to increase their professional networking, sometimes also leads to an excellent collaboration opportunity.

EDUCATIONAL SESSIONS/ TRAINING PROGRAMS

Educational Sessions or training programs are specifically designed for a better understanding of the latest findings and technologies. These are generally 45-minute sessions that gives an exposure to the multidisciplinary field, that provides in-depth learning experiences and address educational needs.

TYPES OF ACADEMIC REGISTRATIONS

Speaker Registration

COMBO A (Registration + 2 Night Accommodation)

COMBO B (Registration + 3 Night Accommodation)

Delegate Registration

TYPES OF BUSINESS REGISTRATIONS

Speaker Registration

COMBO A (Registration + 2 Night Accommodation)

COMBO B (Registration + 3 Night Accommodation)

Delegate Registration

TYPES OF STUDENT REGISTRATIONS

Registration

YIF

COMBO A (Registration + 2 Night Accommodation)

COMBO B (Registration + 3 Night Accommodation)

Posters

TYPES OF ADDITIONAL REGISTRATIONS

Accompanying Person

E-Poster

Virtual Presentation

Workshops

Start-Ups

Register & Participate

.in

ADV. CHEMISTRY 2024

https://advanced-chemistry.peersalleyconferences.com/

TIME TO
CONNECT

WITH YOUR
PEERS

CONCURRENT EDUCATIONAL SESSIONS

ANALYTICAL CHEMISTRY

- Applications of analytical chemistry
- Chromatography
- Electrochemical analysis
- Hybrid techniques related to analytical Chemistry
- Lab-on-a-chip
- Mass spectrometry
- Microscopy
- Qualitative and quantitative analysis
- Separation
- Spectroscopy
- Thermal analysis

AGRICULTURAL CHEMISTRY

- Agricultural biotechnology
- Technology and sustainable agriculture best practices
- Climate change impacts, mitigation and adaptation
- Renewable energy sources and sustainable agriculture
- Greenhouses and horticulture
- Agricultural machinery
- Fertilisers and chemicals
- Irrigation and water management
- Nanotechnologies in agriculture

BIOCHEMISTRY

- Biochemistry methods
- Bioinorganic chemistry
- Biology and pharmacology of chemical elements
- Chemical ecology
- Chemical pathology
- Clinical Biochemistry and Nutrition
- Metabolisms
- Neurochemistry
- physiological biochemistry
- Reagents for biochemistry

CHEMISTRY OF TRANSITION ELEMENTS

- Characteristics of transition elements
- Electronic configuration
- Chemical formula
- Ligand binding
- causes of colour compounds of transition elements
- complex compound formation
- coordination complexes
- transition metal Dinitrogen complexes

GROUP PHOTO | COFFEE BREAK

CHEMICAL ENGINEERING

- Etymology
- Process design and analysis
- Chemical reaction engineering,
- Heat-transfer equipment
- New concepts and innovations in chemical Engineering
- Nuclear engineering
- Safety and hazard assessments
- Separation columns (distillation, absorption and extraction)

ELECTROCHEMISTRY

- Bipolar electrochemistry
- Electroanalytical method
- Electrochemical energy conversion
- Electrochemical engineering
- Electrochemical impedance spectroscopy
- Electrochemical potential
- Fuel cells
- Nanoelectrochemistry
- Photoelectrochemistry
- Redox titration

ENVIRONMENTAL CHEMISTRY

- Radiochemicals
- Aquatic chemistry
- Atmospheric chemistry
- Bioassays and immunoassay
- Environmental measurement and monitoring
- Environmental monitoring
- Environmental quality parameters related to fresh water
- Gravimetric, titrimetric and electrochemical methods
- Pollution

FOOD CHEMISTRY

- Food engineering
- Food fortification
- Food microbiology
- Food packaging
- Food physical chemistry
- Food preservation
- Food rheology
- Food safety
- Food science
- Food storage
- Food supplements
- Food technology

LUNCH BREAK

FORENSIC CHEMISTRY

- Ballistic fingerprinting
- Bloodstain pattern analysis
- Encompasses organic and inorganic analysis
- Fingerprint analysis
- Forensic data analysis
- Forensic toxicology
- Investigating the physical and chemical properties
- Scientific methods for analyzing evidences

GEOCHEMISTRY

- Aqueous geochemistry
- Biogeochemistry
- Concepts of energy, entropy and fundamental thermodynamics
- Earth crust
- Giant planets
- Isotope geochemistry
- Organic geochemistry
- Petrology
- Photogeochemistry
- Radiogenic isotope geochemistry
- Regional geochemistry

GREEN CHEMISTRY

- Biocatalysts in organic synthesis
- Bioremediation
- Designing a green synthesis
- Disaster management
- Environmental engineering science
- Environmental pollution
- Green catalysts
- Green chemistry in day-to-day Life
- Green computing
- Green engineering
- Green synthesis
- Sustainable engineering

INDUSTRIAL CHEMISTRY

- Chemical plants development
- Food microbiology
- Green water treatment
- Industrial photo chemistry
- Industrial water supply
- Petroleum refining and petrochemicals
- Pyrolysis
- Ultrapure water production
- Waste water treatment
- Water treatment using different types of nanomaterials

COFFEE BREAK

INORGANIC CHEMISTRY

- Bioinorganic chemistry
- Bioorganometallic chemistry
- Ceramic chemistry
- Cluster chemistry
- Coordination chemistry
- Materials science
- Organometallic chemistry

MATERIALS SCIENCE

- Biomaterial
- Bioplastic
- Ceramic engineering
- Crystallography
- Metallurgy
- Polymer science and polymer engineering
- Surface science
- Tribology

MEDICINAL CHEMISTRY

- Chemical synthesis
- Chemicals in medicine
- Drug design
- Drug discovery
- Medicinal inorganic chemistry
- Medicinal radiochemistry
- Natural products
- Pharmacokinetics
- Pharmacology

METALLURGY

- Archaeometallurgy
- CALPHAD
- Carbonyl metallurgy
- Cupellation
- Experimental archaeometallurgy
- Gold phosphine complex
- Goldbeating
- Metallurgical failure analysis
- Mineral industry
- Pyrometallurgy

MOLECULAR BIOLOGY

- Central dogma of molecular biology
- Genetic code
- Genome
- Molecular engineering
- Molecular microbiology
- Molecular modeling
- Protein interaction prediction
- Proteome
- Cell biology

NATURAL PRODUCT CHEMISTRY

- Carbohydrates
- Aromatic compounds
- Terpenoids
- Steroids
- Amino acids, peptides and proteins
- Alkaloids
- Nucleosides, nucleotides and nucleic acids
- Porphyrins
- Aliphatic compounds
- Primary metabolites

NANOTECHNOLOGY

- Energy applications of nanotechnology
- Environmental benefits of nanotechnology
- Molecular nanotechnology
- Nanobiotechnology
- Nanoelectromechanical relay
- Nanoengineering
- Nanometrology
- Nanometrology
- Nanotechnology in water treatment
- Nanoweapons
- Wet nanotechnology

NEUROCHEMISTRY

- Molecular neuroscience
- Neuroendocrinology
- Neurogenesis
- Neuroimmunology
- Neuromodulation
- Neuropharmacology
- Neuroplasticity or synaptic plasticity
- Signal transduction

GROUP PHOTO | COFFEE BREAK

ORGANIC CHEMISTRY

- Ethers
- Alcohol
- Aldehydes
- Amine
- Aromaticity
- Carboxylic derivatives
- Chemical Reactivity
- Haloalkanes
- Haloarenes
- Hydrocarbons
- Intermolecular forces
- Ketones
- Nomenclature
- Phenol

PETROCHEMISTRY

- Advanced oil and gas technologies
- Drilling and well operation technology
- Environmental hazards of petroleum
- Hydraulic fracturing
- Oil refining
- Petroleum engineering and its industrial application
- Petroleum geology and geo-physical exploration

PHYSICAL CHEMISTRY

- Thermochemistry
- Chemical kinetics
- Quantum chemistry
- Electrochemistry
- Photochemistry
- Surface chemistry
- Solid-state chemistry
- Spectroscopy
- Biophysical chemistry
- Materials science
- Physical organic chemistry
- Micromeritics

POLYMER CHEMISTRY

- Polymerization Techniques
- Biodegradable Polymers
- Bioplastics
- Biopolymers & Biomaterials
- Ionic chain-reaction and complex coordinative polymerization
- Naturally occurring polymers
- Organic and inorganic polymers
- Polymer Synthesis
- Polymers For Emerging Technologies
- Rheology

LUNCH BREAK

Title: Distal Functionalization via Transition Metal Catalysis

Haibo Ge| Department of Chemistry & Biochemistry, Texas Tech University, USA

Abstract:

Description of presentation

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

Title: DOZN™2.1 - A Quantitative Green Chemistry Evaluator for a Sustainable Future

Ettigounder (Samy) Ponnusamy | MilliporeSigma, USA

Abstract:

Merck KGaA, Darmstadt, Germany developed and launched as DOZN™2.0 in 2017, a unique web-based greener alternative scoring matrix, also known as a quantitative green chemistry evaluator. This tool is based on the 12 principles of green chemistry for customers to evaluate their relative greenness of their processes which provide a framework for learning about green chemistry and designing or improving materials, products, processes, and systems. DOZN™2.0 scores products based on metrics for each principle and aggregates the principle scores to derive a final aggregate score. DOZN™2.0 calculates scores based on manufacturing inputs, GHS and SDS data which provide a green score for each substance. DOZN™2.0 is flexible enough to encompass the diverse portfolio of products. The DOZN™2.0 system has also been verified and validated by a third party to ensure best practices are applied. Based on customer feedbacks, we upgraded the tool to DOZN™2.1 and launched in December 2022. Through DOZN™2.1 customers now have access to calculate the green scores of their processes and products. This free, web-based tool provides users with more data so that they are properly equipped to improve their sustainability. DOZN™2.1 keeps data privacy top of mind - allowing customers to score their processes/products in a safe and secure manner to improve their sustainability.

Title: MDH CURES Community: A Supportive Network to Increase Student Retention and Learning

Joseph J. Provost | **University of San Diego, USA**

Abstract:

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

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

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

PEERS ALLEY
M E D I A

Title: Agrichemicals in drinking water: The role of nitrite in birth outcomes

Augustine Kena Adjei | University of Nebraska-Lincoln, USA

Abstract:

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

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

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

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

Title: On some analogies of modern science with Plato's science in Timaeus and on Plato's influence on Kepler and Ptolemy

Francesco Di Giacomo| Sapienza University of Rome, Italy

Abstract:

The Timaeus of Plato is the only one of his Dialogues devoted to science. Among his readers we find Descartes, Boyle, Kepler, Heisenberg, Hermann Weyl and, more recently, Frank Wilczek. The aspects of the Democritean atomistic theory and those of Plato's geometrical atomism in Timaeus are discussed and compared. Plato presents the first mathematical theory of the structure of matter at three levels, analogous to the modern molecular, atomic and sub-atomic levels. In an impressive progress with respect to the Democritean theory with its unalterable micro-entities, Plato introduces in science the inter-transformability of elementary corpuscles and so the first "chemical" reactions in the history of science. Analogies with modern physics and chemistry are described throughout and Plato's influence on Kepler and Ptolemy is also treated. The different fortunes of Plato's geometric atomism and celestial motion in Timaeus are described in the Discussion section.

ORGANIZING COMMITTEE MEMBERS

Pier Giorgio Righetti
Politecnico di Milano, Italy

Fathi Moussa
Head of LETIAM, University of Paris-Sud, France

Cody Coyne
Professor, Molecular Pharmacology and
Immunology, Mississippi state university, USA

Ilya G Kaplan
Materials Research Institute, National Autonomous
University of Mexico, Mexico

Saeed Fartokhpay
Senior Researcher, University of Lorraine, France

Fabiola Monroy-Guzmn
Instituto Nacional de Investigaciones Nucleares, Mexico

Title: Contextualized teaching of chemistry to promote active citizenship

Motlhale Judicial Sebatana | North-West University, Mafikeng, South Africa

Abstract:

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

Title: Low-temperature synthesis of ZnO nanorods and their performance as H2S gas sensor

Laura Lorena Diaz-Flores | Juarez Autonomous University of Tabasco, Mexico

Abstract:

The nanotechnology studies the growth of nanostructures with improved physicochemical properties compared to their bulk materials. These modifications in properties at the nanoscale are due to changes in their dimensions, which generate rearrangements in their atomic structure that enhance certain properties. Therefore, this work presents the fabrication of epitaxially grown of ZnO nanostructures, combining the Sol-Gel and Hydrothermal synthesis methods. Firstly, ZnO seed layer solution was synthesized using Sol-Gel method (60 °C) and deposited by means of the Spin Coating technique (32 °C), applying three cycles of deposition onto substrates (ITO/PET) creating nucleation points for helping the orientation and morphology of the nanostructures. A drying procces was carried out at 100 °C for 30 min between each layer deposited to achieve a well-adhered film. The growth of nanostructures was stimulated through Hydrothermal synthesis (90 °C) using solutions of zinc nitrate and hexamethylenetetramine as precursors (molar ratio 1:1). The reaction time and temperature used were 90°C and 240 min respectively. Three different concentrations of hydrothermal solution were used 10 mM, 15 mM, and 20 mM. The structural characterization showed a polycrystalline structure of ZnO in its hexagonal wurtzite phase. The chemical analysis of seed layer revealed Zn and O signal considered the nucleation points. The morphology of well-aligned ZnO nanorods was observed (D= ≈174.3 nm; L= ≈1397.1 nm) and it was also observed that by increasing the concentration of the hydrothermal solution the diameter of the ZnO nanorods increased. Optical evaluation of the ZnO films revealed that they have absorption in the UV region (365-375 nm) and in the Visible region (400-700 nm), which is helpful for gas sensor application. The films with ZnO nanorods were tested in the sensing of 600 ppm of H2S gas at 29 °C, the sensitivity was directly proportional from 19.9% to 38.2%.

Title: Promotion and Implementation of Bioenergy for A Better Environment

Abdeen Mustafa Omer| Energy Research Institute (ERI), Nottingham, United Kingdom

Abstract:

There is strong scientific evidence that the average temperature of the earth's surface is rising and this may be attribute to increased concentration of carbon dioxide (CO_2), and other greenhouse gases (GHGs) in the atmosphere as released by burning fossil fuels. One of the chief sources of greenhouse gases is burning of fossil fuels. Biogas from biomass appears to have potential as an alternative energy source, which is potentially rich in biomass resources. In the present study, current literature is reviewed regarding the ecological, social, cultural and economic impacts of biogas technology. In this communication an attempt has been made to give an overview of present and future use of biomass as an industrial feedstock for production of fuels, chemicals and other materials. However, to be truly competitive in an open market situation, higher value products are required.

ORGANIZING COMMITTEE MEMBERS

Pier Giorgio Righetti
Politecnico di Milano, Italy

Fathi Moussa
Head of LETIAM, University of Paris-Sud, France

Cody Coyne
Professor, Molecular Pharmacology and Immunology, Mississippi state university, USA

Ilya G Kaplan
Materials Research Institute, National Autonomous University of Mexico, Mexico

Saeed Fartokhpay
Senior Researcher, University of Lorraine, France

Fabiola Monroy-Guzmn
Instituto Nacional de Investigaciones Nucleares, Mexico

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

Otavio Pereira dos Santos Junior | Rural Federal University of Pernambuco, Brazil

Abstract:

Anthropogenic Accumulation Based on Chemometrics of the Radionuclide 40K in Tropical Soils in the Northeast Brazil, Otavio Pereira dos Santos Júnior, R. Arq. Luis Nunes, 822, bl 1B – ap 104 – Imbiribeira – Recife – Pernambuco – Brazil, Alex Souza Moraes, R. Dom Manuel de Medeiros, s/n – Dois Irmãos – Recife – Pernambuco – Brazil.
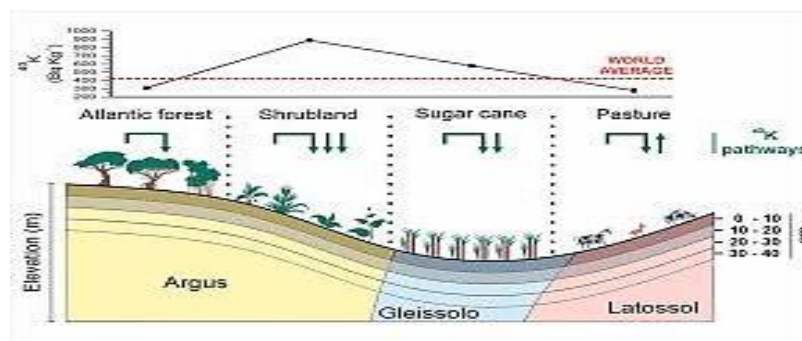
The continuous use of fertilizers can increase the levels of radionuclides in the soil, and their accumulation and concentration are related to their characteristics and to the different processes of use and occupation of the soil. The work presented results of a study to evaluate the accumulation of 40K, in an area of the Zona da Mata of Pernambuco, Northeast of Brazil. The 40K activity concentration was measured by high resolution gamma spectrometry in 108 soil samples, as well as the organic matter content and granulometric distribution. The results showed that the 40K activity reached a value of 1843 Bq.Kg−1, with arable soils showing levels above the world average value (USNCEAR). A higher prevalence of 40K was observed in arable soils, regardless of soil type, organic matter content, depth or texture. Agricultural activities increased at levels of 40K to different degrees, depending on the type of crop used, with an accumulation factor of up to 4 times greater than soils not impacted by agricultural activities. The radiochemometric diagnosis made it possible to draw up a strategic management plan to improve family farming management practices, in order to maximize production efficiency, promote the conservation of natural resources and preserve the environment.

Title: Thermochemical Degradation of Waste Sludge from The Soybean Processing Industry For The Production of Bio-Oil

Marcelo Pedroza| Tocantins Federal Institute of Education, Science and Technology – IFTO, Brazil

Abstract:

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

Title: Identification of Pathogens in Corn Using Near-Infrared UAV Imagery and Deep Learning: Advancing Ecological Sustainability through Reduced Pesticide Consumption

Alfonso Antolinez Garcia | Polytechnic University of Madrid, Spain

Abstract:

Maize, a vital cereal crop sustaining global food production, faces threats from fungal diseases, resulting in substantial yield reductions. Conventional control methods relying on broad-spectrum pesticides raise alarming concerns about their adverse impact on human health, soil quality, and water pollution. To address these challenges, we propose an innovative approach that combines near-infrared (NIR) unmanned aerial vehicle (UAV) imagery and advanced deep learning algorithms to enhance pathogen identification in maize fields. Our primary focus is to contribute to ecological sustainability by significantly reducing the consumption of hazardous pesticides, thereby safeguarding flora and fauna.

UAVs equipped with near-infrared cameras capture high-resolution imagery of maize crops, revealing damage patterns invisible to the human eye or traditional RGB images. This NIR imagery serves as valuable input data for a state-of-the-art Convolutional Neural Networks (CNN) employing a novel Transfer Learning (TL) approach. The TL-based CNN is trained on an extensive dataset containing labeled images of healthy and pathogen-infested maize plants.

Preliminary results demonstrate an impressive accuracy of 86.7%, precision of 98%, sensitivity of 86.9%, and an outstanding F1 Score of 92% of our approach.

The integration of NIR UAV imagery and deep learning technology holds transformative potential for precision agriculture. Swift and precise pathogen identification enables farmers to implement targeted interventions, significantly reducing the reliance on broad-spectrum pesticides. Provision of GPS coordinates of infested areas facilitates precision spraying, ensuring fungicides are applied exclusively to specific targets, curbing chemical consumption while minimizing detrimental effects on the ecosystem.

By substantially decreasing the use of hazardous substances, particularly pesticides, our research contributes to safeguarding precious flora and fauna.

Our work emphasizes the pivotal role of deep learning in shaping a greener and more sustainable farming landscape. Embracing data-driven solutions, we anticipate a transformative impact on crop disease management, ensuring a healthier and more resilient agricultural ecosystem.

Title: Polyol-based extraction: A green approach to extract bioactive compounds for cosmetic and tropical products

Nuntawat Khat-udomkiri | Chulalongkorn University, Bangkok, Thailand

Abstract:

For several decades, organic solvents have been extensively employed in cosmetic and pharmaceutical applications to extract bioactive compounds from plant materials and agricultural wastes. This is primarily due to their widespread availability and cost-effectiveness. However, these solvents must be eliminated from the extract prior to being incorporated into the formulation due to their potential skin toxicity. Methods for solvent elimination will be expensive, time-consuming, and energy-intensive. In order to address this issue, there has been significant research development focused on polyols as a potential substitute solvent for the extraction of bioactive compounds. This talk aims to highlight our new research findings regarding the efficacy of polyols in the extraction process of phenolic compounds from various agricultural wastes and plant materials, such as coffee pulp, Camellia sinensis flowers, and Rhus chinensis Mill. leaves. Furthermore, the extract derived from polyols showed higher efficacy in terms of both in vitro and cellular antioxidant activities when compared to their ethanolic extract. In addition, some polyol-based extracts had greater cell viability in skin fibroblasts than ethanolic extracts. Moreover, the utilization of polyols in conjunction with unconventional extraction methods has the potential to enhance the presence of bioactive molecules and their antioxidant ability. Thus, polyol-based extractions can be regarded as environmentally friendly alternatives for extracting bioactive substances and are suitable for implementation in the cosmetic and pharmaceutical industries.

Title: Nontargeted Data Analysis Strategy in Forensic Discrimination of Gasoline based on GC-MS Data and Classification and Regression Tree (CART)

Lee Loong Chuen | Universiti Kebangsaan Malaysia

Abstract:

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

Title: How important is the metal-free catalytic Knoevenagel reaction in Medicinal Chemistry?

Nader Ghaffari Khaligh | **University of Malaya, Malaysia**

Abstract:

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

ORGANIZING COMMITTEE MEMBERS

Pier Giorgio Righetti
Politecnico di Milano, Italy

Fathi Moussa
Head of LETIAM, University of Paris-Sud, France

Cody Coyne
Professor, Molecular Pharmacology and Immunology, Mississippi state university, USA

Ilya G Kaplan
Materials Research Institute, National Autonomous University of Mexico, Mexico

Saeed Fartokhpay
Senior Researcher, University of Lorraine, France

Fabiola Monroy-Guzmn
Instituto Nacional de Investigaciones Nucleares, Mexico

Title: Efficient removal of carbamazepine from aqueous solutions using activated carbon derived from pomegranate peels

Ghassan Awad Albarghouti | Department of Chemistry, Birzeit University, Palestine

Abstract:

Agricultural waste including pomegranate peels (PGPs) is widely used as a removal method for various pollutants from various aquatic environments as it is considered inexpensive, efficient and simple to use. The present study investigates the removal of carbamazepine (CBZ) from aqueous solutions by activated carbon (AC) derived from PGPs. CBZ is an anticonvulsant and analgesic which is recently been detected in various water systems, and it is considered a non-biodegradable pharmaceutical that may be toxic to the aquatic system at high concentration levels.

Characterizations of carbonized adsorbent was done by Fourier Transform Infrared (FTIR) and analysis of CBZ were made by Ultraviolet (UV) spectrophotometer. The effect of various parameters (including pH, temperature, CBZ initial concentration, quantity of carbonized PGPs adsorbent, contact time) was studied regarding the efficiency CBZ removal by carbonized PGPs.

The highest percentage removal efficiency was 98.0% at 23 °C when the optimum adsorbent dose was determined as 400.0 mg and the CBZ initial concentration was 20.0 mg L-1. The CBZ removal efficiency was not affected by changes in pH values but was slightly enhanced at the outset of the adsorption experiment with increasing temperature. The adsorption kinetics of CBZ on AC-PGPs was well represented by the pseudo-second-order kinetic model. Moreover, the data were well explained by Freundlich and Langmuir isotherm models. The general and potential applicability of this method is presented by using available agricultural wastes as a low-cost source of AC and as an efficient removal method of pharmaceuticals from aqueous solutions.

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

Tri Nguyen | Power Engineering Consulting Company 2 (PECC2), Thu Duc City, HCMC, Vietnam

Abstract:

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

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

Title: Effect of Divalent and Trivalent Cations on Structural, Electrical and Magnetic properties of In Mn substituted M. Type Hexaferrites

Hasan M. Khan | The Islamia University

Abstract:

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

Image:
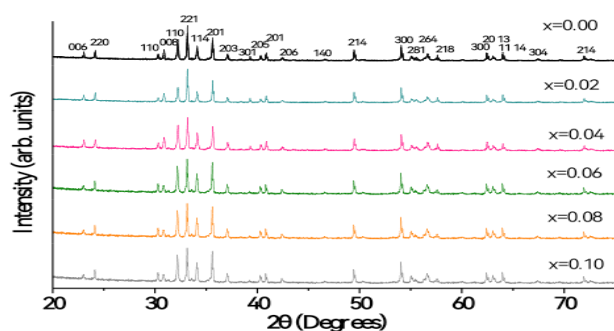
Title: Application of CSM-CANEGRO Model for Climate Change Impact Assessment and Adaptation for Sugarcane in Semi-arid Environment of Southern Punjab, Pakistan

Muhammad Naazir Khan Niazi | Bahauddin Zakariya University

Abstract:

Climate warming poses a serious danger to the production of the sugarcane crop. Crop growth simulation models offer the capacity to assess the impact of climate change and management practises on sugarcane crop growth and production. Crop growth simulation models generate simulations based on the relationship of genotype, management, and environment. The study was carried out with the goals of (1) calibrating, evaluating, and using the CSM-CANEGRO-Sugarcane model and (2) assessing climate change and developing adaptation strategies for industrial (spring and autumn crops) and non-industrial (summer crop) sugarcane. Two field experiments regarding industrial sugarcane were carried out at Multan in Pakistan during 2013–2014 and 2014–2015 and two field trials regarding ponda chewing sugarcane (non-industrial, thick, soft and juicier sugarcane) at Vehari in Pakistan during 2017 and 2018. Calibration and evaluation of CSM-CANEGRO-Sugarcane model showed that all model statistical parameters were attained under satisfactory range. Results indicated that average temperature is raised almost 0.9 °C during baseline weather data (1980–2018), whereas according to diverse climate projections by GCMs, average temperature 3-5 °C can be increase during mid-century. Therefore, if adaptation strategies are not adopted then as a result, sugarcane yield will be lessened ranging from 15 to 23% under various GCMs during mid-century. Adaptation strategies such as 18 to 25 days advance planting, increasing 15% N application dose and increasing frequency of irrigation and growing heat tolerant and more thermal time demanding cultivars can reduce the harmful influence of climate warming during upcoming decades.

Title: Kinetic and Isotherm studies on removal of hexavalent chromium by nano-bentonite

Ashok Kumar Jha | Bhagalpur University

Abstract:

In the present study, an adsorptive removal was developed using nano-bentonite of Rajmahal hills. Nano-bentonite was prepared by adopting ultrasonic process or chemical method and characterized by FTIR, SEM, XRD, TGA, and DTA. The BET surface area was known by adsorption of N2 gas on bentonite at -95oC. Freundlich and Langmuir adsorption isotherm models were tried to see the best fit. The experimental data showed the best fit for Freundlich isotherm. The percentage removal was also recorded with a fixed amount of nano-bentonite up to different intervals of time. The optimum conditions such as pH, agitation time, and sorbent doses were determined for removal of Cr(VI) from aqueous medium. The kinetic studies were done based on first order, second order, and intra particle diffusion model. The regeneration of bentonite was also done for its reuse.

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

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

Title: Dune Sand Stabilization using Sustainable Pozzolanic Cement Supplementary Material

Manish V Shah | L D College of Engineering, Ahmedabad

Abstract:

Due to increasing trend of urbanization and industrialization, it is required to make transportation more feasible and accessible. But always it is not so easy due to presence of very problematic soils at the proposed pavement construction site. One of such problematic soils is dune sand which occupies major land portion in regions like Rajasthan and Kutch of Gujarat, India. Dune sand being collapsible and due to lose formation, is not suitable at all to use it as subgrade material. So, it is required to stabilize such soil to increase its strength and decrease collapsibility by binding all sand grains together. Still, production of several harmful gases in environment during production of cement sets a limit on its use. Also, there is a disposal problem of the wastes generated in industries which not only occupy land but degrade the quality of environment and have pozzolanic property also. So, considering both problems, there is necessity to use these wastes in productive manner. The aim of this research study is to improve engineering properties of 'dune sand' using sustainable and pozzolanic cement supplementary wastes based on macro-molecules interaction with quartz silica of dune sand and interaction chemistry of waste material. This will also limit the use of cement by partially replacing it in stabilization of such soils. According to provision given by IRC, the most suitable stabilizer was found to be cement due to its pozzolanic reaction with water in presence of silica. This pozzolanic reaction takes place between $Ca(OH)2$ and $Sio2$ which ultimately results in formation of C-S-H (calcium silicate hydrate) gel which binds all soil grains and increases the strength and by replacing the cement with pozzolanic waste materials make more presence of silica and alumina which are primarily responsible for pozzolanic reaction. Additionally, such wastes in finely divided form are having more specific surface area available for pozzolanic reaction and also fill the pores present between sand grains. In this study, UCS and CBR samples are prepared at maximum dry density to determine strength that satisfies criteria given in IRC. Addition of optimum cement content is then replaced by varying percentages of pozzolanic wastes which are Wheat Straw Ash (WSA), Nano-Silica (NS) and Fluid Catalytic Cracking Catalyst Residue (FC3R). Thus, the parameters involved in subgrade design are analyzed. Also, the improvement in pore structure of stabilized soil and a pozzolanic reaction is analyzed using microscopy.

Title: Improvement of Fatty Acid Based Nutritional Quality of Fish During Frying Using Artificial Intelligence

Jitamanyu Chakrabarty | National Institute of Technology Durgapur

Abstract:

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

PEERS ALLEY
M E D I A

Title: Is samarium hexaboride a strong topological insulator?

Partha Goswami | **University of Delhi**

Abstract:

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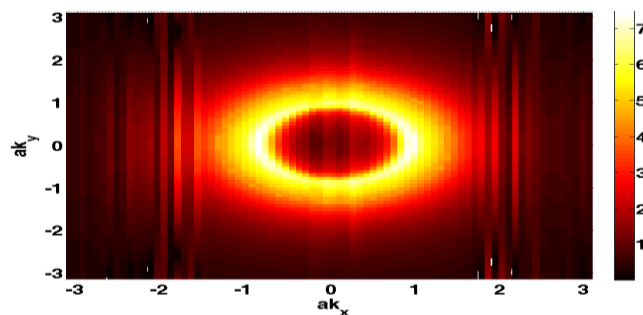
Contour plot of the Berry-curvature in the z-direction for M=0.08 as a function of the dimension-less wave vector components ak_x and ak_y.

PEERS ALLEY
M E D I A

Title: Computational studies on the photochemical reaction paths of cyclic nitrones and dinitrones

Anjan Chattopadhyay | **Birla Institute of Technology and Science (BITS)**

Abstract:

Experimental studies on the photochemistry of methyl-substituted pyrroline 1-oxides, 2H-imidazole-1-oxides and 2H-imidazole-1,3-dioxides have been reported long back. However, the actual mechanisms leading to their photoproducts were not known for many years. In the last one decade, our group has thoroughly investigated and revealed these photochemical reaction paths through studies on their ground (S0) and excited (S1 and S2) states using high level quantum mechanical calculations. In each case, photo-excitation of the cyclic N-oxide was found to form the photoproduct oxaziridine through a low-lying S0/S1 conical intersection (CI). The oxaziridine geometry consists of a heterocyclic CNO ring, slightly twisted upward or downward with a lone pair on nitrogen. The 2H-imidazole-1,3-dioxide systems were found to be involved in a 2-step photo-process, each step involving a low-lying conical intersection (S0/S1) which finally forms trans and cis dioxaziridines. Though the oxaziridine photo-conversion pathways of all these cyclic N-oxides are not significantly different, stabilities of these photoproducts are not similar and subsequently led to other products, in few cases. The oxaziridine obtained from DMPO and 3-Me DMPO (DMPO= 5,5-dimethyl-1-pyrroline 1-oxide) were less stable and found to convert easily to lactam through a [1,2]-H shift while the same for 2-Me DMPO (no H at 2-position) has to overcome a huge barrier to form this cyclic amide. This is in line with the experimental results which reported that heating at 3000C is required to form lactam in the latter case while this conversion is easier in the other two cases. Some other methyl-substituted pyrroline 1-oxides were reported to form multiple products (pyrroline, N-acetyl azetidine) on prolonged photo-irradiation and our computational studies were able to track all these reaction paths. The two diastereomeric dioxaziridines obtained as photoproducts from 2H-imidazole-1,3-dioxides were more stable than their oxaziridines where the latter can give back the parent dinitrone systems under heating. Overall, these studies have addressed most of the unanswered questions related to the photochemistry of these cyclic systems. Currently, our group is involved in exploring the photo-isomerization pathways of few other categories of important cyclic nitrone systems.

ORGANIZING COMMITTEE MEMBERS

Pier Giorgio Righetti
Politecnico di Milano, Italy

Fathi Moussa
Head of LETIAM, University of Paris-Sud, France

Cody Coyne
Professor, Molecular Pharmacology and Immunology, Mississippi state university, USA

Ilya G Kaplan
Materials Research Institute, National Autonomous University of Mexico, Mexico

Saeed Fartokhpay
Senior Researcher, University of Lorraine, France

Fabiola Monroy-Guzmn
Instituto Nacional de Investigaciones Nucleares, Mexico

Title: Characterization and Optimization of Process Parameters of DLP based Stereolithography

Baban K. Suryatal | National Council for Vocational Education and Training

Abstract:

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

Title: Controlled in-line cooling setup for heat treatment of Pearlitic Rail Steels

M. Kalyan Phani | OP Jindal University

Abstract:

Recent trends in railway transportation have been focused on enhancing axle load capacity and increasing operational speed. As a result, rail steel is being subjected to more rigorous operating conditions. An essential goal in the advancement of new rail materials is the enhancement of their wear resistance. By employing head-hardened rails and implementing a suitable maintenance strategy, a notable reduction in overall life-cycle expenses can be achieved. Aligned with the Government's "Make in India" initiative, JSPL has successfully implemented a Head Hardened Rails system. As the exclusive manufacturer of Head Hardened Rails in the nation, JSPL is positioned to play a pivotal role in the expansion of India's rail infrastructure. The pioneering installation of the first-ever rail head hardening technology in India was initiated at Jindal Steel and Power Ltd, Raigarh.

To facilitate the optimization of the unit installed at JSPL's rail rolling mill, a "Rail Head Hardening prototype" system was devised. A similar controlled cooling process was executed on the rail cooling rig, involving extensive research, numerous trials, and the application of various customized cooling protocols. These efforts aimed to attain the desired microstructure and hardness distribution across the rail head with exceptional precision and operational adaptability. This article outlines the fundamental concepts behind Rail Cooling Rig Design and empirically investigates the impacts and interplay of the primary factors governing the cooling process.

PEERS ALLEY MEDIA

Title: Effect of TiB2 Particles on the Morphological, Mechanical and Corrosion Behaviour of Al7075 Metal Matrix Composite Produced Using Stir Casting Process

J. Suresh Kumar | **Anna University**

Abstract:

Aluminium metal matrix composites are lightweight high-performance materials mostly applicable in aerospace, automobile and marine applications. In this study, the morphological, mechanical and corrosion behaviour of Al7075 metal matrix composites were investigated to find the effect of reinforcement of TiB2 particles for various weight percentage. Al7075-TiB2 composites were developed by reinforcing the 3–5 µm size TiB2 ceramic particles using stir casting process. The particles with different weight percentage of 2, 4, 6 and 8 were uniformly reinforced with the help of the mechanical stirrer. The energy dispersive X-ray diffraction (EDAX) pattern confirms the presence of TiB2 particles in the composites. SEM and optical microstructures clearly revealed the uniform distribution of TiB2 particles in the aluminium matrix. The additions of TiB2 particles enhance the tensile strength and micro hardness due to the strong interface and load sharing between the matrix and the reinforcement particles. Dry sliding wear test was conducted by varying the applied load and sliding distance. SEM microstructure of worn surfaces shows that addition of TiB2 particles decreases the wear rate due to the presence of stiffer and stronger reinforcement particles. The electrochemical potentiodynamic polarization and salt spray test were also conducted to study the corrosion behaviour of the Al-TiB2 composites. SEM microstructures confirm the occurrence of pitting corrosion and shows that addition of TiB2 particles improves the corrosion resistance.

Title: An Intensity-Modulated Optical Fiber Sensor with Sol Gel Coating for Measurement of Refractive Index

Jayprabha Vishal Terdale | A.C.Patil College of Engineering

Abstract:

The refractive index (RI), which represents the substance's optical characteristics, is a vital optical measurement. The principle of operation is based on intensity modulation, evanescent field and scattering of light. The intensity modulation sensors are popular for their accuracy and ruggedness. They require inexpensive non-coherent source such as Light Emitting Diode (LED). The modulation of optical light intensity in the sensor happens as a collective effect of combination of agarose and chitosan sol gel coating on the cladless sensing region, sensing length, and analyte's (sucrose solution) RI profile surrounded to the coating. A unique aspect of the developed sensor is the analysis of sensor performance is done by immersing the coated sensing region of the sensor in the prepared sucrose concentration. The samples of different concentrations of sucrose in distilled water were prepared for different refractive indices and measured by Abbe's refractometer (DR-194). Due to the absorbance, scattering and pore size of agarose and chitosan coating, sensitivity of the sensor is enhanced with the coating on the claddless core with polishing depth of 250 μm. The experiments were carried out for the clad removed fiber with and without sol gel coating. Sensor with combination of 20% of agarose and 80% of chitosan coating and 2 cm sensing region at higher wavelength (RED LED) has shown better sensitivity as compared to all other fabricated sensors. The sensor has shown good reproducibility. The coating is formed with the sol-gel technique. The microcontroller-based optical bench is designed to ensure that the intensity of light source remains stable. The Electrical to Optical convertor is vital for maintaining the light source's stability. It boots the fidelity in the sensor output. The optical test bench helps in eliminating the effect of dark current and stray radiations. This sensor is biocompatible, tiny and inexpensive.

Title: Introducing the Vitrification potential as a poly-categorial Glass-Forming Ability criterion for metallic glasses

Abdelmalek Roula | M. S. Benyahia University

Abstract:

Glass scientists always consider the aptitude for glass formation of any melted material with a lot of thermal criteria. Among them, the Crystallization Driving Force seems to be the most effective because considering that ''both the stability of the liquid phase and the resistance of the glass against crystallization'': CDF= 〚(CDF)〛 _T/(R.T) where ∆G, T and R are the Gibbs free energy change for solidification, temperature and the universal gas constant, respectively. Aiming to describing the vitrification as opposite phenomena to the glass formation, authors suggests to amend the CDF criterion with the Relative Glass-Forming Ability "RGF" "A" ^"BMG" =1/((〚CDF)〛_(l-g))=(R.(T_l-T_g))/("∆" "G" _(l-g)) (2) using the CDF inverse mathematical formulation in one hand and the ∆Tl-g = (Tl-Tg) instead of any other chosen temperature or temperature range (not Tl, Tx, Tg nor (Tx – Tg) neither (Tl – Tx) in the other hand. ∆Tl-g is the representative temperature interval where the competition Vitrification Vs Crystallization is occurring (not before, staring with nucleation and ending at Tg and nor after). The application of this model with technical data of different metallic glasses systems revealed a strong correlation with Dmax and Rc and therefore has proven its suitability to quantfy the GFA of melted solid materials. For a better and easier reading of these values, author introduces the Vitrification potential as pV= 〚log〛_10⁡〖〚("RGF" "A" ^"BMG")〛 and finally, discusses the results with a comparative statistical analysis and some adequate graphical representations.

Title: Electronic, magnetic and elastic properties of hexagonal YMnO3 oxide at high temperature: Insights from ab initio study

Abdelhakim Chadli | University of Biskra

Abstract:

The h-YMnO3 compound at high temperature in the paraelectric phase, which has hexagonal centro-symmetric structure and conform to the P63/mmc space group, has been investigated using generalized gradient approximation (GGA), the density functional theory (DFT) and the full-potential linearized augmented plane wave method (FP-LAPW) implemented in the Wien2k code in the ferromagnetic ordering (FM). The mechanical stability, the electronic, magnetic, elastic and anisotropic properties have been investigated after the well-optimized structure. The agreement of our calculations including internal atomic relaxations, with the experimental data is very good. The spin-polarized electronic band structure exhibit metallic behavior using GGA approximation with band gap equal to zero, while a semi-conductor band structure is observed including the modified Beck-Jonson approach (TB-mBJ) with a low band gap equal to 0.4 eV. Excluvely, the total magnetic moment of h-YMnO3 is carrying by the Mn atoms. Its value is equal to 3.634 µB and 3.632 µB per formula using the both approximations GGA and GGA+TB-mBJ, respectively. Moreover, the calculated elastic constants verify that our material is stable mechanically satisfying the Born stability criteria. The estimated anisotropy factors show that h-YMnO3 has a strong anisotropic character. Other relevant quantities namely bulk and shear moduli, compressibility (β), Young's modulus (Y), Poisson's ratio (ν) and Lamé coefficients (μ, λ), are performed.

Title: Ionic conductivity of B2O3-NaSICon type glass-ceramics

Nedjemeddine Bounar | University of Jijel

Abstract:

The glass-ceramics belonging to the Li2O-SnO2-P2O5 system were prepared by adding different amounts of B2O3. The starting glasses were obtained by the melt-quenching technique and the glass-ceramic samples were then, prepared by a one-step heat treatment. The glass-forming ability of the glass starting materials, the crystallisation tendency and the ionic conductivity of the corresponding glass-ceramics were also examined. The glass-ceramic samples were then examined by X-ray diffractometry, differential thermal analysis, and electrochemical impedance spectroscopy and scanning electron microscopy. According to the results, the addition of 2.0 mol % B2O3 to the glass composition resulted in a large increase in ionic conductivity at room temperature. Thus, the overall conductivity of the ''heat-treated at 900 °C for 6 h'' sample was measured to be 1.67×10^{-3} S.cm^{-1}, which is 8 times higher than that of the base glass-ceramic without additive. The increase of B2O3 amount reduced the conductivity and crystallinity of the glass ceramic.

Title: Electrical Conductivity, Microstructures, Chemical compositions, and Systematic Multivariable Models to Evaluate the Effect of Waste Slag Smelting (Pyrometallurgical) on the Compressive strength of Concrete

Ahmed Salih Mohammed | **American University of Iraq**

Abstract:

Concrete is a composite material widely used in construction. Waste slag smelting (Pyrometallurgical) (Steel slag (SS)) is a molten liquid melt of silicates and oxides created as a by-product of steel production. It is a complex solution of Silicates and Oxides. Steel slag recovery conserves natural resources and frees up landfill space. Steel slag has been used in concrete to replace fine and coarse particles (gravel). Three hundred thirty-eight data points were collected, analyzed, and modeled. It was determined which factors influenced the compressive strength of concrete with steel slag replacement in the modeling phase. Water/cement ratio was 0.3–0.872, steel slag content 0–1196 kg/m3, fine aggregate content 175.5–1285 kg/m3, and coarse aggregate content (natural aggregate) 0–1253.75 kg/m3. In addition, 134 data were collected regarding the electrical conductivity of concrete to analyze and model the effect of SS on electrical conductivity. The correlation between compressive strength and electrical conductivity was also observed. This research used a linear regression (LR) model, a nonlinear regression (NLR) model, an artificial neural network (ANN), a full quadratic model (FQ), and an M5P-tree model to anticipate the compressive strength of normal strength concrete with steel slag aggregate substitution. For predicting the electrical conductivity, the ANN model was performed. The compressive strength of the steel slag was raised based on data from the literature. Statistical techniques like the dispersion index and Taylor diagram showed that the ANN model with the lowest RMSE predicted compressive strength better than the other models.

Title: Utilizing choline chloride-containing DESs to extract value-added compounds from tomato pomace and incorporating them into cosmetic emulsion

Liudmyla Khrokalo | National Technical University of Ukraine

Abstract:

The aim was to evaluate the efficiency of environmentally-friendly choline chloride-based deep eutectic solvents (DESs) in extracting phenolic compounds and utilizing them in cosmetic products. The extraction process was optimized by sonication using. Two types of DESs were investigated, the first one was choline chloride : 1,2-propanediol (1:2 v/w) : water (10% w/w); the second was choline chloride : lactic acid (1:2 v/w) : water (10% w/w). The choline chloride is chosen as hydrogen bond acceptor due to its low cost, low toxicity, biodegradability, and biocompatibility, meanwhile, D,L-lactic acid and 1,2-propanediol are selected as hydrogen bond donors. Compounds are renewable and keep a liquid state at room temperature. To gauge the overall antioxidant capacity of the extracts, the phosphomolybdenum method was employed, while cyclic voltammetry was utilized to evaluate the redox potential. Additionally, the ζ-potential, colloidal stability, and antioxidant activity of the final cosmetic product were examined. The tomato pomace extracts were found to contain substantial quantities (26–37% from total amount) of phenolic acids and flavanols. Chlorogenic acid emerged as the predominant phenolic compound within the tomato pomace extracts, ranging 37.23–52.33 μg/g. The total antioxidant activity of extracts displayed variation from 408 to 511.18 μg/g. Choline chloride-based DESs exhibited notably low oxidation potential values. ζ-potential ranged from –0.0102 to –0.0594 mV, that is showed the middle stability of emulsions in cosmetic product. Upon assessment, it was determined that the antioxidant hierarchy within the cosmetic emulsions was as follows: emulsions containing extracts obtained from choline chloride: lactic acid deep eutectic solvent demonstrated the highest efficacy, followed by emulsions incorporating extracts from choline chloride:1,2-propanediol deep eutectic solvent. Moreover, the antibacterial and antifungal activities of these cosmetic emulsions were evaluated against Bacillus subtilis (poorly expressed), Escherichia coli (not registered) and Candida albicans (excellent expressed)

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

Imane Lebkiri | **Ibn Tofail University**

Abstract:

In this study, anionic polyacrylamide hydrogels (APAM) were used to remove three dyes, namely Crystal Violet (CV), Methylene Blue (MB), and Safranine (SF), from an aqueous solution. APAM hydrogels demonstrated excellent dye adsorption performance. The objective was to investigate and evaluate the efficiency of dye removal for the three dyes by examining the influence of different parameters: initial dye concentration (A), adsorbent dosage (B), and solution pH (C). As a first step, a customized design (CD) based on response surface methodology (RSM) was used to build predictive models and optimize the reduction of the three dyes. Twenty-six sets of experiments were conducted to assess dye removal performance based on these three parameters. The results revealed that the efficiency of dye removal for all three dyes exhibited similar trends in response to the three parameters. An increase in the initial dye concentration (A) led to a decrease in the removal efficiency, while higher adsorbent dosage (B) and elevated pH levels improved the removal efficiency for all three dyes. Analysis of variance was utilized to study the variables and their interactions. The predictive models showed a strong correlation between experimental and predicted values, with a coefficient of determination (R^2) exceeding 0.86 for all three dyes. In addition, the optimal values of the three parameters were verified to maximize the removal efficiency of the three dyes, thereby enhancing the overall quality of the treatment process. In a second step we further investigated the adsorption kinetics and isotherms of CV, MB, and SF onto APAM. The results indicated that the Langmuir isotherm provided the best fit to the experimental data and both the first-order and second-order kinetic models provided a good fit.

Title: Inclusion membranes for the facilitated extraction and recovery of Co (II)and Ni(II) ions form acid medium

Zakaria Habibi | University of Hassan II Casablanca

Abstract:

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

Functional recycling of lithium-ion batteries would meet both economic and environmental needs. It would ensure the continued availability of cobalt and nickel for industrial applications and allow waste reduction.

The majority of heavy elements are toxic and harmful to living organisms, even at low concentrations.

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

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

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

Title: Applications of FTIR and chemometrics methods in authenticity analysis of walnut oil

Moulouda El Mouftari | Université sultan Moulay Slimane

Abstract:

This study focuses on detecting and evaluating the adulteration in nut oil, which can cause health and food dangers. The two adulterants used during this study are cheaper vegetable oils and present a similar property with walnut oil, sunflower oil with a falsification percentage of 5.80–31.95%, and rapeseed oil with 4.33–29.37%. This adulteration was studied using Fourier transform infrared spectroscopy (FTIR) coupled with chemometrics, a new and specific approach. The spectra of the studied samples were determined by FTIR and were analyzed by PLSR and PCR with two sorts of pretreatment, normalization, and first derivation. The results showed different functional groups of the nut oil. The most appropriate pretreatment that provides reliable calibration values (RMSE) and prediction (RMSEP) is the normalization preprocessing in the range of 3050 to 700 cm−1. The chemometrics results give the best model selected in the PLSR with an R^2 of 0.998 for sunflower oil and 0.999 for rapeseed oil. According to this study, we have solved nut oil falsification by developing a chemometrics model that can detect and evaluate this adulteration.

Title: Acid-Base Pretreatment and Enzymatic Hydrolysis of Palm Oil Mill Effluent in a single reactor system for production of fermentable sugars

Tawfikur Rahman | International University of Business Agriculture and Technology

Abstract:

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

Title: Mixed convection in a double lid-driven wavy shaped cavity filled with nanofluid subject to magnetic field and internal heat source

Kakali Chowdhury | Presidency University

Abstract:

A numerical investigation is carried out to analyze the impacts of heat source, solid concentration of nanoparticles, magnetic field, and Richardson number on fluid flow, heat transfer and temperature field in an oppositely directed lid-driven wavy-shaped enclosure. The left and right vertical walls of the enclosure are cooled isothermally and moving with a constant velocity in the upward and downward directions respectively. The bottom wall is wavy shaped and isothermally cooled as the vertical walls while the top wall is kept adiabatic. A rectangular heat source is placed horizontally in the center of the enclosure. A uniform magnetic field is applied in the negative $x-$

$axis$ direction normal to the vertical walls. The physical problems are characterized by 2D governing partial differential equations accompanying proper boundary conditions and are discretized using Galerkin's finite element formulation. The study is executed by analyzing different ranges of geometrical, physical and non-dimensional parameters namely, the ratio of heat source length and cavity length ($0.2 \leq b \leq 0.6$), solid concentration of nanoparticles ($0 \leq L\ \varphi \leq 0.09$), Hartmann number ($0 \leq Ha \leq 70$), and Richardson number ($0.1 \leq Ri \leq 10$). The results indicate that, the ratio of b and magnetic field have negative influences whereas the volume L fraction of nanoparticle and Richardson number have positive influences on heat transfer. More specifically the result of this investigation shows that, the lowest value of the ratio of $b = 0.2$ gives L the maximum heat transfer rate in the natural convection regime. With the increasing value of Ha from 10 to 70, heat transfer rate is decreased by 23% in base fluid but 25% in nanofluid with 6% of copper nanoparticle. Average Nu is upsurged by 8%, 16% and 24% for nanofluid with solid volume concentration 3%, 6% and 9% respectively in comparison with that of pure base fluid.
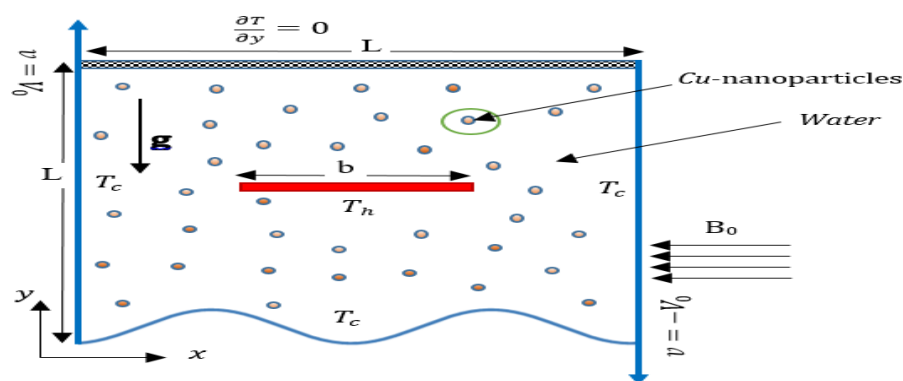
Title: Process Validation of Some Important Pharmaceutical Products in the Light of cGMP and cGLP

Modhusudan Shome| Rajshahi University

Abstract:

At present the world wide recognized regulatory bodies such as World Health Organization (WHO) and Food & Drug Administration (FDA) stipulate very strict criteria for quality assurance of healthcare products. From these increasing concerns about the quality of healthcare products evolved the concept of Pharmaceutical Validation, which is a modern tool for the assurance of quality of healthcare products. According to the WHO cGMP & cGLP guidelines, EU-GMP and FDA guidelines, Pharmaceutical Validation is a must to ensure the quality of the pharmaceutical products. Validation is concerned with those aspects such as quality, safety, and efficacy of pharmaceutical products, which may be affected through manufacturing process carried out on any scale. It has become a major pharmaceutical issue throughout the world. Regulatory agencies now expect all pharmaceutical operations to be in a state of validation as a mean of ensuring that products and services are of consistently high-quality day to day, year to year, batch to batch and from one facility to another. Although Pharmaceutical Validation has become an established norm in the pharmaceutical operations throughout the first world countries, but very few of the Bangladeshi pharmaceutical companies as well as third world countries have adopted this important and effective mechanism in their quality assurance program. And among the very few companies those are trying to follow validation process, almost none has been able to comply with all the elements of the Pharmaceutical Validation Process. Therefore, it is obvious that there is a very good scope to study how the pharmaceutical companies of Bangladesh and other third world countries and their users of healthcare products can be benefited from the adoption of Validation process in the operations of pharmaceutical companies. Therefore, this validation process will be strongly contributed to the overall quality, safety and economy of the healthcare products and consequently human health.

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

A. Stage-1: Process Design I. Building & Capturing Process Knowledge & Capability II. Establishing a strategy for Process Control B. Stage-2: Process Qualification I. Design of a Facility and Qualification of Utilities and Equipment II. Process Performance Qualification III. Process Performance Qualification-Protocol IV. Process Performance Qualification-Execution & report C. Stage-3: Continued Process Verification

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

Title: Potential serum biomarkers for early detection of diabetic nephropathy

Tarek Kamal Motawi | **Cairo University**

Abstract:

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

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

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

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

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

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

Conclusion: Our results suggest that serum NGAL and bTP as tubular and glomerular markers respectively, together with serum miR-130b may be independent and reliable

biomarkers for early detection of DN in patients with T2DM

Title: Technical and economic investigation of stabilized clayey track with RRP$_{235}$special

Hossein Ghorbani Dolama | Islamic Azad University

Abstract:

Construction of transportation facilities on the clayey soft soil has high investment costs. Significant maintenance cost and time-consuming operations have been encountered due to presence of clay. Using the Royal Road Product (RRP235 Special), as an innovative method for the first time, the layers underneath the sleeper have been replaced with the clayey subgrade stabilized with RRP 235 special. A series of static and dynamic lab experiments such as Maximum Compaction test, California Bearing Ratio, Unconfined Compressive Strength, Brazilian Indirect Tensile test, Direct Shear Strength, and Uniaxial Cyclic tests were carried out. Samples with different dosages of additive were made, and an optimal percentage was found. As a result, the sample with 0.15 lit/m3 RRP235 Special was determined as the suitable dosage in terms of mechanical and physical tests, while only in the Maximum Compaction test, by increasing the additive, the optimum water content decreased. The use of this method will reduce the need for raw materials and, as a result, decrease the environmental impacts. Also, due to the use of in situ materials, the costs of transportation will be significantly reduced. Evaluations illustrated 20 to 60 percent construction costs reduction.

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

Edy Sanwani | Institut Teknologi Bandung, Indonesia

Abstract:

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

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

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

Title: Loading zinc oxide nanoparticles on carbon nanotubes for the electrochemical measurement of blood cholesterol

Davood Ghanei Agh Kariz | Islamic Azad University

Abstract: Cholesterol (C27H46O) is one of the most important biomolecules and is one of the essential components of body. Its major role is to provide strength and flexibility to the biological membrane of cells and is present in several nerve tissues, brain and also serves as a source for preparation of fatty acids. Despite the undeniable importance of cholesterol, the excessive amounts of it can be dangerous for human health. Biocompatible nanomaterials open a promising field toward the development of enzyme-based electrochemical biosensors. Sensors based on carbon nanotubes (CNTs) have shown excellent performance in determining biomolecules such as cholesterol, and many others. In this work, a new sensitive enzyme-based electrode for electrochemical cholesterol biosensor was fabricated based on a nanocomposite of Au nanoparticles, ZnO nanoparticles and multi-wall carbon nanotubes (ZnO/MWCNTs). The nanocomposite was prepared by sol–gel method and deposited on FTO substrate by dip coating, followed by cholesterol oxidase (ChOx) enzyme immobilized (ChOx/ZnO/MWCNTs). Structural properties and morphology of the nanocomposite have been studied using X-ray diffraction (XRD) and Field emission scanning electron microscopy (FESEM). The sample was subjected to Fourier transform infrared spectroscopy (FTIR) to determine functional groups. Electrochemical behavior of the electrode was studied by cyclic voltammetry (CV) and differential pulse voltammetry (DPV) techniques as a function of cholesterol concentration. Electrochemical impedance spectroscopy (EIS) was also considered to study of surface modified electrodes. The ChOx/ZnO/MWCNTs electrode has been found to have enhanced electron transfer and display excellent analytical linear performances. The fabricated electrode exhibited low detection limit (1 µM), high sensitivity (12.49 µA/µM) evaluated from DPV data in the detection range of 0.1–100 µM and high selectivity in the determination of cholesterol over glucose and uric acid. The application of the ChOx/ZnO/MWCNTs electrode in detection of cholesterol in human serum was also confirmed.
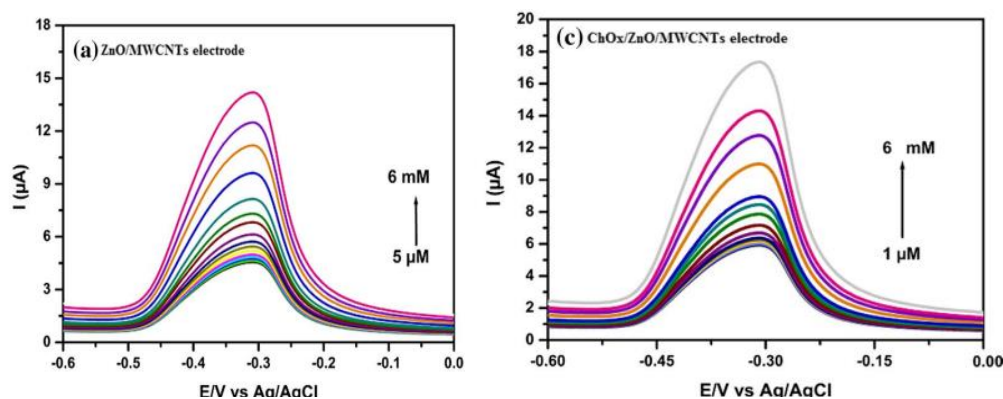
Title: Beyond the environmental Kuznets curve: Do combined impacts of air transport and rail transport matter for environmental sustainability amidst energy use in E7

Benjamin Ampomah Asiedu | Cyprus international university

Abstract:

This study is motivated by the United Nations Sustainable Development Goals (UN-SDG-7,8,11,12 and 13) on the need for clean and responsible energy consumption in view of anticipated actions for environmental sustainability. The world has been plagued with various consequences of environmental degradation including the attendant risks of climate change which has been exacerbated by rising greenhouse gas (GHGs) emissions over the years. To this end, we explore the combined effect of rail, air transportation, and urbanization in an EKC framework for the case of the E7 economies between 1995 and 2016. This study distinguishes itself from the extant ones by extending the EKC framework to explore the nexus between air transport, rail transport, urbanization, and the environment. The empirical evidence obtained from the study is based on second-generation panel econometric methods that are robust to heterogeneity and cross-sectional issues. Firstly, the findings lend support to the EKC phenomenon for E7 economies, thereby, implying that emphasis is placed on higher-income status in the bloc relative to environmental sustainability. Secondly, conventional energy from fossil fuel and air transport significantly dampen environmental quality among the E7 economies. Thirdly, rail transport and urban population, on the contrary, strongly aid the improvement of environmental quality among the E7 countries thus underscoring the significance of green urban mass (rail) transportation to the environmental sustainability agenda. Hence, in view of the economic growth trajectory among the E7 economies, useful policy blueprints were highlighted in the concluding section of the study.

Title: Strong Nuclear Interaction and Acquisition of the Mass

V.G. Plekhanov | Tartu State University

Abstract:

The well-known coefficient - the binding energy of a proton with an electron (13.6 eV) is contained in any book on atomic physics. Being the second particle in the nucleus of an atom, the neutron, whose properties have not been studied as fully as that of the proton. The demonstration of what has been said is the lack of knowledge about the neutron-electron binding energy [1]. We add that the estimate of the radius of action of nuclear forces is obtained from the scattering of 10 MeV neutrons by protons. This report is devoted to the results of non-accelerator study of strong nuclear long-range interaction in the mass isotope effect by the modern method of low-temperature optical spectrjscopy of condensed matter. This became possible after the discovery that the addition of one neutron causes global changes in the macroscopic characteristics of a solid. The observation of an isotopic shift (0.103 eV) of the zero-phonon line of free excitons in the luminescence spectra of LiH (without strong interaction in the hydrogen nucleus) and LiD (with strong interaction in the deuterium nucleus) crystals was the first and direct evidence of the long-range interaction of the Yukawa potential. Indeed, in both crystals, the lithium ions, the proton and the electron are the same and, therefore, the gravitational, electromagnetic and weak interactions are the same, and the addition of a neutron, according to Yukawa, a strong interaction appears, the influence of which manifests itself in the isotopic shift. These experimental results demonstrate the neutron-electron binding energy (0.105 eV) which is in excellent agreement with the theoretical Breit [2] estimate of 0.1067 eV. It was found that the maximum value of the strong long-range coupling constant in the deuterium nucleus is 2.4680. Another вright effect of the new physics is associated with the isotopic creation of mass by massless fermions (leptons) in graphene [3]. This mass creation mechanism was predicted more than 15 years ago by B.L. Ioffe [4] for low-energy elementary excitations that do not require huge excitation energies of modern accelerators.

SPEAKER'S TESTIMONIALS

ADV. CHEMISTRY 2023

https://advanced-chemistry.peersalleyconferences.com/

Testimonials

Placida Baz
University of Buenos Aires, Argentina

It was a really excellent experience at this event.

The quality of the speakers and their international presentations, the kindness of the hosts were the most remarkable things to point out. It was a very good opportunity to make contacts with other scientists and learn about all different subjects. I congratulate you all.

Cemre Avsar
Toros Agri Industry and Trade Co. Inc, Turkey

It was a pleasure for me to participate this international event. The organizing committee were also helpful and friendly. As an industrial participant, it would be better to meet more industrial fellows in these kind of events. The attendees were more likely from universities, it would really be great to see attendees from industry. I am looking forward for your invite to the 2024 event.

Asta Bronusiene
Kaunas University of Technology, Lithuania

The quality of talks was good. Main themes were really good, needful and interesting. It was the first time when I get framed certificate, nice from your side.

At this congress I have met few scientists in similar field of science, so I hope to keep this relationships between in order to collaborate. I think that Peers Alley Media really hardworking due to selecting speakers, because everyone has a high scientific skill.

To sum up everything, I am glad of opportunity to participate and introduce my jobs, expand my knowledge and meet new people. It is very nice that lunches were provided and coffee breaks were at the best time, I do not have enough time to get bored while listen the speeches.

Saliha Chellak
Cadi Ayyad University, Morocco

At first, I am so proud to have been able to join the 4th Edition of Advanced Chemistry World Congress.

I would like to congratulate you for the success of this scientific meeting and for the good organization and the fascinating talks.

All the talks were very interesting.

This participation has really given me a gain of confidence to communicate in English, since I used to do it in French only.

https://advanced-chemistry.peersalleyconferences.com/

Testimonials
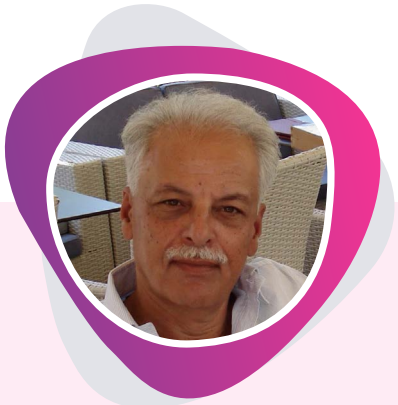
Dimitrios Kotzias
Institute for Health and Consumer Protection, Italy

First of all, I would like to express my thanks to Peers Alley Media for the Certificates of Recognition I received.

The quality of the talks, as expected from renowned scientists, was excellent.

I found new elements in many of the presentations, which enriched my knowledge and could enlarge my professional development.

Peers Alley Media, Canada, did a good job.

Abdolreza Hormati
CEO Manager of the First Producer of Industrial Salt from Sea Water, Iran

Greetings and thank you for holding a very valuable congress in Barcelona

- The venue and halls were excellent.

- The planning and coordination was excellent.

- The articles and lectures were very good and useful.

- The presenters were very good and coordinated.

- The opportunities created for young people and university graduates were excellent and it was successful.

- The communication between the participants was very good

Thank you for a very successful 4th Edition of Advanced Chemistry World Congress in Barcelona.

Sana Shilstein
Weizmann Institute of Science, Israel

First of all idea to collect in rather small sessions significant experts from different fields is in my opinion very interesting and important.

The level of presentations to Advanced Chemistry 2023 was very high.

In my age it is difficult to discuss about own development, but I'm sure that for younger colleagues such kind of experience will be useful. As physicist working in collaboration with archaeological teams I know that new points of view are very productive. Selection of speakers for this event is excellent.

https://advanced-chemistry.peersalleyconferences.com/

Testimonials

Carlos Artur Alves
Centro Universitário Inta - Uninta, Brazil

I had an excellent experience in the chemistry congress. The diversity of the speakers was interesting to my horizontal knowledge. So, I am very happy with the experience. I am very happy for your invitation.

Yuri Feldman
The Hebrew University of Jerusalem, Israel

The congress was well organized. Different fields at the same time. However, everything was well or goes used and went smoothly. I will be happy to join such wonderful meetings in future.

Yuli D. Chashechkin
Ishlinsky Institute for Problems in Mechanics RAS, Russia

Many thanks for the opportunity to give a talk at your remarkable congress.

I was somewhat skeptical about the event at the initial stage of preparation, but my opinion changed when I received the program. The breadth of your geographical coverage made an impression.

I will not make a detailed analysis of the reports, but would like to note that some of the talks I listened to made the strongest positive impression both in the depth of the material and in the originality of the presentation form. Of course, with such coverage, technical failures are inevitable, but you have successfully overcome them. I am sincerely grateful for the opportunity to participate. I wish you success in your future work.

Michel K. Yao
Université Nangui Abrogoua, Côte d'Ivoire

I am also so glad to have joined the Adv. Chemistry 2023 Conference.

CONGRATULATIONS for that GREAT JOB.

https://advanced-chemistry.peersalleyconferences.com/

Testimonials

Eben von Well
ARC-Small Grain Institute, South Africa

The quality of the talks was good. A wide range of topics were covered. It was interesting to listen to presentations that you would not have heard otherwise. This exposure is good for collaboration with other scientists that aren't in your primary research field.

Nataliya Nikolaevna Yazvinskaya
Don State Technical University, Russia

All speakers' presentation reports were interesting.

Udaya K Jayasundara
Institute of Chemistry Ceylon, Sri Lanka

The quality of talks were up to the standard. In fact it exceeded my expectations. I am glad that the abstract booklet was amazingly in high quality. It is a great experience for me.

I am looking forward to present my future work in future as well. Thank you for the opportunity given.

Paras Nath Yadav
Tribhuvan University, Nepal

The content of the congress was quite rich and remarkable. Found platform to present the findings from research. It encouraged me as well as came to know works of scientists from different countries. Peers Alley Media did a good job in selecting speakers for thought-provoking sessions for Adv. Chemistry 2023 congress.

https://advanced-chemistry.peersalleyconferences.com/

Testimonials

Yousef H. Ajeeb
Modern University for Business and Science, Lebanon

I would like to extend my congratulations to you also for the well-organized conference and sure will in touch for future cooperation.

The quality of talks was high and the given presentations were clearly very well-prepared and interesting to listen to.

Attending international conferences is one of the key elements in our professional development as a university professor, so certainly my participation has had a positive impact on the progress of my career.

Peers Alley Media did a great job in selecting their speakers, this was evident in the presented work, although the discussions were sort of limited.

Alexander Krasnovsky Jr.,
Federal Center of Biotecnology Russian Academy of Science, Russian Federation

This meeting was an interesting experience for me. The meeting covered many countries and many specialists and was really well organized. I understand that great job was done by the organizers.

Chi Kwan Tsang
The First Affiliated Hospital of Jinan University, China

Thank you for your invitation. Peers Alley Media, Canada did a good job in organizing the meeting so it could be running smoothly.

Thanks again for the invitation, and I am looking forward to the future congress.

Satyajit Shukla
CSIR-National Institute for Interdisciplinary Science and Technology (NIIST), Indiaa

All the talks were of high quality at Adv. Chemistry 2023. This conference gave me a brief idea about what is going in the other research areas. It looks like relatively large number of speakers were pick-up from the Asian countries; although, few speakers from the European, American, and African countries also participated. It was a good blend of speakers from the different nations and continents which justifies the conference title "World Congress".

I look forward to attending the future conferences organized by Peers Alley Media in the research areas of my interest.

Testimonials

Ali Shaikh Shamser
Energy Conservation Project Management, India

The topics selection and quality of the presentation contents were relevant to the seminar headlines and good.

The topics were thought provoking and presented well. Peers Alley Media, Canada has done the great job. Once again thank you for giving the opportunity to present my paper and I shall be looking forward to receiving the recording of my presentation so that it can be shared with my friends who joined but missed the presentation.

Hadi Barati
Amirkabir University of Technology, Iran

It was my pleasure to attend such a well-organized event. Thank you for all efforts. I am really appreciative of your invitation. I have learnt a lot from the speakers.

The quality of talks was good. It contributed to my professional development greatly. Peers Alley Media, Canada invited most experienced and dynamic speakers from all around the globe.

Katarzyna Kiegiel
Institute of Nuclear Chemistry and Technology, Poland

The quality of talks at Adv. Chemistry 2023 was good. I believe this event could really improve my professional development. It was indeed a great professional and educational experience to listen to the most powerful speaker presentations.

https://advanced-chemistry.peersalleyconferences.com/

SPEAKER'S TESTIMONIALS

ADVANCED CHEMISTRY 2021

https://advanced-chemistry.peersalleyconferences.com/

Testimonials

Dr. Kennedy Chege
University of Cape Town (UCT), South Africa

I would also like to sincerely express my deepest gratitude to you and the Advanced Chemistry team for the opportunity to present at the conference. The conference was very insightful and was conducted professionally. I really had such a wonderful time over the two days of the conference.

I am unreservedly very grateful, and I look forward to presenting at the event in the future.

Antonina Dunina-Barkovskaya
Lomonosov State University, Russia

It was my pleasure to participate in the Congress. Thank you for the high evaluation of my talk. I do think that the congress was very stimulating and useful for the participants in many ways. I wish you success in organizing new conferences.

Dr. Kouassi Innocent Kouame
Nangui Abrogoua University, Ivory Coast

Well done to the organisers, the speakers were of a very high standard and the topics covered were of great quality. The topics were recent and well developed and the research methodology was very good in general. In addition, I really got to know other researchers during these two days. Peers Alley Media, Canada did a great job in terms of the quality of the speakers at this conference and especially the quality of the topics covered.

Ermelinda Falletta
University of Milan, Italy

High quality of the talks and very interesting topics. I appreciated the organizers very much. The conference gave me the opportunity to open the horizons of my research. Absolutely! Peers Alley Media, Canada did a good job.

Testimonials

Carla Sardo
**University of Salerno, Italy**

My opinion on the conference is overall positive and I enjoyed my session.

Alina Diana Zamfir
National Institute for Research and Development in Electrochemistry and Condensed Matter, Romania

The quality of talks are very good to excellent! I adored it. YOU DID A FABULOUS JOB IN ALL SENSES AND ALL ASPECTS!!! THANK YOU FROM THE BOTTOM OF MY HEART ♡🌷
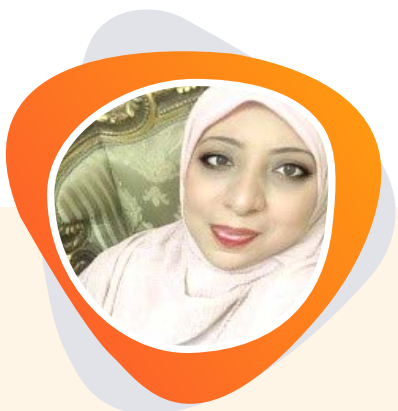
Nesrin M. Morsy
National research Centre, Egypt

The quality of talking at the conference was very good. I loved your conference so much. The conference was contributing the professional development of my career. Peers Allay Media doing good when select all these professionals. I hope all the success for the next conferences.

Mohammad Dahri
Computational Biology and Chemistry Group (CBCG), Iran

Thanks for your excellent conference. I wish I could participate in your future conferences.

https://advanced-chemistry.peersalleyconferences.com/

Testimonials

Antonina Dunina-Barkovskaya
Lomonosov State University, Russia

In my opinion, the talks concerning biological chemistry were of a very high level both in content and quality of presentation. I loved it very much. The congress created an atmosphere of togetherness, despite scattering and isolation due to coronavirus and other problems. We worked as one team, and that was great. Presentations were very interesting to me, i learned a lot of new things, and this is always stimulating and inspiring. And certainly thought-provoking. I'm sure Peers Alley Media did it. In the current conditions it was not easy to organize an international conference, but Peers Alley Media did it. It was really good that we got together, and I am sure everyone involved, myself included, and appreciated it. Many thanks!
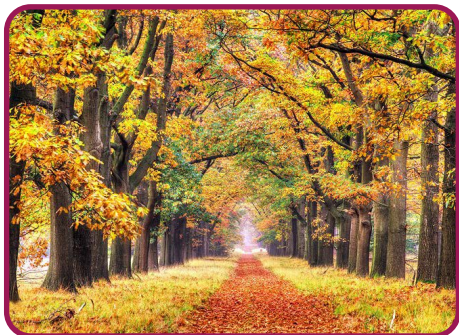
Wishing you every success in your future work.

Amsterdam Royal Zoo

Art Collections at the Rijksmuseum

Dam Square

De Hoge Veluwe National Park, Otterlo

EYE Film Institute Netherlands

Great Art at the Van Gogh Museum

NETWORKING... CONFERENCING... FOSTERING

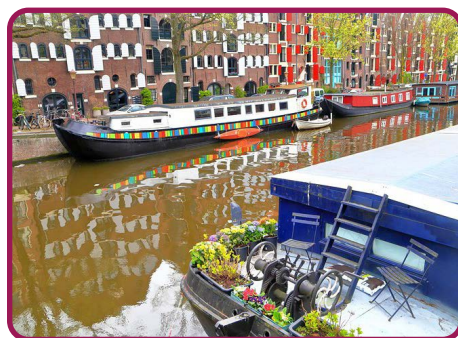### Attending a Conference isn't all about Learning and Networking

DISCOVERING

A right choice of conference destination is an important aspect of any international conference and keeping that in consideration, *Adv. Chemistry 2024* is scheduled in the Beautiful city "Amsterdam'.

Hop-On Hop-Off Bus and Boat

Jordaan and Amsterdam's Canals
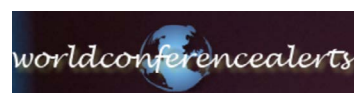

Jordaan Neighborhood

NEMO Science Museum

Oude Haven, Rotterdam

Oude Kerk's Tower

Program Director

Adv. Chemistry 2024

Peers Alley Media

1126 59 Ave East, V5X 1Y9, Vancouver BC, Canada

WhatsApp No: +1 778-244-7702

adv.chemistry@scholarsdebate.org

CONNECT US