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3rd European Congress on

Chemistry and Applied Sciences

June 24-25, 2024 | Amsterdam, Netherlands

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Conference Programme

Conference Programme

Day 1, June 24, 2024

Meeting Hall: Rembrandt 4

8.00 - 8.45	**Registrations**
8.45 - 09.00	**Introduction**

Keynote Presentations

09.00 - 09.40	Stanislaw Dzwigaj, Sorbonne Université, France

Title: Application of Metal Single Site Zeolite Catalysts in Catalysis

09.40 - 10.20	Višnja Vrdoljak, University of Zagreb, Croatia

Title: Preparation and Post-Assembly Modification of Metallosupramolecular Architectures Derived from Hydrazone-based Ligands

10.20 - 11.00	Lucia Steenkemp, CSIR, South Africa

Title: Commercialization of Biocatalysis Technologies

Group Photo: 11.00 - 11.15

Networking and Refreshments: 11.15 - 11.30 @ Pre Function Area

11.30 - 12.10	Otakar Jiří Mika, Police Academy of the Czech Republic in Prague, Czech Republic

Title: Possibilities for Improving Chemical Safety and Security According to the Act on the Prevention of Major Chemical Accidents in the Czech Republic

Oral Presentations

Session Chair:	**Stanislaw Dzwigaj, Sorbonne Université, France**
Session Co-Chair:	**Otakar Jiří Mika, Police Academy of the Czech Republic in Prague, Czech Republic**

Sessions: Organic Chemistry | Inorganic Chemistry | Agricultural Sciences | Medicinal Chemistry | Material Science | Nanomaterials | Chemical Engineering | Green Chemistry | Polymer Chemistry | Industrial Chemistry | Catalysis | Applied Chemistry | Metallurgy | Geochemistry | Food Chemistry

12.10 - 12.40	Denis Prodius, Ames National Laboratory USDOE, USA

Title: Acid-Free Dissolution Recycling of Rare Earth Elements from the Diluted e-Waste Streams

12.40 - 13.10 | Jaeyoung Jang, Yonsei University, South Korea

Title: Solid-State Polymerization of Recycled PET with Chain Extending Modification as a Bottle-to-Bottle Approach

13.10 - 13.40 | Horng Yi Chang, National Taiwan Ocean University, Taiwan

Title: Structure and Optical Properties Characterization on Alkaline-Earth Elements Substituted Strontium Aluminate Prepared by Wet Chemical Process

Lunch: 13.40- 14.30 @ Restaurant

14.30 - 15.00 | Lozan Todorov, Medical University-Sofia, Bulgaria

Title: Antioxidant Activity of Gd(III) and Ho(III) Complexes with 1,2,3-Triazole Ligand

15.00 - 15.30 | Jose Refugio Parga Torres,Tecnologico Nacional De Mexico-ITS, México

Title: Electrocoagulation Technology for the Production of Healthy Water Free of Arsenic and Lead in La Laguna Mexico

15.30 - 16.00 | Carlos Munoz Hernando, Mibelle Group Biochemistry, Switzerland

Title: Phytochemical Exploration of Ceruchinol in Moss: A Multidisciplinary Study on Biotechnological Cultivation of *Physcomitrium patens* (Hedw.) Mitt

Networking & Refreshments: 16.00 - 16.30 @ Pre Function Area

16.30 - 17.00 | Nedyalka Naneva Valcheva, University of Thrace, Bulgaria

Title: Characteristics of Isolated Strains of Microorganisms from Mineral, Mountain and Spring Waters from Italy, England, South Korea, Japan and Bulgaria

17.00 - 17.30 | Jean C. Villa, Universitat de Barcelona, Spain

Title: Neighboring Alkali Cation as an Efficient Theoretical Strategy for N_2 Activation

17.30 - 18.00 | Mory Traore, University of Science and Technology Beijing, China

Title: Assessment of Rare Earth Element Variations in Five Water Systems in Beijing: Distribution, Geochemical Features, and Fractionation Patterns

Day 1 Concludes followed by Certificate distribution

Day 2, June 25, 2024

Meeting Hall: Rembrandt 4

Keynote Presentations

10.00 - 10.40 — Irena Kostova, Medical University-Sofia, Bulgaria

Title: Metal Coordination Compounds with Cytotoxic and Antioxidant Activity

10.40 - 11.20 — Robert Kaptein, Utrecht University, Netherlands

Title: Birth of the Radical Pair Mechanism of Chemically Induced Dynamic Nuclear Polarization (CIDNP)

11:20-12:00 — Roberto Mugavero, European Center for Disaster Medicine, San Marino

Title: Connecting Chemistry and Applied Sciences for Disaster Resilience: Innovations, Challenges, and Opportunities

Networking and Refreshments: 12.00 - 12.30 @ Pre Function Area

Oral Presentations

Session Chair: **Višnja Vrdoljak, University of Zagreb, Croatia**

Session Co-Chair: **Irena Kostova, Medical University-Sofia, Bulgaria**

Sessions: Environmental Chemistry & Biodiversity | Catalysis | Chemical Engineering | Physical and Theoretical Chemistry | Metallurgy | Analytical & Surface Chemistry | Materials Science | Pharmaceutical Chemistry | Organic Chemistry | Inorganic Chemistry

12.30 - 13.00 — Dino Kuzman, University of Zagreb, Croatia

Title: The Influence of Complex Cobalt(III) Cations and Synthetic Methods on Polyoxovanadate Formation

13.00 - 13.30 — Jose Refugio Parga Torres,Tecnologico Nacional De Mexico-ITS, México

Title: Hermetic Electrocoagulation Technology for Recovery of Gold/Silver and Sodium Cyanide from Pregnant Cyanide Solution

Lunch: 13.30 - 14.30 @ Restaurant

14.30 - 15.00 — Mirta Rubčić, University of Zagreb, Croatia

Title: Low Dimensional Halometallates-from Synthesis and Structure to Application Perspective

15.00 - 15.30 | Tara Balen, University of Split, Croatia

Title: Plasma Physics and its Role in Nuclear Fusion Processes

15.30 - 16.00 | Milazim Tahirukaj, Alma Mater Europaea Campus College "REZONANCA", Kosovo

Title: Optimization Parameters of Fragmentary Voltage and Collision Energy for Identification and Separation RDX (1,3,5-Trinitro-1,3,5-triazinane) from Other Explosives with LC/MS-MS

Networking and Refreshments : 16.00 - 16.30 @ Pre Function Area

Poster Presentations

PP001 | Jelena Petrović, Mining and Metallurgy Institute Bor, Serbia

Title: The Content of Heavy Metals in the shoots of Coltsfoot Plant which was grown at Contaminated Soil in Surrounding of the city of Bor

PP002 | Tofik Nagiev, Azerbaijan National Encyclopedia, Azerbaijan

Title: Mechanism of Direct Conversion of Methane into Methanol and Dimethyl Ether with Hydrogen Peroxide on a Biomimetic Catalyst

PP003 | Ljiljana Avramović, Mining and Metallurgy Institute Bor, Serbia

Title: Investigation of the Copper Sulfide Thermal Destruction Process from Flotation Tailings

PP004 | Sylwia Myszograj, University of Zielona Gora, Poland

Title: A Comprehensive System for Monitoring the Quality of Surface Waters Using the Hyperspectral Cameras

PP005 | Ewelina Płuciennik-Koropczuk, University of Zielona Gora, Poland

Title: Application of Hyperspectral Analysis of Chlorophyll-a in Surface Waters Quality Monitoring

PP006 | Fupeng Zhang, Tsinghua University, China

Title: DFT Investigations of 5-hydroxymethylfurfural Photooxidation on Copper Porphyrin Derived MOF

Video Presentation

VP001 | Madhawee Ketipe-Arachchi, Wayne State University, USA

Title: Mechanistic Investigations into Rhodium-Catalyzed Asymmetric Allylic Amination toward α-Trisubstituted α-Tertiary Amines

Day 2 Concludes followed by Panel Discussion - Awards & Closing Ceremony

Virtual Programme

June 24-25, 2024 | Virtual Program

Day 1 | June 24, 2024 (BST)

Keynote Presentations

10.00 - 10.40 — Ashanendu Mandal, University of Calcutta, India

Title: Remediation of Phenol Contamination of Wastewater Using Solid Waste Materials as Adsorbents

10.40 - 11.20 — Kamal, IIT-Jammu, India

Title: Dioxygen Controlled Chemodivergent Carbon-Carbon Bond Formation Reaction Using Redox Non-Innocent Azo Aromatic Complexes of Cobalt

Oral Presentations

11.20 - 11.45 — Guohui Jiang, North Sichuan Medical College, China

Title: A Novel Full Solar Light Spectrum Responsive Antimicrobial Agent of WS_2 Quantum Dots for Photocatalytic Wound Healing Therapy

11.45-12.10 — Bernd Binder, Quanics, Germany

Title: Orbital Waves and Quantum Densities from Time-Discrete Chaotic Sequences Stabilized by Symmetry

12.10-12.35 — Youssef Ait Hamdan, Rennes University, Morocco

Title: Exploring the Potential of Chitosan/Aragonite Biocomposite Derived from Cuttlebone Waste for Bone Regeneration

12.35-13.00 — Parvatam Siva Prasad, IITM, India

Title: Global Developments in Metal-Air batteries for Various Applications including Fflying Cars

Lunch (13:00-13:30)

13.30-13.55 — Stanislav A. Grabovskii, Ufa Institute of Chemistry, Russia

Title: Pyrimidin-4(3H)-Ones: Antioxidants, Prooxidants, and New Direction in Tissue Regeneration Therapeutics

13.55-14.20 Yiwei Zhang, Tokyo Institute of Technology, Japan

Title: Enhancing Separation Technology: The Role of a Novel PDMS Sponge Strategy

14.20-14.45 Evelyn Okorafor, Miami University, USA

Title: Creating a Suitable Bilayer Environment for the Biophysical Study of Membrane Proteins

14.45-15.10 Eddy C. Borchert, The Dow Chemical Company, USA

Title: Mechanical Integrity for Research Scale Environments

15.10-15.35 Ziqiao Sun, Cornell University, USA

Title: Evidence and Metabolic Implications for a New Non-Canonical Role of Cu-Zn Superoxide Dismutase

15.35-16.00 Cristina Lavorato, University of Calabria, Italy

Title: New System Combining Removal and Photocatalytic Degradation of Micro and Nano Plastics in Water

16.00-16.25 Maria J Espona, ArgIQ, Argentina

Title: Education about Dual Use at STEM Universities: Current Situation and Analysis of the Case or Argentina

Day 1 Concludes

Day 2 | June 25, 2024 (BST)

Keynote Presentations

10.00 - 10.40 | Mohammad Amin Tarahomi,SBU, Iran

Title: Scaling Two-Phase Gas-Liquid Flow in Horizontal Pipes

10.40 - 11.20 | Osman Adiguzel, Firat University, Turkey

Title: Thermomechanical Processes and Phase Transformations in Shape Memory Alloys

Oral Presentations

11.20 - 11.45 | Barbara Gallo, Archivio Disarmo, Italy

Title: The Erosion of Non-Proliferation Regime: Causes and Consequences

11.45-12.10 | Baurov Yuriy Alexeevich, “Byuon Space Energy” LLC, Novo-rosseysk Town, Russia

Title: Byuon Energy and New Environmentally Friendly Heat Installations

12.10-12.35 | Paul Tamaragaibi Elijah, Nigeria Maritime University, Nigeria

Title: RCM on Pump System: Application of Fuzzy Linguistics and Failure Mode Effect and Criticality Analysis Technique

12.35-13.00 | Catherine B. Adeniji, Lead City University, Nigeria

Title: Levonorgestrel-Induced Hepatotoxicity and Nephrotoxicity in Female Wistar Rats

13.00-13.25 | Sivasubramanian Palanisamy, PTR College of Engineering and Technology, India

Title: Enhancing Ramie Fiber Properties: Effects of Sodium Lauryl Sulphate (SLS) Treatment

13.25-13.50 | Rahul Hajare, Sandip University, India

Title: The Clinical Characteristics, Antiviral Action against RNA Viruses, and Historical Usage of Doxycycline in Local Medicine

Day 1

Chemistry 2024

Keynote Presentations

APPLICATION OF METAL SINGLE-SITE ZEOLITE CATALYSTS IN CATALYSIS

Stanislaw Dzwigaj
Sorbonne Université, France

Abstract:

The metal ions well dispersed at zeolite framework are considered to be active sites of catalytic processes. Therefore, the incorporation of these metals into zeolites as isolated tetrahedral sites appears to be the important task. We have earlier shown that the incorporation of transition metal ions into vacant T-atom sites of framework zeolite is strongly favored when, in the first step, zeolite is dealuminated by treatment with nitric acid solution and then, in the second step, the incorporation of transition metal ions results in the reaction between the cationic metal species of the precursor solution and the SiO-H groups of vacant T-atom sites created by dealumination of zeolite. During my keynote talk the design of single-site zeolite catalysts with transition metal will be described and characterized by different physical techniques both at the macroscopic (XRD, BET, TPR, TEM) and molecular level (FT-IR, NMR, DR UV-Vis, XPS, EPR, XAFS). The application of metal single-site zeolite catalysts in environmental catalysis will be discussed. This two-step postsynthesis method applied in this work allowed obtaining metal single-site zeolite catalysts active in different catalytic processes such as oxidative dehydrogenation of propane into propene, selective catalytic reduction of NO_x to N_2, production of 1,3-butadiene or hydrogen from renewable sources, including ethanol obtained from biomass. Their catalytic activity strongly depended on the speciation and amount of metal incorporated into zeolite structure as well as their acidity.

Biography

Stanislaw Dzwigaj received his PhD degree in 1982 in Jerzy Haber Institute of Catalysis and Surface Chemistry, Krakow (Poland). After two years of postdoctoral stay at the Laboratoire de Réactivité de Surface Université P. et M. Curie (Paris) he obtained in 1990 a position of contracted researcher in the same Laboratory devoted to surface reactivity in relation to catalysis phenomena. Then, in 2008 he obtained permanent position in CNRS as a researcher. On February 19, 2014 for outstanding scientific achievements he received the title of professor. His published work includes more than 170 papers published in reputable international journals.

PREPARATION AND POST-ASSEMBLY MODIFICATION OF METALLOSUPRAMOLECULAR ARCHITECTURES DERIVED FROM HYDRAZONE-BASED LIGANDS

Višnja Vrdoljak, Edi Topić, Tomica Hrenar, Mirna Mandarić, and Jana Pisk
University of Zagreb, Croatia

Abstract:

Supramolecular architectures based on coordination compounds consisting of metal centres bridged by organic ligands are continuing to be an interesting area of research. These assemblies possess various properties and are considered attractive materials with many possible applications. Our research interests focus on developing high-valent metallosupramolecular complexes with polydentate ligands using conventional methods or post-assembly structural transformations. The synthesis involves carefully designed aroylhydrazone organic or metalorganic ligands with precise control of reaction conditions to confine the highly reactive metal-oxo units from oligomerizing through the oxygen atom. Significant advancement has been achieved in this area previously for high-valent molybdenum and tungsten metallosupramolecular species. Although oxovanadium chemistry is comparable to Group 6 elements, high-valent vanadium complexes have a greater tendency to form oxo- or alkoxo-bridged compounds. Consequently, constructing supramolecular coordination complexes with vanadium(V) building blocks is more challenging and less explored. However, the potential of these types of compounds is very promising and worth exploring. We tested these assemblies as catalysts in the oxidation reactions of organic compounds. To ensure optimal performance and efficiency, we have carefully considered various factors, such as the constituents and ligand substituents, which can affect solubility, stability, electronic structure, complex steric properties, and ultimately catalyst performance.

Biography

Višnja Vrdoljak earned her Ph.D. in Inorganic Chemistry from the Faculty of Science at the University of Zagreb in 1996. Following a postdoctoral fellowship at the University of Trieste, Italy, she joined the Faculty of Science at the University of Zagreb. In 2015, she was appointed as a professor at the Department of Chemistry. Her current research focuses on developing hybrid organic-inorganic polyoxometalate-based materials, metallsupramolecular architectures, and mononuclear complexes of molybdenum, vanadium, and tungsten for catalytic applications.

COMMERCIALIZATION OF BIOCATALYSIS TECHNOLOGIES

Lucia Steenkamp
CSIR, South Africa

Abstract:

Bio-economy in South Africa is defined as any biotechnological activities and processes which can be implemented on commercial scale and creating revenue. The South African Government has identified the bio-economy to be a significant contributor to the country's economy by 2030 in terms of the gross domestic product (GDP) and it is therefore necessary to grow novel industries that can commercialize biotechnologies. Biocatalysis has been identified as one of the areas in South Africa which will contribute to the Bio-economy.

In order to enhance the commercialization of biocatalysis technologies and growing the bio-economy, the Department of Science and Innovation (DSI) and the Technology Innovation Agency (TIA) in South Africa, selected the Council for Scientific and Industrial Research (CSIR) to host the Industrial Biocatalysis Hub. One of the main activities of the Hub, is the development of new or improved technologies for commercialization in collaboration with large companies and SMME industry partners.

The use of biocatalysis in commercial processes is gaining momentum as the processes can be carried out with very mild conditions and in organic solvents as well as aqueous environments, with enzymes and biocatalytically active cells. Some of the biocatalysis technologies developed by the CSIR for industry include flavour esters, nicotinic acid, (S)-naproxen, an anti-inflammatory drug, (-) Ambrafuran and irones for the fragrance industry, L-menthol for the flavours industry, natural extraction of ferulic acid for the food and cosmetics industry and aloesin for the cosmetics industry as well as products for the biocide and insecticidal markets. A platform technology has also been created for bioconversion of nitro containing substrates to amine products, which with classical chemical synthesis can potentially result in explosive reactions. Biocatalysis is also extremely valuable in the circular economy where waste streams are turned into valuable products. These examples will be covered in detail.

Biography

Lucia Steenkamp is a Principal Researcher at CSIR and Director of the Industrial Biocatalysis Hub in South Africa, specialising in Biocatalysis and has been an author and co-author of numerous peer-reviewed papers and two book chapters. She has developed technologies for industry clients in the pharmaceutical, veterinary, biocides, food, flavours and fragrance industries, leading to five granted patents, twelve technology demonstrators and 8 technologies licensed to external clients. She has won the South African Women in Science Award (SAWISA) for Research and Innovation in 2018 for her work in biocatalysis leading to technologies for commercialisation. She has been a finalist in the NSTF rewards in 2012, 2019 and 2020 for the development of new Green technologies. She is passionate about research which can lead to implementation of technologies on commercial scale and training the next generation of scientists.

POSSIBILITIES FOR IMPROVING CHEMICAL SAFETY AND SECURITY ACCORDING TO THE ACT ON THE PREVENTION OF MAJOR CHEMICAL ACCIDENTS IN THE CZECH REPUBLIC

Otakar Jiri Mika
Police Academy of the Czech Republic in Prague, Czech Republic

Abstract:

Chemical safety issues according to the Act on the Prevention of Major Accidents have been systematically addressed since 2000, according to the binding European directive SEVESO I. The expert article analyses and evaluates the current situation in the addressed area based on a literature survey, but also according to the results of a local investigation. The goal is to propose new or improved measures that will ensure an increase in chemical safety and security and thus also increase the protection of the population, focusing on established emergency planning zones.

Biography

Otakar Jiri Mika works at both schools as university teacher, meaning at the Police Academy of the Czech Republic in Prague and the South Bohemia University in České Budějovice. His professional branches cover Prevention of Major Chemical Accident, Hazardous Chemical Substances, CBRN Prevention, Preparedness and Protection, Population Protection, etc.

Day 1

Chemistry 2024

Oral Presentations

ACID-FREE DISSOLUTION RECYCLING OF RARE EARTH ELEMENTS FROM THE DILUTED E-WASTE STREAMS

Denis Prodius
Critical Materials Innovation Hub, Ames National Laboratory (USDOE), USA

Abstract:

The strategic places occupied by rare earth elements (REE) are increasingly being identified because supply disruptions can have negative impacts on dependent technologies, including clean energy applications. Recycling rare earth elements from permanent magnets is one of the ways to mitigate the negative impacts and often requires the decision to either directly reuse the permanent magnets or recover the rare earths in the form of metals, oxides or salts. This presentation will focus on recovery of REEs via the acid-free dissolution recycling technology, developed in the Critical Materials Innovation Hub at Ames National Laboratory (USDOE). The acid-free dissolution process enables selective leaching of REEs from e-wastes (e.g., from the shredded hard disk drives) without pre-separating the magnet contents, making further recycling of other e-waste contents possible. Being acid-free, it offers some environmental benefits (Life Cycle Analysis) and has been shown to be economically feasible (Techno-Economic Analysis) to be deployed in the United States. Since the initial results that led to the development of the acid-free dissolution recycling technology were obtained in 2016, the technology has progressively been matured and is now being licensed for commercial practice. This presentation will feature some of the recent advancements and future directions of the technology, considering the criticality of rare earth elements.

Acknowledgements: This work was supported by the Critical Materials Innovation Hub funded by the US Department of Energy, Office of Energy Efficiency and Renewable Energy, Advanced Materials and Manufacturing Technologies Office. This work was also partially supported by the U.S. Department of Energy SBIR/STTR program (Phases I, II and IIB; Award# DE-SC0020766) in cooperation with industrial partner TdVib LLC (Boone, Iowa/USA).

Biography

Denis Prodius (Ph.D. in Inorganic Chemistry) is a scientist with the Critical Materials Innovation Hub at Ames National Laboratory, with more than ten years of experience working in recycling, recovery, and separation of rare-earth metals from a wide range of chemically processed materials (oxides, ionic liquids, oxalates, swarfs, and electronic wastes). Prodius' research resulted in the development of an original acid-free magnet recycling approach that enables the 'green' and efficient recycling of critical materials, including rare earths and cobalt, from waste materials. He is a recipient of the Ames Laboratory Inventor Incentive Awards 2015, 2017, 2018 (3), 2019 and 2023. He is also the recipient of three R&D 100 awards, one TechConnect Innovation award, and two Federal Laboratory Consortium Notable Technology awards. Before coming to the Ames Lab, he spent three years at Karlsruhe Institute of Technology (Germany) as an Alexander von Humboldt Fellow.

SOLID-STATE POLYMERIZATION OF RECYCLED PET WITH CHAIN EXTENDING MODIFICATION AS A BOTTLE-TO-BOTTLE APPROACH

Jaeyoung Jang, and Jongchul Seo
Yonsei University, South Korea

Abstract:

Polyethylene terephthalate (PET) is one of the most commonly used materials for plastic containers owing to its high tensile strength, high glass transition temperature, and transparency. However, the dramatic increase in PET usage has accelerated plastic waste generation. Disposal of PET waste has been discussed as a main environmental pollution issues. Additionally, approximately 86% of post-consumer plastic products are either landfilled or incinerated annually, resulting in environmental pollution. To overcome the PET waste problems, mechanical recycling is considered an effective recycling method according to global circular economy concept. However, mechanical recycling of PET using extruder is prone to impart the recycled PET (rPET) performance due to reduction in molecular weight (Mw) and intrinsic viscosity (IV). In this study, solid-state polymerization with chain extension (CESSP) of rPET was conducted to enhance the rPET properties. PET flakes were extruded using twin-screw extruder to prepare rPET. The rPET was first treated using poly (phenyl isocyanate)-coformaldehyde (pMDI) solution as a chain extender (CE). Subsequently, rPET chips were thermally treated in the SSP reactor at 160°C for 0 to 24 hours. IV values of $rPET_{CESSP}$ were determined by IV tester and the chemical structure was investigated by FTIR. And the thermal properties were measured by DSC and TGA. Additionally, $rPET_{CESSP}$ chips were formed into a film to analyze the film properties. Therefore, the mechanical properties, barrier properties, and morphology were measured by universal testing machine, OTR, and XRD respectively. Therefore, CESSP of rPET using pMDI can be versatile method to bottle-to-bottle recycling of rPET.

Biography

Authors contributed to this work have been supervised by Prof. Jongchul Seo in Food Packaging Materials Lab (FPML). FPML dedicates to investigate chemistry of polymers used for packaging. The core study in FPML is aligned with chemical and physical characterization of functional materials to improve the polymer packaging performance. Recently, FPML has directed massive attentions to enable sustainability in the packaging science via collaborating with industry. simultaneously, we have focused on a practical recycling program in which polymer can be upcycled with the same performance as virgin materials.

Prof. Seo has obtained the chemical engineering with an expertise in chemistry of packaging materials. He has published more than 100 papers in various peer-reviewed journals with a special focus on synthesis of functional materials and chemical characterization.

Jaeyoung Jang graduated in chemical engineering and currently studies as a combined master/Ph.D. student in packaging department. She is a research assistant in FPML, working on polymer recycling and recycling chemistry. She has publised 3 papers in Polymer reviews and Chemical engineering science journal. And she has submitted 1 paper in Trend in food science and technology.

STRUCTURE AND OPTICAL PROPERTIES CHARACTERIZATION ON ALKALINE-EARTH ELEMENTS SUBSTITUTED STRONTIUM ALUMINATE PREPARED BY WET CHEMICAL PROCESS

Horng-Yi Chang
National Taiwan Ocean University, Taiwan

Abstract:

Alkaline-earth aluminates are the excellent hosts utilized as light storage materials after doping with europium (Eu) and dysprosium (Dy). When different alkaline-earth element is in aluminate structure, it will emit visible light with various wavelength after optical energy source excitation. However, the photoluminescence (PL) intensity and long afterglow (LAG) properties depend on the phase structures and microstructures significantly. The wet chemical process named as modified Pechini-sol gel (PSG) method and solid-state mixed oxide method were used to prepare calcium and magnesium substituted strontium aluminate. The nitrates were dissolved into aqueous solution, then added citric acid ($C_6H_8O_7$) with mole ratio of metallic nitrate to citric acid as 1 to 2. Here, the citric acid acted as a chelating agent. Such an aqueous mixture in a beaker with a magnetic stirrer was put on a hot plate heating at 200°C for 2 hours until the mixture solution dried and became a loose foam. The dried foam was then ground and put in an electric furnace to calcine at different temperatures of 900-1100°C for 6 hours, respectively, in order to obtain the necessary phase. The higher temperatures of 1200-1400°C in reduction atmosphere were used to complete the PL and LAG properties. It was found that the PSG method could synthesize pure phase of aluminates at lower temperature but solid-state method obtained the pure phases difficultly even at high preparation temperature. Furthermore, the PSG method prepared aluminates exhibited higher PL intensity and better LAG than solid-state prepared ones. The blue (440 nm), green (520 nm) and red (618 nm) emission spectra were achieved in our study and widened emission bands could be obtained by mixed alkaline-earth elements substitution.

Biography

Horng-Yi Chang has experienced as a department Manager in EMTAC Technology Corp. (Hsinchu Science Park) and a principal researcher in the Industrial Technology Research Institute (ITRI), Taiwan. Now, he is a professor of the Department of Marine Engineering, National Taiwan Ocean University, Taiwan. Professor Chang is also the director of Taiwan Association for Hydrogen Energy and Fuel Cell (THEFC), director of the China Marine Institute and alternate director of the Taiwan Ceramic Society. In the past years, Professor Chang engaged in studying piezoelectric materials, microwave sintering and microwave dielectric materials, core-shell structural materials and laser annealing process as well as nano-particles treatment. Recently, his research concentrates on energy materials about solid oxide fuel cells/solid oxide electrolyzer cells (SOFC/SOEC), photosensitive solar cells and luminescent energy conversion by use of chemical processes such as hydro/solvothermal, sol-gel, core-shell, precipitation and microwave techniques to synthesize, improve and enhance those materials' properties for industrial applications.

ANTIOXIDANT ACTIVITY OF Gd(III) AND Ho(III) COMPLEXES WITH 1,2,3-TRIAZOLE LIGAND

Lozan Todorov, Nadya Hristova-Avakumova, Nataliya Belskaya, and Irena Kostova
Medical University – Sofia, Bulgaria

Abstract:

Lanthanide transition metals are of critical importance for modern technology - in lasers, industrial magnets, thermonuclear reactors, photocatalytic systems, electric cars, solar cells, anti-counterfeit protection of banknotes, wind turbines, NMR contrasts, among others. Their applications are generally related to the excellent fluorescent properties of lanthanide atoms and ions as well as their magnetism. In recent years lanthanide compounds have been gaining more and more traction as potential novel drug molecules. Their ionic mimicry towards a number of biometals and excellent fluorescent properties combined with the so-called ligand "antenna effect" make lanthanide complexes suitable candidates for novel theragnostic agents. 1,2,3-Triazole is a prominent pharmacophore, present in a large number of medicinal molecules – anticancer, antimicrobial, antidiabetic, neuroprotective, etc. The present study elucidates the potential antioxidant biological activity of a fluorescent 2H-1,2,3-triazole-bearing ligand (BNP01 - Sodium 2-(4-chlorophenyl)-5- (pyrrolidine-1-yl)-2H-1,2,3-triazole-4-carboxylate)) and its complexes with Gd(III) and Ho(III). Both ligand and complexes were tested for scavenging activities against a several of biologically significant reactive species – hydroxyl radicals, generated by UV-induced water radiolysis and Fenton reaction; superoxide, generated by potassium superoxide and xanthine/xanthine oxidase enzymatic model system; hypochlorite, derived from sodium hypochlorite. In addition, possible mechanisms of radical scavenging were investigated by way of the DPPH and ABTS assays. UV-VIS spectroscopy and chemiluminometry were applied during the investigations. Relative differences in observed activity were discussed. In addition, a comparison between BNP01, its complexes with Gd(III) and Ho(III) and a previously reported 1,2,3-triazole ligand and its respective Gd(III) and Ho(III) have also been discussed.

Acknowledgments: The administrative support received by the European Union-NextGenerationEU, through the National Recovery and Resilience Plan of the Republic of Bulgaria, project No. BG-RRP-2.004-0004-C01 is greatly appreciated.

Biography

Lozan Todorov currently serves as a Senior Assistant Professor at the Department of Chemistry at the Faculty of Pharmacy in Medical University – Sofia, Bulgaria. His PhD thesis, under the scientific supervision of prof. Irena Kostova, deals with antioxidant properties of gallium and lanthanum complexes with 5-aminoorotic acid. He has participated in and overseen a number of university-level projects in close collaboration with Dr Hristova-Avakoumova at the Department of Medical Physics and Biophysics at the Faculty of Medicine, Medical University-Sofia. Dr Todorov's research experience includes a variety of antioxidant assays, involving a different reactive species, derived from various model systems. His current research interests are associated with the promising field of lanthanide coordination chemistry and its potential applications in biomedical sciences. To that effect, together with prof. Kostova, Dr Hristova-Avakoumova and in collaboration with a multinational research team, including prominent scientists from Spain, India and Italy, Dr Todorov is participating in a new project "Biologically Active Heterocyclic Ligands and Metal Complexes with Antioxidant Activity", part of the Research Universities program, financed by the European Union, the Bulgarian Ministry of Education and the Bulgarian National Sciences Fund.

ELECTROCOAGULATION TECHNOLOGY FOR THE PRODUCTION OF HEALTHY WATER FREE OF ARSENIC AND LEAD IN LA LAGUNA MEXICO

Jose R Parga, Teresita Borrego and Esteban Sánchez
Tecnologico Nacional De Mexico, Mexico

Abstract:

In the last years in La Laguna Mexico, Arsenic and lead-contaminated natural waters, including surface water and groundwater, are a significant problem as some of these compounds are known as toxic, mutagenic, and carcinogenic. This study has been carried out to determine the feasibility of Arsenic and Lead adsorption on iron species by Electrocoagulation (EC) process.

The full potential of EC with air injection as an alternative wastewater treatment technique to effectively remove Arsenic and Lead from well water without adding any chemical reagents or causing secondary pollutants. Experiments were conducted to determine the optimum operating conditions such as current density, conductivity, pH, and retention time. In this study, X-ray diffraction, Scanning Electron Microscopy, and Mössbauer Spectroscopy were used to characterize the solid products that revealed the expected crystalline iron oxides (lepidocrocite, magnetite, goethite, iron oxide). Finally, we used a pilot plant of the EC process for the 99 % removal of Arsenic and Lead from the water sample.

Biography

José Refugio Parga Torres is a professor and is currently assigned to the graduate area of the Saltillo Technological Institute. Dr. Parga is a PhD graduate from the University of Utah and M.Sc. from Colorado school of mines. His work experience of 43 years is focused on the recovery of gold and silver using the flotation and smelting of non-ferrous metals and the care of the environment where he has contributed to innovative developments for the purification of water and recovery of toxic substances and precious metals contained in industrial effluents with 200 articles, 12 books, 12 patents, 50 research projects with industrial applications, and more than 6,400 citations. Dr. Parga has graduated 100 postdoctoral, doctoral, master, and engineering students, and 40 of them have won national and 5 international awards in Technological Innovation.

PHYTOCHEMICAL EXPLORATION OF CERUCHINOL IN MOSS: A MULTIDISCIPLINARY STUDY ON BIOTECHNOLOGICAL CULTIVATION OF *PHYSCOMITRIUM PATENS* (HEDW.) MITT

Carlos Munoz-Hernando, Kirsten Schroder, Bernhard Henes, Jane Hubert, Sébastien Leblond, Stéphane Poigny, Ralf Reski and Franziska Wandrey
Mibelle Group Biochemistry, Switzerland

Abstract:

The moss *Physcomitrium patens* (*P. patens*), formerly known as *Physcomitrella patens*, has ascended to prominence as a pivotal model organism in plant biology. Its simplicity in structure and life cycle, coupled with genetic amenability, has rendered it indispensable in unraveling the complexities of land plant evolution and responses to environmental stimuli. As an evolutionary bridge between algae and vascular plants, P. patens offers a unique perspective on early terrestrial adaptation.

This research involved the biotechnological cultivation of *P. patens*, followed by a deep phytochemical investigation of two extracts covering a large polarity range together using an NMRbased dereplication approach combined with GC/MS analyses. Subsequently, a multidisciplinary approach combining bioinformatics, in-silico techniques, and traditional methods was adopted to uncover intriguing molecules such as the diterpene ceruchinol and its potential receptor interactions for future cosmetic applications. The kaurene diterpene ceruchinol, representing up to 50% of the supercritical CO_2 extract and also identified in the hydroalcoholic extract, was selected for the molecular docking study, which highlighted several biological targets as CAR, AKR1D1, and 17β-HSD1 for potential cosmetic use. These findings offer valuable insights for novel uses of this plant biomass in the future.

Biography

Carlos Munoz-Hernando is a highly accomplished Senior RnD Scientist at Mibelle Group Biochemistry with a PhD magna cum laude in Biological Sciences from Eberhard-Karls Universität Tübingen, Germany. He made significant contributions as a post-doc at the University of Zurich, Switzerland, where he worked on cloning new protein variants, protein-protein interactions and amino acid transporters. His expertise lies in uncovering new actives, devising innovative concepts, and driving projects from conception to reality. His work has led to more than 45 publications in various fields.

CHARACTERISTICS OF ISOLATED STRAINS OF MICROORGANISMS FROM MINERAL, MOUNTAIN AND SPRING WATERS FROM ITALY, ENGLAND, SOUTH KOREA, JAPAN AND BULGARIA

Nedyalka Naneva Valcheva
Faculty of Agriculture, University of Thrace, Bilo, Bulgaria

Abstract:

Intensive use of water resources as well as the ever-increasing amount of wastewater can exhaust the self-cleaning capabilities of natural water sources, disrupt the natural balance in water and make the water balance unusable. Along with wastewater, pathogenic microorganisms that create a potential epidemic situation, as a result of which water plays an essential role in the spread of bacterial and viral infections. The aim of the present works investigate the bacterial research from one hypotermal healing spring waters in Paris region, France, and from 10 hypotermal healing spring waters in Stara Zagora, Bulgaria. 19 bacterial strains were isolated and their colonial and morphological characteristics were determined, and the studied strains were identified. The data showed that the isolated 9 strains from the hypotermal healing spring waters in Paris region, France is identified as *Lisinibacillus pakistanensis, Serratia marcescens* (four strains), *Staphylococcus hominis*, *Staphylococcus haemoliticus, Bacillus pumilus* and *Bacillus cereus*. The isolated 10 strains from the hypotermal healing spring waters in Stara Zagora region, Bulgaria belong to spore forming bacteria of the genera *Bacillus: B. thuringiensis* B62 (two strains), *B. vallismortis, Bacillus amyloliquefaciens* (three strains), *Bacillus altitudinis/pumilus* (two strains) and *Bacillus cereus* group (two strains). The difference in the type of strains identified can be explained by the influence of the composition of the water, the type of soil and the rocks through which it passes.

Biography

Nedyalka Naneva Valcheva graduated from the Chemical College and the University of Food Technology. In 2023, She became a doctor of science. From 1985 -2016, she was a teacher of chemistry, biochemistry, microbiology. Now she is the organizer of the Department of Biological Sciences at Trakia University.

NEIGHBORING ALKALI CATION AS AN EFFICIENT THEORETICAL STRATEGY FOR N_2 ACTIVATION

Jean C Villa, JP Saucedo-Vazquez and T Terencio
Universitat de Barcelona, Spain

Abstract:

Nitrogen gas is one of the most abundant resources on Earth, serving as a fundamental component in both biological and industrial processes. Nevertheless, this straightforward molecule can only be activated by a select group of microorganisms in nature. Significant efforts have been made to replicate the activity of biological structures using metal-organic approaches. However, it is becoming increasingly evident that non-covalent interactions can enhance catalytic reactions, particularly ionic interactions. The effect of alkali and alkali-earth cations on the activation of dinitrogen was assessed with density functional theory (DFT) at distances from 2 to 10 Å. This approach yielded three distinct activity cases. In Case I, the polarization of the N_2 molecule is the primary driving force, while in Case II, the polarization effect is less pronounced. In Case III, the system is dominated by electrostatic interactions, enhancing the delocalization of electrons between the N_2-M^{n+} system. Among the various cations, those of the II-A group are particularly noteworthy due to their high ionic potential and polarizing power, where Mg^{2+} species highlights due to its superior activity at a N_2-Mg^{2+} distance of 2.7 Å. Consequently, this theoretical information can be employed as a strategy for the design of efficient N_2-activating complexes that integrate covalent and non-covalent interactions in a synergistic manner.

Biography

Jean C. Villa is a young Ecuadorian researcher. He received his Bachelor of Science in Chemistry degree in 2023 from Yachay Tech University, where he was awarded the Magna Cum Laude distinction and the Best Graduated Award of his generation. His final project was a study of catalysis and computational chemistry. His final project was a study of catalysis and computational chemistry. It examined the influence of cationic species on the activation of dinitrogen, as well as the relevance of these species in combination with transition metals and feasible ligands in order to identify more sustainable and efficient methods for the reduction of dinitrogen molecules. In addition, he has been part of other computational studies related to the modification of the chemical properties of the dinitrogen molecule with the objective of modulating physical responses for applicability purposes. He is currently pursuing his Master of Science degree in Theoretical Chemistry and Computational Modeling at the Universitat de Barcelona, where his research focuses on the hydrogen evolution reaction process and machine learning development.

ASSESSMENT OF RARE EARTH ELEMENT VARIATIONS IN FIVE WATER SYSTEMS IN BEIJING: DISTRIBUTION, GEOCHEMICAL FEATURES, AND FRACTIONATION PATTERNS

Mory Traore, Min Zhang, Aijun Gong, Yiwen Wang, Yang Liu, Lina Qiu, Yuli Zhang, Yueyi You, Yuzhen Bai, Ge Gao, Weiyu Zhao, Mariame Traore and Mahamat Abderamane Hassan

University of Science and Technology Beijing, China

Abstract:

This study investigates the distribution of rare earth elements (REEs) within the Beijing water system, specifically examining the Yongding, Chaobai, Beiyun, Jiyun, and Daqing rivers. Results indicate that the Beiyun River exhibits the highest REE concentrations, ranging from 35.95 to 59.78 µg/mL, while the Daqing River shows the lowest concentrations, ranging from 15.79 to 17.48 µg/mL. LREEs (La to Nd) predominate with a total concentration of 23.501 µg/mL, leading to a notable LREE/HREE ratio of 7.901. Positive Ce anomalies (0.70-1.11) and strong positive Eu anomalies (1.38-2.49) were observed. The study suggests that the Beijing water system's REEs may originate from geological and anthropogenic sources, such as mining and industrial activities in neighbouring regions, including Inner Mongolia. These findings underscore the importance of ongoing monitoring and effective water management strategies to address REE-related environmental concerns.

Biography

Mory Traore, Ph.D., is a distinguished chemist focusing on rare earth extraction and environmental chemistry. His expertise lies in developing innovative methods for rare earth extraction and separation and studying their environmental impact. Through his research, Mory aims to advance sustainable practices in resource utilization while addressing environmental challenges associated with pollutants and waste. I am currently working for Beijing Chaser Technology Co., Ltd.

Day 2

Chemistry 2024

Keynote Presentations

METAL COORDINATION COMPOUNDS WITH CYTOTOXIC AND ANTIOXIDANT ACTIVITY

Irena Kostova
Medical University- Sofia, Bulgaria

Abstract:

There is an increasing requirement for the discovery of new metal-based compounds having better activity profiles than their precursors. The cytotoxicity and the oxidative behavior of metal ions are of great importance for their medicinal applications. As a part of our continuing work on the synthesis, characterization and pharmacological applications of metal coordination compounds with organic molecules of biological relevance, it was observed that changes in ligands, metals and reaction conditions had profound effects on selectivity and activity of the products obtained.

In the present work novel biologically active metal complexes have been synthesized and their structures have been determined using theoretical, analytical and spectral investigations. It was important to clarify the effects of the metal type and its oxidation state as well as the effects of the metal–ligand binding mode on their therapeutic or thermodynamic properties. Detailed spectral analysis of the ligands and metal complexes based on both calculated (DFT) and experimental (FT-IR, FT-Raman, ^{1}H-NMR and ^{13}C-NMR) data confirmed the suggested metal–ligand binding mode. The recorded spectra and the marker bands of characteristic functional groups were identified, in order to use them as data bank for further application in trace analysis of metal complexes. The overall results confirmed that the DFT approximation is a reliable method for calculations of electronic and structural features, metal–ligand interactions, intra- and/or intermolecular hydrogen bonding and vibrational frequencies of the tested ligands and their metal complexes.

The results established from biotests of the studied complexes include their oxidative behavior and inhibitory cytotoxic effects. The complexes revealed promising pharmacological properties which in all the cases were more pronounced for the metal complexes than for the respective bioligands.

Acknowledgments: The support from the European Union-NextGenerationEU, through the National Recovery and Resilience Plan of the Republic of Bulgaria, project No. BG-RRP-2.004-0004-C01 is greatly acknowledged.

Biography

Irena Kostova is one of the World's Top 1% of scientists according to Stanford University's ranking of scientists with the greatest contribution to the development of modern science. Graduated from Mendeleev University in Moscow. Defended her PhD and DSc theses at MU-Sofia where she is currently a full professor at Chemistry Department. Graduated her second specialization "Theoretical bases of medical chemistry" at MU-Sofia. Her research interests include developmental work in theoretical and coordination chemistry, vibrational spectroscopy, pharmacological investigations of biologically active compounds etc. Author of about 200 publications with high impact factor and h-index, several textbooks, education book materials and monographs with around 7000 citations in indexed journals. She has been a lecturer at renowned universities in India, Austria, Italy, Romania, Spain, Slovakia etc. Member of the organizing committees of over 30 international conferences. She is an Editor of 7 prestigious international scientific journals, a member of the Editorial Boards of over 25 international journals and a reviewer for numerous high-ranking journals and international projects. She has created and maintains collaborations with a number of European universities in the framework of joint research projects and European programs.

BIRTH OF THE RADICAL PAIR MECHANISM OF CHEMICALLY INDUCED DYNAMIC NUCLEAR POLARIZATION (CIDNP)

Robert Kaptein
Utrecht University, Netherlands

Abstract:

In 1967 two groups, Bargon & Fischer, and Ward & Lawler, observed enhanced positive and negative lines in NMR spectra recorded when free radical reactions proceed in the NMR tube. By analogy with Dynamic Nuclear Polarization (an electron-nuclear cross relaxation effect), they called it CIDNP. However, some of the experimental results could not be explained by a DNP-based theory.

As a PhD student at the time I had experience with NMR of stable free radicals, so I was well prepared to make the switch to studying these mysterious CIDNP phenomena. This led in 1969 to a new theory, the Radical Pair Mechanism (RPM), developed independently by Gerhard Closs and me. In the lecture I will explain the RPM and discuss two simple qualitative rules for net polarization and the so-called multiplet effect. Several examples in organic and biochemistry will illustrate this. It is interesting to note that in nature the RPM forms the basis of navigation of birds and other migratory animals.

Biography

Robert Kaptein studied chemistry at the University of Leiden in 1958 –1965. He obtained his doctoral degree in 1971 cum laude with Prof. L.J. Oosterhoff as his promotor. In 1967 he switched topics to study the mechanism of Chemically Induced Dynamic Nuclear Polarization (CIDNP), a phenomenon that had been discovered in that year, but was not well understood. In 1969 the correct explanation (the Radical Pair Mechanism) was found by Kaptein and independently by Gerhard Closs. After a postdoc at Varian in Palo Alto, California, and 3 years at the research laboratory of Shell in Amsterdam Kaptein went back to Academia, first at the University of Groningen in 1975 and in 1987 at Utrecht University, where he could work with the then highest field NMR spectrometer (500 MHz). This allowed the study of biomolecules and his group was able to determine one of the first 3D structures of a protein (lac repressor headpiece) by NMR. Protein-DNA interaction was a major topic of his later research.

CONNECTING CHEMISTRY AND APPLIED SCIENCES FOR DISASTER RESILIENCE: INNOVATIONS, CHALLENGES, AND OPPORTUNITIES

Roberto Mugavero
European Centre for Disaster Medicine – CEMEC, San Marino

Abstract:

In the face of escalating global challenges, the synergy between chemistry and applied sciences is vital in enhancing disaster resilience. This article explores the latest advancements, challenges, and prospects in this field, focusing on innovative approaches, emerging technologies, and interdisciplinary collaborations reshaping disaster preparedness, response, and recovery. It aims to explain the transformative potential of chemistry and applied sciences in mitigating the impacts of natural and human-induced disasters, highlighting the dynamic landscape of disaster resilience and charting a course towards a safer, more resilient future. Key areas include novel materials with superior properties for infrastructure reinforcement, responsive sensors for early warning systems, and AI-powered predictive analytics optimizing disaster response strategies. Community-based participatory research is emphasized for fostering local engagement and empowerment, ensuring contextually relevant and sustainable resilience strategies. Additionally, cutting-edge technologies such as drones, renewable energy solutions, and biotechnological innovations are identified as significant contributors to global disaster resilience. Interdisciplinary collaborations and public-private partnerships are highlighted as catalysts for breakthroughs, bridging the gap between scientific research and practical applications. Despite challenges like limited funding and ethical considerations, the convergence of diverse scientific disciplines holds immense potential. Inclusive governance and holistic approaches are necessary to address socio-economic vulnerabilities and build a resilient world. This article underscores the transformative power of science and technology in navigating the complexities of disaster management and fortifying resilience against future challenges.

Biography

Roberto Mugavero has expertise in environmental engineering and security studies, focusing on the integration of academic knowledge with practical applications in disaster resilience and risk management. As a Director and Professor at the Centre for Security Studies (CUFS) and the Second Level master's degree in international security studies, he leads innovative research and education initiatives. His work in environmental risk management, as part of the Degree Course in Civil and Environmental Engineering, underscores his commitment to interdisciplinary approaches in addressing safety and security challenges. Serving as a Member of the Academic Senate at the University of the Republic of San Marino, Roberto influences academic policies and fosters collaborative research efforts. As President of the European Centre for Disaster Medicine, a specialized Centre of the Council of Europe, and the Observatory on Security and CBRNe Defense in Italy, he promotes initiatives to enhance disaster preparedness and response. His extensive experience as a chairman and speaker at national and international conferences, workshops, and seminars reflects his expertise in security, territorial risk, and CBRNe risk. Roberto Mugavero's comprehensive approach, blending research, education, and practical applications, creates new pathways for enhancing global security and resilience.

Day 2

Chemistry 2024

Oral Presentations

THE INFLUENCE OF COMPLEX COBALT(III) CATIONS AND SYNTHETIC METHODS ON POLYOXOVANADATE FORMATION

Dino Kuzman, Lucija Drempetić, Marina Cindrić, and Višnja Vrdoljak
University of Zagreb, Croatia

Abstract:

Polyoxometalates (POMs) represent a large group of compounds that, due to their unique structures and interesting optical, electronic and magnetic properties, find their application as model systems in homogeneous and heterogeneous catalysis, as antitumor and antiviral reagents, and as magnetic materials. The main driving forces responsible for the formation of polyoxometalates are various interactions and self-assembly processes between smaller building blocks, such as $[VO_4]^{3-}$. Our research is focused on examining the conditions for the formation of complex salts made of polyoxovanadate anion and complex cations of cobalt(III) with the aim of defining the influence of macrocations on the selfassociation process. The macrocationic species prevent rapid aggregation of polyoxovanadates, stabilize intermediate building units and direct their self-association. Polyoxovanadate anions with cobalt(III) macrocations were prepared by several different synthetic methods which include synthesis at room temperature, at elevated temperature, or at elevated temperature and pressure (hydrothermal synthesis), as well as liquid-assisted grinding with vapour-assisted aging. Ammonium vanadate and tetraammineoxalatocobal(III) nitrate were used as the precursors for the synthesis, as well as succinic acid. Although succinic acid was not found to be present in any of the isolated products, its presence appeared to be essential for the polyoxovanadate formation. The reactions were also carried out in the presence of sodium molibdate. Several new compounds were isolated and characterised using elemental analysis, infrared spectroscopy, thermal analysis and X-ray diffraction on a single and polycrystalline sample. In order to confirm the oxidation states of the transition metal ions ESR spectroscopy was used. Most of the isolated compounds contained decavanadate anions, while one contained a molybdovanadate anion.

Biography

Dino Kuzman obtained his Master's degree in 2017 at the Faculty of Science, University of Zagreb. He is currently working as an expert associate at the Depatrment of Chemistry, Faculty of Science, University of Zagreb where he continued his studies to obtain a PhD degree. His research includes the design,synthesis and characterization of novel inorganic and organic-inorganic polyoxometalate-based compounds. Focusing on the solid-state chemistry of prepared compounds, he utilizes different characterization techniques (thermal analyses, X-ray diffraction and IR spectroscopy) to study the correlation of the compounds' structures and their properties.

HERMETIC ELECTROCOAGULATION TECHNOLOGY FOR RECOVERY OF GOLD/SILVER AND SODIUM CYANIDE FROM PREGNANT CYANIDE SOLUTION

Jose Refugio Parga Torres, Victor Vazquez Vazquez, and Nelson Oshogwue Etafo
Tecnological nacional de Mexico, Mexico

Abstract:

Gold and Silver are non-renewable resources and the consumption rates of the precious metals in various industrial and electronic purposes have been increasing continually, and resources of these metals have become more and more scarce over time in Mexico. The processes considered in this study are simultaneously recapturing gold and silver from the cyanidation process by electrocoagulation technology and by decreasing the pH at 8, injecting air into the electrolytical cell, and bubbling $HCN_{(gas)}$ in sodium hydroxide solution we can regenerate the sodium cyanide. Electrocoagulation (EC), an emerging technology mainly used for wastewater treatment, was successfully applied for this achievement. This study will provide an introduction to the fundamental concepts of the EC method for recovering gold/silver metals from cyanide solutions. In this research X-ray Diffraction, Scanning Electronic Microscope and Atomic Adsorption were used to characterize the solid products formed during the EC process. The results suggest that magnetite particles and amorphous iron oxyhydroxides are present (Lepidocrocite and Gohetite). The EC products recover 97 % of gold and silver from pregnant cyanide solutions within 10 minutes and simultaneously the recovery of sodium cyanide was 95 % and recycled to the leaching process.

Biography

José Refugio Parga Torres is a professor and is currently assigned to the graduate area of the Saltillo Technological Institute. Dr. Parga is a PhD graduate from the University of Utah and M.Sc. from Colorado school of mines. His work experience of 43 years is focused on the recovery of gold and silver using the flotation and smelting of non-ferrous metals and the care of the environment where he has contributed to innovative developments for the purification of water and recovery of toxic substances and precious metals contained in industrial effluents with 200 articles, 12 books, 12 patents, 50 research projects with industrial applications, and more than 6,400 citations. Dr. Parga has graduated 100 postdoctoral, doctoral, master, and engineering students, and 40 of them have won national and 5 international awards in Technological Innovation.

LOW DIMENSIONAL HALOMETALLATES-FROM SYNTHESIS AND STRUCTURE TO APPLICATION PERSPECTIVE

Mirta Rubčić, Edi Topić, Pavla Šenjug, Dario Barišić and Damir Pajić
University of Zagreb, Croatia

Abstract:

In the last few decades hybrid organic-inorganic halometallates (HOIHs) have emerged as ubiquitous materials with their applications ranging from photovoltaics, photocatalysis to optoelectronics and spintronics. Benefits of the HOIH materials with respect to multifunctional but compositionally isotropic ones arise from the fact that HOIHs unify organic and inorganic sublattices, each with its own merits, that are coupled through hydrogen bonding and electrostatic interactions. Whereas the inorganic sublattice can give rise to, e.g., magnetic order, organic one can be electrically ordered, and if achieved concurrently, the two can yield materials with multiple orders. By the proper choice of the building units (organic cations, metal cations, and halide anions), one can accomplish diverse structures, depending on the spatial arrangement of the halometallate units: three-dimensional (3D), two-dimensional (2D), one-dimensional (1D), and zero-dimensional (0D) structures. Each of these architectures has its unique properties that are useful for different applications. In this contribution, the impact of the geometry of the building blocks on the dimensionality and structural features of the low-dimensional halocuprate(II) and halomanganate(II) based hybrid organic-inorganic halometallates will be presented and discussed. Finally, correlation between the magnetic and structural features on some illustrative examples will be addressed.

Biography

Mirta Rubčić obtained her PhD in 2008 at the Faculty of Science, University of Zagreb, and spent a year as a post-doc at Bielefeld University, Germany, at prof. dr. dr. h. c. mult. A. Müller's lab. She is currently working as a Full Professor at the Department of Chemistry, Faculty of Science, University of Zagreb. Her research interests include solid-state chemistry of organic, inorganic and hybrid organic-inorganic compounds. She has expertise in thermal analyses, X-ray diffraction as well as IR, Raman and NMR spectroscopy. She is highly interested in contemporary topics of crystal engineering of functional materials and chemical crystallography.

PLASMA PHYSICS AND ITS ROLE IN NUCLEAR FUSION PROCESSES

Tara Balen, and Mirko Marušić
University of Split, Croatia

Abstract:

Since the industrial revolution, the demand for electrical energy has never ceased to grow. Such energy demands cannot be met in an economically feasible and environmentally acceptable manner with current available technologies. It is argued that nuclear fusion has significant advantages in terms of safety, fuel reserves, environmental impact, and the amount of produced energy. The only obstacle regarding commercialization are the highly demanding scientific and engineering challenges inherent to the fusion process.

Plasma is simply defined as ionized gas. However, since not every gas can be considered as plasma, the most important phenomena, conditions, and physical quantities characterizing plasma as a distinct state of matter are being introduced. The probability of achieving fusion reaction is based on the height of the Coulomb barrier, physical and quantum-mechanical conditions. The best energy production yields are described with microscopic and macroscopic quantities. The most researched reaction for the first commercial fusion power plants involves tritium and deuterium. Since the Earth does not have the conditions for achieving nuclear fusion like stars do, gases need to be heated to extremely high temperatures, turning them into plasma, which must then be confined in a device whose material can withstand such temperatures long enough for fusion reaction to occur, all under conditions for the fusion reaction to be self-sustaining. To achieve self-sustaining D-T fusion reaction, optimal conditions of pressure, density, temperature, and confinement time need to be met. The two main methods of plasma confinement are magnetic and inertial confinement, with emphasis on magnetic confinement. The leading project in building an experimental fusion-powered electricity plant is currently ITER. The final challenge will be integrating all the solutions of the described fusion challenges into a power plant that will enable us to exploit fusion energy for global energy production in the DEMO project. Commercializing fusion power plants for energy needs is one of the, if not the most, demanding scientific and technological undertaking of the modern era. Given the positive outcomes scientists and engineers are achieving over time, we can hope for this new energy source in the near future.

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OPTIMIZATION PARAMETERS OF FRAGMENTARY VOLTAGE AND COLLISION ENERGY FOR IDENTIFICATION AND SEPARATION RDX (1,3,5-TRINITRO-1,3,5-TRIAZINANE) FROM OTHER EXPLOSIVES WITH LC / MS-MS

Milazim Tahirukaj[1], Fahri Gavazaj[1] and Andriana Surleva[2]

[1]Alma Mater Europaea Campus College "REZONANCA", Kosovo
[2]University of Chemical Technology and Metallurgy, Bulgaria

Abstract:

Explosives are classified in several ways, based on different criteria. Thus, the explosives are divided into: high and low explosives based on the type and speed of the action they are doing. Explosives are also classified according to their chemical structure. The most important group is that of organic compounds containing the nitro (NO_2) group. They are further subdivided based on the site where NO_2 is attached to the atomic structure. Nitrogen compounds contain C-NO_2 groups, a group of C-O-NO_2 nitrate ethers and C-N-NO_2 nitrite nitriles.

There are different methods for identifying and separating organic explosives, especially RDX (1,3,5-Trinitro-1,3,5-triazinane), but recently, double-mass spectrometric detector chromatography has begun to accommodate numerous scientific researches by forensic scientists to find appropriate parameters for the identification and separation of organic explosives in low concentrations in pg (pictograms) or even in fg (fentogram).

Therefore, considering the needs reasonable we have begun to create optimal parameters for CE (collision energy) and FV (fragmentary voltage) for identifying and dividing RDX from other explosives by using the Liquid chromatography instrument with double-mass spectrometric detector (LC-MS/MS) with the Atmospheric pressure chemical ionization (APCI) model, Zorbox SB - C18 column 600 bar 3 X 50 mm 3.5 µm and mobile phase: Methanol / Isopropanol / Water (1: 3: 6) as well as 0.1% chloroform.

In our studies we have found optimal "CE" and "FV" values for the identification and separation of RDX from other explosives, the change of fractional energy values greatly influences the fragmentation of the molecule we are studying, the fragmentation fractions molecule at all levels and this facilitates the identification of the molecule of unknown explosive and all fractions comply with our preliminary knowledge of the RDX structure and knowledge of its potential fragmentation, in addition to the excellent division achieved with this technique and the limit of detection up to fg.

Conclusion: At the end of this study, optimized parameters for identification and separation of organic explosives with LC-MS/MS we have the following conclusions:-In our study the samples analyzed were organic explosives: HMTD (3,4,8,9,12,13-Hexaoxa-1,6-diazabicyclo[4.4.4]tetradecane), HMX (1,3,5,7-Tetranitro-1,3,5,7-tetrazocane), RDX, TATB (1,3,5-triamino-2,4,6-trinitrobenzene), EGDN (1,2-dinitroxyethane), 1,3,5-TNB (1,3,5-Trinitrobenzene, 1,3-DNB (1,3-Dinitrobenzene), TETRYL (N-Methyl-N-(2,4,6-trinitrophenyl)nitramide),4A-DNT (4-amino-2,6-dinitrotoluene), NB (Nitrobenzene), NG (Nitroglycerin), 2A-DNT (2-amino-2,6-dinitrotoluene), TNT (2,4,6-Trinitrotoluene), 2,6-DNT (2,6-Dinitrotoluene), 2,4-DNT (2,4-Dinitrotoluene), 1,3,5-Trinitro-2-[2-(2,4,6-trinitrophenyl)ethenyl]benzene (HNS),2-Nitrotolueni (2-NT), 4-Nitrotolueni (4-NT), PETN (2,2-Bis[(nitrooxy)methyl]propane-1,3-diyl dinitrate), 3-NT (3-Nitrotolueni), TATP

(3,3-Dimethyl-1,2-dioxacyclopropane) and CARBAMITE, creation of methods for identification and separation of explosives doing the optimization of parameters on LC and MS/MS.

- Parameter optimization for both methods done as follow: flow of mobile phase 0.5 ml/minute, temperature of colon 350°C and the length of colon 3x50 mm, diameter 3.5 µm, ionization source multimode (MMI), ionization model (APCI), volume of sample injected 20 µm. Mobile phase was suitable for both above methods.

- For above explosives we have done optimization of parameters as "FV" and "CE" for identification and separation of explosives in a trace amount until fg.

Day 2

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Poster Presentations

THE CONTENT OF HEAVY METALS IN THE SHOOTS OF COLTSFOOT PLANT WHICH WAS GROWN AT CONTAMINATED SOIL IN SURROUNDING OF THE CITY OF BOR

Jelena Petrović, Sladjana Alagić, Dejan Bugarin, Ljiljana Avramović, Vojka Gardić, Mirjana Šteharnik, and Sanela Vasiljević

Mining and Metallurgy Institute Bor, Serbia

Abstract:

This paper shows the content of heavy metals such as arsenic, cadmium, nickel, lead, copper and zinc in the shoots of the Coltsfoot plant (lat - Tussilago farfara or pharm - Asteraceae). The Coltsfoot plant is perennial herbaceous plant, which is used in phytomedicine for bronchitis and coughs and usually grows near rivers and streams. The sampled plant grew wild and was sampled near the polluted river Veliki Krivelj, as well as on agricultural land in the vicinity of the village of Oštrelj, which is also under the influence of long-term mining in the City of Bor, and therefore the pollution of rivers and soil. The results showed that the content of the tested metals was at different levels, mostly very high and often at the level of phytotoxicity. Despite the results obtained in this way, it was clear that the researched Coltsfoot plant could grow normally and survive even in the aggressive circumstances of its habitat, which can be interesting for phytoremediation and biomonitoring, but also very dangerous if the plant is used in phytomedicine.

Biography

Jelena Petrović, research associate, is employed at the Mining and Metallurgy Institute Bor, at the Center for Laboratory in Chemical Laboratory, currently in the position of Main Coordinator. She performed chemical testing on x-ray fluorescent analyzer, ion-selective electrode for fluorine, development of method for digest of different type of samples. Engaged in research of environmental monitoring and analysis of soil, water, waste, air. Participant of national, IPA and international projects in the field of environmental protection. She is the author or co-author of a large number of national and international papers.

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MECHANISM OF DIRECT CONVERSION OF METHANE INTO METHANOL AND DIMETHYL ETHER WITH HYDROGEN PEROXIDE ON A BIOMIMETIC CATALYST

GCh Nahmatova[1], IT Nagieva[2], LM Gasanova[1] and TM Nagiev[1,2]

[1]Nagiev Institute of Catalysis and Inorganic Chemistry, Azerbaijan
[2]Baku State University, Azerbaijan

Abstract:

The monooxidation of methane into methanol was carried out on biomimetic heterogeneous catalyst – iron pentafluorotetraphenylporphyrin on Al_2O_3 (ImtOH), at atmospheric pressure and temperatures of 200-350°C, which resulted in liquid one-carbon compounds CH_3OH (19.2%), CH_2O (1.55%), CH_3OCH_3 (8.2%) with high selectivity and are widely used in the chemical industry. In order to establish the routes of these products formation and the mechanism for the methane conversion into them, the investigation of the methanol conversion reaction was carried out, as an intermediate compound of the methane oxidation, under identical conditions on the same catalyst. The result was only dimethyl ether with 100% selectivity. This proved that in this reaction system, methanol obtained from the methane monooxidation is converted only into dimethyl ether, and formaldehyde, in parallel with methanol, is formed from methane.

Our proposed catalytic system – biomimetic catalyst for the direct conversion of methane into methanol and DME, is analogue of enzymes that lead redox reactions in living systems and have a multi-functional effect, made it possible to carry out a one-stage process of methane monooxidation into its oxygenates with high selectivity.

The mechanisms of the elementary stages of the formation of methanol, formaldehyde and dimethyl ether on the surface of the bioimitator through the formation of an active complex (ImtOOH) are presented, in which the unity of the mechanisms of redox and acid-base catalysis traced within the framework of the principle of the bond redistribution chain (BRC), similar to enzymatic reactions.

Experimental investigations of the biomimetic oxidation of methanol to dimethyl ether made it possible to determine the optimal condition for the oxidation of methane to methanol and dimethyl ether in one reactor. By varying the process parameters, the reaction can be directed either towards the selective formation of methanol, or towards the selective formation of dimethyl ether.

Biography

Tofik Nagiev is a Vice-president of Azerbaijan National Academy of Sciences, Director of Research Center of "Azerbaijan National Encyclopedia" and Department chief of Nagiev Institute of Catalysis and inorganic chemistry of ANAS. The Professor of the department of the physical and colloid chemistry of Baku State University. He is author of the monography "Coherent Synchronized Oxidation Reactions by Hydrogen Peroxide", Amsterdam: "Elsevier", p. 325, 2007.

INVESTIGATION OF THE COPPER SULFIDE THERMAL DESTRUCTION PROCESS FROM FLOTATION TAILINGS

Ljiljana Avramović, Vanja Trifunović, Dragana Božić, Vesna Conić, Dejan Bugarin, Jelena Petrović, and Vojka Gardić

Mining and Metallurgy Institute Bor, Serbia

Abstract:

This paper presents the results of experimental tests on the thermal destruction of sulphide and leaching of copper from a sample of flotation tailings taken from the Old Flotation Tailing Dump (OFTD) of the Mining and Smelting Complex Bor (now Serbia Zijin Copper doo) in eastern Serbia. OFTD presents a typical example of a source of contamination through the acid mine drainage processes. The average copper content in the OFTD is about 0.2%, and the estimated amount of tailings amounts to 27 million tons, so it represents a significant potential raw material for copper recovery. Complete physico-chemical and mineralogical characterization of the composite tailings sample was performed, as well as the Leaching test and TCLP (Toxity Characteristic Leaching Procedure) test, which indicates that OFTD represents a significant environmental problem because it leads to the generation of acidic mine waters that pollute the surrounding waterways. Experimental tests included combined treatment: two-stage thermal treatment in a tubular furnace at temperatures of 250°C and 630°C in order to destroy copper sulfide from the flotation tailings, and leaching of the obtained calcine with water, during which a copper leaching rate of 92% was achieved. The solutions after leaching contain about 2 g/L Cu and less than 1 g/L Fe and are suitable for the application of the SX-EW (solvent extraction-electrowinning) process in order to obtain copper of commercial quality. A special advantage of the elaborated method is the possibility of disposing of the solid residue, formed after the process of thermal treatment and leaching of the tailings, without the risk of pollution of the human environment.

Biography

Ljiljana Avramović, research associate, is employed at the Mining and Metallurgy Institute Bor, at the Center for Development Technologies in Metallurgy, currently in the position Head of Center. She is engaged in research, development and application of new technologies in the field of hydrometallurgical treatment of gold-bearing ores and concentrates; Obtaining and refining precious metals from primary and secondary raw materials; Development of technologies for copper recovery from mining waste; Participant of national, IPA and international projects in the field of environmental protection. She is the author or co-author of a large number of national and international papers.

A COMPREHENSIVE SYSTEM FOR MONITORING THE QUALITY OF SURFACE WATERS USING THE HYPERSPECTRAL CAMERAS

Sylwia Myszograj, Ewelina Płuciennik-Koropczuk, Izabela Krupińska, Jakub Kostecki, Maciej Sobczak,Tomasz Smoliński, and Sebastian Ryś
University of Zielona Gora, Poland

Abstract:

The research project will develop a comprehensive surface water quality monitoring system using unmanned aerial vehicles (UAVs) and underwater vehicles (UUVs) equipped with innovative data collection and continuous measurement methods. The use of variable reflection, emission and scattering properties of electromagnetic radiation is the basis of remote sensing research. The expected impacts of the innovative monitoring solutions will be discussed, including: - The measurement of water quality parameters, which affect the spectral properties of water. These parameters include phytoplankton composition, turbidity, specific conductivity, chlorides, sulphates, nitrogen compounds, phosphorus compounds, COD, and organic carbon. The floating platform will be fitted with sensors to measure water temperature, reservoir depth, and substrate type, in addition to the capability of collecting water samples. - The developed technology has a key advantage: it continually obtains data, simplifying the monitoring and analysis of physical and chemical water parameters. Furthermore, the system allows for rapid data generation at local and global levels, while maintaining an acceptable degree of observation repeatability. This makes it easier to monitor seasonal changes in water quality. - The implementation of the project's results in a water monitoring system has high potential for information. Measurement data can generate dependable models of water quality degradation phenomena as well as risk assessment. The identification of water pollution, such as in a drinking water source, enables the determination of the pollutant type, degree of risk assessment and source identification. - The wide-spectrum scanning of bodies of water will prove to be a valuable technique in the management of point sources of pollution that enter water. The detection of possible pollutants will enable the swift identification and localisation of their source. This approach will undoubtedly facilitate more effective intervention against environmental degradation.

Biography

Sylwia Myszograj has been employed at the University of Zielona Góra, Poland since 1997, and since 2019 has served as Director of the UZ Institute of Environmental Engineering and Chair of the Discipline of Environmental Engineering, Mining and Energy. Her scientific specialisation includes environmental biotechnology, micropollutants in the aquatic environment, monitoring and determination of microplastics, optimisation of wastewater treatment and methane fermentation processes and product carbon footprint determination. She has published 215 scientific articles and developed 50 implementation papers and technology concepts

A comprehensive system for monitoring the quality of surface waters and coastal areas using a multi-sensor system with the hyperspectral cameras

HYDROSTRATEG1/001/T/2022 (acronym HIPER). Co-financed by NCBiR within the framework of the 1st Government Strategic Program HYDROSTRATEG, POLAND, 1.10.2023 – 30.09.2026

APPLICATION OF HYPERSPECTRAL ANALYSIS OF CHLOROPHYLL-a IN SURFACE WATERS QUALITY MONITORING

Ewelina Płuciennik-Koropczuk, Izabela Krupińska, Sylwia Myszograj, and Jakub Kostecki

University of Zielona Gora, Poland

Abstract:

One of the objectives of surface water monitoring is to provide information on water status for management planning and assessment of environmental objectives. When only the classical approach (field measurements) is used to monitor surface water quality, we are always dealing with trace information and not a surface distribution. It is also possible to obtain a regional distribution of various parameters using an interpolation algorithm, but this is a very limited spatial distribution (especially for lakes and rivers). In this context, the potential of hyperspectral camera data for continuous monitoring of large water bodies is being investigated. The optical properties of surface waters change in response to different bands of electromagnetic radiation, allowing for the assessment of various water quality parameters. Analysis of the electromagnetic spectrum in several hundred narrow (1-2 nm) radiation ranges provides detailed information about the studied object. This is because it relates the structure of the electromagnetic spectrum to specific features, such as the compounds that build up the studied objects and cover their surface, as well as the chemical processes taking place within them (e.g. in the case of vegetation: photosynthesis, photosynthetically active pigments, plant cell structures). The green and near-infrared bands are used to assess the chlorophyll-a content of water. These signals can be readily obtained from hyperspectral data. An initial laboratory study was carried out using a hyperspectral camera to determine the chlorophyll-a content of surface water samples taken from a river and from a stillwater reservoir. At the same time, model solutions of chlorophyll-a with different known concentrations were tested and analysed using a SPECIM FX 10 hyperspectral camera in the wavelength range from 400 to 1000 nm and by spectorphotomertype using a Cary 3500 UV-VIS spectrophotometer in the wavelength range from 200 to 1100 nm. The possibility of estimating chlorophyll-a in water using hyperspectral methods is due to the fact that it alters the spectral properties of water, as it is an effective photoreceptor due to the presence of conjugated double bonds in its molecules. According to the literature, chlorophyll-a strongly absorbs radiation in the wavelength range of approximately 420-520 nm and 670-680 nm. Analysis of the results obtained for chlorophyll-a using the spectrophotometric method showed the highest absorption at 440 nm and in the range 620-680 nm, while at the same wavelengths using a hyperspectral camera for chlorophyll-a, the minimum reflection was obtained.

Biography

Ewelina Płuciennik-Koropczuk has been employed at the University of Zielona Góra since 2003. The scope of the research work includes municipal and industrial wastewater treatment technologies, including removal of pollutants difficult to decompose, occurring on a micro scale (especially from the PPCPs group) and estimation of threats they pose to the environment and human health, as well as the possibility of recovering raw materials and resources from wastewater and sludge streams. She is the author and co-author of more than 80 scientific articles and 10 technological concepts.

A comprehensive system for monitoring the quality of surface waters and coastal areas using a multi-sensor system with the hyperspectral cameras

HYDROSTRATEG1/001/T/2022 (acronym HIPER). Co-financed by NCBiR within the framework of the 1st Government Strategic Program HYDROSTRATEG, POLAND, 1.10.2023 – 30.09.2026

DFT INVESTIGATIONS OF 5-HYDROXYMETHYLFURFURAL PHOTOOXIDATION ON COPPER PORPHYRIN DERIVED MOF

Fupeng Zhang, Lan Ma, and Yingchuan Zhang
Tsinghua University, China

Abstract:

We developed a Cu (II) porphyrin framework featuring side-chain incorporated urea linkages, denoted as TBUPP-Cu MOF, to render HMF a weak hydrogen bond at the urea site and flat adsorption via π–π stacking with the benzyl moiety. The unique configuration enables the selective activation of O_2 over the porphyrin to generate $\cdot O^{2-}$ and $^1O_2$ via spin-flip electron transfer, which drives the ambient oxidation of proximal –CHO of HMF. Open shell DFT method gives the orbital energy of general triplet O_2 and monomer molecule of TBUPP-Cu, enable the energy transfer during photoexcitation process. The excited states that make the main contribution to the adsorption spectrum occur in the excitation of H-1 and H to L and L+1 orbitals. Each excited state is formed by mixing the excitations between these orbitals in different proportions, with an uncertain spin multiplicity due to the open shell system. The distribution of electron/hole of the major excited state is located on the core region of TBUPP-Cu, which indicates the local excitation property and the heat map gives the contribution of related atoms. Local excitation allows for in-situ energy exchange, which might be the reason produces singlet oxygen during the excitation processing analysis shows that HMF prefers to adsorb at the flank of TBUPP-Cu, which performed a considerable π–π stacking and exposed the –CHO towards the copper center. Free energy calculation shows that with the TBUPP-Cu, the free energy barrier of the oxidation process is significantly reduced, which is also the reason for the high selectivity.

Biography

Fupeng Zhang is a master student in Tsinghua Shenzhen International Graduate School, Tsinghua University and he will graduate in June this year. During the master's degree studies, he has learned about statistical mechanics and quantum chemistry course and made many attempts in molecular dynamics simulations and quantum chemical calculations. on the one hand, he is familiar with the simulation of biological systems, such as proteins, membranes, and DNAs. On the other hand, he can also proficiently calculate the electronic structural properties of chemical molecules, as well as many analytical methods of wave functions. Further, he can performance the ab initio calculations for materials, and write some simple scripts by using python or TCL language. So far, his work has included calculations of surface adsorption, hydrogen evolution reactions, as well as molecular spectroscopy and calculation of chemical reaction path free energy. He is going to apply a PhD program and look forward to conducting more in-depth research in the field of computational chemistry.

Day 2

Chemistry 2024

Video Presentation

MECHANISTIC INVESTIGATIONS INTO RHODIUM-CATALYZED ASYMMETRIC ALLYLIC AMINATION TOWARD α-TRISUBSTITUTED α-TERTIARY AMINES

Madhawee Ketipe-Arachchi, Hien Nguyen, and Bernhard Schlegel
Wayne State University, USA

Abstract:

Forging quaternary stereocenters has long been sought after in the realm of modern synthetic chemistry. Among the fundamental structural motifs in organic chemistry, the synthesis of α-tertiary amines poses a surprisingly formidable challenge. Nonetheless, α-tertiary amines are privileged structures present myriad of bioactive molecules. A highly efficient asymmetric synthesis of α-trisubstituted α-tertiary amines from racemic allylic trichloroacetimidates has been developed using chiral bicyclo[2.2.2]octadiene-ligated rhodium catalyst. This protocol achieves highly sterically demanding bond assembly leading to a fully substituted carbon and fully substituted nitrogen, in a single step offering precise control over regioselectivity and enantioselectivity to furnish α-trisubstituted α-tertiary amines. The synthetic utility is showcased by efficient preparation of α-tertiary amines featuring pharmaceutically relevant secondary amine cores with good yields and excellent selectivities (branched:linear >99:1, up to 99% enantiomeric excess). Mechanistic investigations were conducted using synergistic experimental and computational studies. DFT calculations and kinetic experiments showed that the rate of conversion of the less reactive π-allyl intermediate to the more reactive isomer via π-σ-π interconversion was faster than the rate of nucleophilic attack onto the more reactive intermediate. Altogether, these data imply that the *CurtinHammett* conditions are met in the amination reaction, thereby leading to dynamic kinetic asymmetric transformation. The thermodynamically more stable π-allyl intermediate was found to be kinetically more reactive, leading to the major (S)-enantiomer of the product. Isotopic labeling experiments established that the nucleophilic addition occurs via an outersphere nucleophilic addition with an inversion of π-allyl stereochemistry. The observation of complete branched selectivity is noteworthy and as corroborated by computations might be attributed to the hydrogen bonding interactions between β-oxygen of allylic substrate and amine-NH that greatly assist the delivery of amine nucleophile onto more hindered internal carbon of the π-allyl intermediate.

Biography

Madhawee Ketipe-Arachchi embarked her academic journey earning BSc degree from University of Sri Jayewardenepura, Sri Lanka, in 2017. She earned her PhD (Organic Chemistry) from Wayne State University, USA, in 2023. Currently she works as a R&D scientist at AAPharmaSyn, and her research interests focus on the development of new asymmetric methods for the synthesis of bioactive molecules, mechanistic studies and medicinal chemistry.

Virtual Presentations

Virtual
Day-01

Chemistry 2024

Keynote Presentations

REMEDIATION OF PHENOL CONTAMINATION OF WASTEWATER USING SOLID WASTE MATERIALS AS ADSORBENTS

Ashanendu Mandal
University of Calcutta, India

Abstract:

This research aims for adsorptive removal of phenol from wastewater by solid waste materials viz. guava tree bark, rice husk, neem leaves, activated carbon from coconut coir, rice husk ash, red mud, clarified sludge from basic oxygen furnace and activated alumina. The characterizations of the adsorbents are performed by SEM, XRD, FTIR and BET analyzers. The experiments of phenol removal are carried out in batch process with the variation of initial phenol concentration (5-500 mg/L), initial pH (2-12), adsorbent dose (0.10-20 gm/L), temperature (25-50°C) and contact time (30-600 min). The maximum phenol removal percentage was found with neem leaves used as adsorbent and it was 97.50%. The kinetics study shows that the pseudo-second order model is best fitted for all adsorbents except red mud. The kinetic modeling shows that the adsorption mechanism is supportive of film diffusion, intra-particle diffusion and chemisorption for all adsorbents. The isotherm analysis suggests that Freundlich isotherm model is best supportive for guava tree bark, rice husk, neem leaves, activated carbon, red mud and activated alumina, whereas Langmuir and D-R isotherm are best supportive for rice husk ash and clarified sludge respectively. The thermodynamics shows the spontaneity, randomness and endothermic/exothermic nature of the adsorption processes. The ANN modeling using Levenberg-Marquardt and Scaled Conjugate Gradient algorithms establish that the experimental and predictive data are within allowable range. The scale-up designs, the regeneration and the safe disposal of used adsorbents are also studied for studying their commercial applications. Further, the column study is also carried out using the most efficient batch adsorbent neem leaves. The research concludes that all these adsorbents can be used commercially for removal of toxic phenol from wastewater.

DIOXYGEN CONTROLLED CHEMODIVERGENT CARBON-CARBON BOND FORMATION REACTION USING REDOX NON-INNOCENT AZO AROMATIC COMPLEXES OF COBALT

Kamal
Indian Institute of Technology- Jammu, India

Abstract:

The replacement of a noble metal catalyst with an earth-abundant 3d-transition metal catalyst is an atom-economic and environmentally benign catalytic pathway for synthesizing new organic molecules. Various carbon-carbon and carbon-hetero atom bond forming reactions using alcohols as reactants with acceptorless dehydrogenative coupling (ADC)/ borrowing hydrogen (BH) strategy have received tremendous research interest in recent times. Herein, employing redox non-innocent pincer like cobalt (II) complexes containing azo-benzimidazole ligand a switchable and chemodivergent catalytic cross-coupling of primary and secondary alcohols are reported. The complexes were fully characterized by various spectroscopic techniques as well as by X-ray crystallography. Taking the advantage of redox non-innocent behavior of azo-aromatic compound which is known to exist in oneelectron reduced azo-anion radical and two-electron reduced hydrazido forms, first crosscoupling between two alcohols are scrutinized. Thus, the reactions are environmentally benign and atom efficient. It liberates water and hydrogen gas as the only by products. While the reaction in inert condition gives α –alkylated ketones, in presence of air as well as lower temperature and base loading selectively the reaction results in α, β –unsaturated compounds. Both the catalytic protocols have a very good functional group tolerance. Thus, a wide range of substrates have been found to be effective for the synthesis of α –alkylated ketones as well as α, β –unsaturated alkylated ketones via dehydrogenative cross-coupling reaction of alcohols. Several control experiments and kinetic studies were performed to elucidate the reaction pathways.

Virtual
Day-01

Chemistry
2024

Oral Presentations

A NOVEL FULL SOLAR LIGHT SPECTRUM RESPONSIVE ANTIMICROBIAL AGENT OF WS2 QUANTUM DOTS FOR PHOTOCATALYTIC WOUND HEALING THERAPY

Guohui Jiang
North Sichuan Medical College, China

Abstract:

Photocatalytic antimicrobial therapy (PCAT) is considered to be a potential therapeutic treatment for bacterial-infection diseases. However, the antibacterial efficiency is unsatisfactory due to the limited application scope of photocatalysis. In this work, full-spectrum responsive tungsten disulfide quantum dots (WS2 QDs) are prepared for killing bacteria and enabling wound healing through photocatalytic reactive oxygen species (ROS) generation and glutathione (GSH) depletion. On the one hand, these ultrasmall WS2 QDs exhibit an excellent full spectrum (*UV-Vis-NIR*)-responsive photocatalytic effect by hindering the recombination of electron-hole pairs, thereby achieving the full use of the energy spectrum. Furthermore, the full-spectrum photocatalytic property of the as-prepared WS2 QDs can be effectively strengthened by redox reaction to deplete GSH for accelerated wound healing. In a word, the as-prepared nanoplatform exhibits the ability to act as an admirable antibacterial reagent with full-spectrum catalytic performance for photocatalytic wound healing therapy. Therefore, this work will not only provide an effective full-spectrum photocatalytic reagent for anti-bacteria therapy and wound healing, but also provide a rational idea for the development of other novel antibacterial agents for applications in the biomedical field.

ORBITAL WAVES AND QUANTUM DENSITIES FROM TIME-DISCRETE CHAOTIC SEQUENCES STABILIZED BY SYMMETRY

Bernd Binder
Quanics, Germany

Abstract:

Rotation-Translation-Reflection type time-discrete recurrent algorithms can generate orbital type density structures showing up like opposite "charges" orbiting around each other. Some fixed-point clouds of these chaotic attractors show a constant drift or rotation, some resemble particles in atom orbits having a core surrounded by orbital shelves with quantized structure. Like in chemistry, the most interesting structures are based on symmetries. Some "Dynamic Autonomous Chaotic Orbital Pattern, #DACOP" examples can be discussed with respect to the impact of symmetries leading to chaos reduction, stability, and robust pattern formation, some cases show. Utilizing the cross product (always orthogonal to all the input vectors and only defined in 3 or 7 dimensions) we apply algebraic methods to have rotation-translation invariance, a "charge" symmetry (alternating opposite sign two-period even/odd tuple by reflection leading to infinitesimal shifts of a cloud of fixed points) and a time-invariance (constant curvature or torsion in the discrete Frenet frame). All symmetries contribute via proper time-discrete geometric algebra and initial value conditions to stabilize orbital densities. As expected, we can show, that DACOP solitons generated in 3+1d (as quaternion pattern) are likely to survive after being released in 7+1d (as octonion pattern) spreading out to all 7 dimensions while showing small adaptions and damped vibrations/dissipations after distortions. In the Frenet frame there are relations to well-known 3d physics ODE in the continuous limit, where invariants or conserved quantities can be assigned to a physical meaning. Example videos are usually accessible via tag "#DACOP" as YouTube videos on the internet. The actual focus is on atomic type symmetries and the "chemistry" of DACOP.

Biography

Bernd Binder has expertise in physics, mathematics, software engineering, and material sciences. After some stimulation by Christos Skiadas, he applied discrete-time Rotation-Translation-Reflection type chaotic modelling about 12 years ago in 2 dimensions focusing on standing wave pattern. The modelling of "Dynamic Autonomous Chaotic Orbital Pattern #DACOP" utilizing the cross product in chaotic systems in 3 and 7 dimensions begun in 2021 and lead to some astonishing real-time simulations with publications and online videos.

EXPLORING THE POTENTIAL OF CHITOSAN/ARAGONITE BIOCOMPOSITE DERIVED FROM CUTTLEBONE WASTE FOR BONE REGENERATION

Youssef Ait Hamdan, Samia Elouali, Hassane Oudadesse, Bertrand Lefeuvre and Mohammed Rhazi

University of Rennes & Cadi Ayyad University, Morocco

Abstract:

Cuttlefish bone biowaste is a potential source of a composite matrix based on chitin and aragonite. In the present work, we propose for the first time the elaboration of biocomposites based on chitosan and aragonite through the valorization of bone waste. The composition of the ventral and dorsal surfaces of bone is well studied by ICP-OES. An extraction process has been applied to the dorsal surface to extract β-chitin and chitosan with controlled physicochemical characteristics. In parallel, aragonite isolation was carried out on the ventral side. The freeze-drying method was used to incorporate aragonite into the chitosan polymer to form CHS/ArgS biocomposites. Physicochemical characterizations were performed by FT-IR, SEM, XRD, ^{1}H-NMR, TGA/DSC, potentiometry and viscometry. The ICP-OES method was used to evaluate in vitro the bioactivity level of biocomposite in simulated human plasma (SBF), enabling analysis of the interactions between the material and SBF. The results obtained indicate that the CHS/ArgS biocomposite derived from cuttlefish bone exhibits bioactivity, and that chitosan enhances the bioactivity of aragonite. The CHS/ArgS biocomposite showed excellent ability to form an apatite layer on its surface. After three days' immersion, FTIR and SEM analyses confirmed the formation of this layer.

Biography

Youssef ait hamdan is a PhD student and researcher in codiplomation between the University of Rennes (France) and Cadi Ayyad University (Morocco). His thesis focuses on the biomedical application of waste biomaterials for bone reconstruction. His fields of expertise include biochemistry and medical biology.

GLOBAL DEVELOPMENTS IN METAL–AIR BATTERIES FOR VARIOUS APPLICATIONS INCLUDING FLYING CARS

Parvatam Siva Prasad
Independent Consultant and IITM, India

Abstract:

Fast developing EV fleets and global warming are hastening the development of alternatives to Lithium-ion batteries (LIBs) with their inherent safety and energy limitation concerns. Rechargeable Metal – air batteries (MABs) can be said to work on water and air. They are having high energy density, safety, low cost, sustainable and recyclable properties. Among various alternatives to LIBs studied rechargeable MABs and solid state metal air batteries (SSMABs) are widely considered as suitable for next generation batteries for various energy applications. MABs and SSMABs are also expected to play a key role as suitable energy storage systems for achieving net zero by 2050 as per IEA targets. Several inherent challenges associated with the functioning of MABs and SSMABs have to be overcome before accepting for commercial production. Al -air and Li - air batteries are comparable to jet fuel in energy density making them suitable for various energy storage applications including large-scale energy storage systems to electric vehicles and portable devices, flying cars, electric aircrafts, heavy trucks. The overview, global developments and breakthroughs in Al-air, Zn -air and Li-air are briefly presented. The latest developments in SSMABs are summarized with focus on solid state Li –air batteries (SSLABs). Effective strategies, key issues, future directions for developing high performing SSMABs and SSLABs are discussed. The progress made and the expectations of Metal –air flow batteries and the projects in pipeline are presented. Worldwide projects in flying cars, domestic electric aircrafts involving MABs and developments in MABs startups and manufacturing companies are also briefed. The expected timelines for the commercial availability of MABs and SSMABs in the market are indicated. Finally the future expected cost and global market value of MABs have been presented.

Biography

Siva was awarded PhD degree in Chemistry from IITM, India in 1979 specializing in Electrochemistry. Having over 45 years of global chemical industrial research experience. Worked in a span of industries including petrochemical, polymer coatings including specialty UV curable coatings, polymer recycling, chemical recycling, Geopolymer concrete, specialty chemical formulations. Having several proven technologies to credit supported by several international publications, patents, and presentations in conferences. Gave several invited lectures in national and international conferences as keynote speakers. Working on EV battery development and recycling for the last six years and currently focusing on development of solid-state metal – air EV batteries for applications in domestic electric aircrafts, heavy trucks, flying cars, and all other consumer energy needs in view of their 100% recyclability, safety, sustainability, low cost and environment friendly materials. Presently working as Independent Senior Chemical Consultant to various process industries, eco-friendly and EV battery industries in India and based at Chennai.

EDUCATION ABOUT DUAL USE AT STEM UNIVERSITIES: CURRENT SITUATION AND ANALYSIS OF THE CASE OR ARGENTINA

Maria J Espona
ArgIQ, Argentina

Abstract:

Since the discovery and use of chemical weapons, it has been clear that chemistry has become a dual-use discipline. Still, only a few decades ago, it started to be discussed at universities. Research and industry sectors are more advanced since they must be aware of the potential misuse of their work given the export control regulations in many countries, especially the developed ones. Nevertheless, all countries that are members of the Chemical Weapons Convention and would like to comply with it, ideally, must implement some outreach to the research and industry community about dual use.

Research performed in Argentina about education on dual-use topics in STEM careers had produced interesting results, particularly regarding the willingness of university professors to deliver this content to their students. Nevertheless, only a few initiatives were identified, which shows the poor awareness of the academic and research community about this topic.

A particular case was the Itinerary Lecture, developed (and presented several times) by professors at the University of Cordoba (Argentina). This lecture covers different aspects related to the main elements of the Chemical Weapons Convention (CWC) and raises awareness about the potential misuse of chemistry research to produce chemical weapons or to use chemicals to cause harm, and it is delivered in such a way that the students engage easily in the discussions. The creation of this lecture was inspired by the initiatives of the Organization for the Prohibition of Chemical Weapons (OPCW).

Other countries face similar challenges, but with the extensive work performed by the OPCW and also experts on chemical weapons non-proliferation, there is a growing tendency that hopefully will revert the current situation and help to have a safer world.

Biography

Maria J Espona, a biologist with a Master's in Terrorism Studies and a PhD in Criminology, have been working in chemical and biological weapons non-proliferations for several decades. She is passionate about working with universities and the research community to implement academic programs that are sustainable and help to raise awareness in a sustainable way, to those communities. She is professor not only in Argentina but also in Georgia about information quality, export control and other topics. Some years ago, she created the NGO ArgIQ, Argentina Information Quality, and got several awards because of the job done. She works for several NGOs and also in projects financed by the European Union on topics of export control, biorisk management, among others. WHO's Technical Advisory Group on the Responsible Use of the Life Sciences and Dual-Use Research (TAG-RULS DUR).

ENHANCING SEPARATION TECHNOLOGY: THE ROLE OF A NOVEL PDMS SPONGE STRATEGY

Yiwei Zhang, Naokazu Idota, Ki Chul Park, and Takehiko Tsukahara
Tokyo Institute of Technology, Japan

Abstract:

In recent years, the demand for valuable metals in various industries has rapidly increased. Recovering these elements selectively and efficiently from nuclear and industrial wastes not only can alleviate the resources scarcity but also significantly reduce potential environmental and ecological hazards associated with leached metals. Conventional separation techniques such as solvent extraction can efficiently separate target element but will generate large amounts secondary wastes. Therefore, developing a facile, green and efficient recovering/preconcentration approach for continuously detecting the distribution of potential pollutants in underground water or nuclear wastes is of great significance. There has been growing attention to polydimethylsiloxane (PDMS) sponge applications due to their flexibility, excellent regeneration ability, chemical and mechanical robustness, and high adsorption capacity. In this study, we synthesized various functional PDMS sponges, evaluated their adsorption-desorption performance in both batch separation and continuous microfluidic experiments, and investigated the underlying mechanisms. We found as-prepared PDMS sponge can selectively separate target metals from wastes solutions in high efficiency. Taking PDMS-Glycine sponge as example, it exhibited high affinity to oxoanions such as molybdate in multi-elemental solutions, maximum adsorption capacity can reach 11.45 mg/g, larger than many other adsorbents. The adsorption process followed the pseudo-secondorder kinetic model and the Langmuir isotherm adsorption model, driven by intraparticle diffusion and electrostatic attraction. Attached molybdate can be separated from the sponge effectively and rapidly by squeezing, compared to traditional elution methods. Desorption is promoted by the synergistic effects of chemical and mechanical stresses within the sponge. Notably, the sponge demonstrated good regeneration abilities, as their adsorption capacity did not decrease after treatment. These results prove that as-prepared sponge typed adsorbents can be used to recover valuable metals from contaminated waste solutions. Currently, our group are trying to immobilize sponges in microfluidic chips for rapid separation and detection of multi-element solutions, more information will be presented in the report.

Biography

Yiwei Zhang studies the nuclear science and material science. His main research interests are in creation of functional materials and its applications to nuclear and environmental chemistry and development of waste free solvent extraction method. The overarching mission of his research is to develop the novel separation techniques for nuclear waste management. His work concerns the development of advanced separation process of radionuclides using functional silicone spongetyped adsorbent, mainly focus on the novel adsorbents design and separation mechanism investigation. This endeavor is driven by the overarching vision of providing innovative solutions to some of the most pressing grand challenges, particularly in the realms of environmental protection and sustainability. His research has also concentrated on gaining a fundamental understanding of the unusual thermodynamic and kinetic phenomena related to the dissolution, aggregation, and denaturation processes of nanoparticles generated during fuel debris retrieval under various environmental conditions.

CREATING A SUITABLE BILAYER ENVIRONMENT FOR THE BIOPHYSICAL STUDY OF MEMBRANE PROTEINS

Evelyn A Okorafor, Emma Gordon and Gary Lorigan
Miami University, USA

Abstract:

Membrane proteins play a vital role in biological systems, comprising approximately one-third of the genome and accounting for 60% of all FDA-approved drugs. However, their solubility and stability outside their native environment present formidable challenges, thereby restricting the comprehensive structural and functional analysis of membrane proteins. To address this limitation, appropriate membrane mimetics are imperative for investigating the structural dynamics and functions of membrane proteins in biophysical and biochemical research. A particularly promising tool in this regard is the Styrene maleic acid (SMA) copolymer, which has proven successful in resolving membrane structures through advanced Cryo-EM and NMR techniques. However, it is important to understand how SMA affects the lipid bilayer and its potential impact on the reconstitution of membrane proteins due to the strong interaction between the two. In this investigation, EPR spectroscopy and DLS were employed to analyze the impact of SMA on lipid bilayers comprising lipids with varying degrees of saturation, (from fully unsaturated to fully saturated lipids). Our findings indicate that fully saturated lipids contribute to the formation of a more rigid bilayer when integrated with SMA, whereas the spin-label in unsaturated lipids exhibits high mobility. This research holds significant value for the comprehensive examination of the structural and functional attributes of membrane proteins, given their substantial interaction with the lipid environment. Furthermore, it offers valuable insights into the realm of drug discovery.

Biography

Evelyn Okorafor is an exceptional graduate student with expertise in polymer synthesis and membrane solubilization, which is essential for drug discovery and delivery. Her research focuses on creating a near-native environment for the biophysical study of membrane proteins by determining the optimal lipid composition, polymer charge, and ratios needed for each membrane protein. She has received numerous awards for her research presentations and proposals during her ongoing PhD program.

MECHANICAL INTEGRITY FOR RESEARCH SCALE ENVIRONMENTS

Eddy C Borchert
The Dow Chemical Company, USA

Abstract:

Synopsis: Mechanical integrity is an important element in an overall safety management system and is applicable in a wide variety of industrial settings. This presentation will define mechanical integrity, discuss why it is a key ingredient to improve and maintain safe operations in a research scale environment using cases from industrial research settings. It will also describe the components to include when building a sustainable program.

Method: A Mechanical Integrity program is a means of risk management. The program applies to equipment that when failure occurs, it's most likely to cause personal injury or environmental insult. Well intended designs may lack components to ensure safe operations. Improper inspections and maintenance provide a false sense of security. Several cases are examined and discussed.

Result: The contents of a sustainable Mechanical Integrity program:

- Requirements: describes what to do, and what is required for the Mechanical Integrity program.
- Guidance: how to do it.
- Maintaining: team effort responsible for maintaining the guidance.

Use a practical failure mode and mitigation approach consisting of five (5) components.

1. Define the Process.
2. Define the Equipment.
3. Identify Failure Scenarios.
4. Consider Failure Mode.
5. Employ "Mitigation Methods" or "layers of protection" to prevent or mitigate the effects of failure.

Conclusions: Mechanical Integrity is a program to manage risks to prevent injury and environmental insult by use of proper:

- Design of the equipment to ensure it is suitable for the application.
- Inspections needed to ensure continued safe operation of the equipment.
- Maintenance of the equipment to ensure the equipment is always fit for service.

Components of a sustainable program:

• Define the Process • Define the Equipment • Identify Failure Scenarios • Consider Failure Mode • Employ "Mitigation Methods"

Biography

Eddy Borchert joined The Dow Chemical Company in 1981 after graduating from Purdue University with a bachelor's degree in chemical engineering. During his 43 years in Dow and related businesses, he has been involved in a variety of roles including engineering, manufacturing, research operations, and safety. Today, Eddy is a mechanical integrity manager for Dow's Global R&D organization. His focus since 2010 is to leverage best practices for effective implementation of mechanical integrity requirements for research scale environments to prevent incidents and sustain compliance

EVIDENCE AND METABOLIC IMPLICATIONS FOR A NEW NON-CANONICAL ROLE OF CU-ZN SUPEROXIDE DISMUTASE

Ziqiao Sun
Cornell University, USA

Abstract:

Copper-zinc superoxide dismutase 1 (SOD1) has long been recognized as a major redox enzyme in scavenging superoxide radicals. However, there is little information on its non-canonical role and metabolic implications. Using a protein complementation assay (PCA) and pull-down assay, we revealed novel protein-protein interactions (PPIs) between SOD1 and tyrosine 3-monooxygenase/tryptophan 5-monooxygenase activation protein zeta (YWHAZ) or epsilon (YWHAE) in this research. Through site-directed mutagenesis of SOD1, we studied the binding conditions of the two PPIs. Forming the SOD1 and YWHAE or YWHAZ protein complex enhanced enzyme activity of purified SOD1 in vitro by 40% ($p < 0.05$) and protein stability of over-expressed intracellular YWHAE (18%, $p < 0.01$) and YWHAZ (14%, $p < 0.05$). Functionally, these PPIs were associated with lipolysis, cell growth, and cell survival in HEK293T or HepG2 cells. In conclusion, our findings reveal two new PPIs between SOD1 and YWHAE or YWHAZ and their structural dependences, responses to redox status, mutual impacts on the enzyme function and protein degradation, and metabolic implications. Overall, our finding revealed an unorthodox new role of SOD1 and will provide novel perspectives and insights for diagnosing and treating diseases related to the protein.

NEW SYSTEM COMBINING REMOVAL AND PHOTOCATALYTIC DEGRADATION OF MICRO AND NANO PLASTICS IN WATER

Cristina Lavorato[1], Angela Severino[1], Beatrice Russo[2], Raffaele Molinari[1], Pietro Argurio[1], Alberto Figoli[2] and Teresa Poerio[2]

[1]Department of Environmental Engineering (DIAm), University of Calabria, Via P. Bucci, Cubo 44/A, Rende (CS), Italy

[2]Institute on Membrane Technology, National Research Council, ITM-CNR, via P. Bucci, 17/C, Rende (CS), Italy

Abstract:

Plastic pollution has become one of the most global graves environmental issues for their impact on the environment and on human health1. The significant and continuous increase of plastics waste necessitate effective strategy to implement the reduction/elimination of plastic pollutants in water bodies. Currently, wastewater treatment plants (WWTPs) are not fully effective in retaining microplastics (MPs) and nanoplastics (NPs). To address this issue, we have developed a new system that combine the advantage of membrane filtration and photocatalytic processes to recover and degrade these types of water pollutants. Membrane processes demonstrated excellent performance in terms of rejection and cleaning efficiency with a low fouling index. Specifically, the use of a nanofiltration membrane resulted in complete rejection of microplastics. Preliminary photocatalytic tests on microplastics recovered by membrane process showed partial decomposition within 48 h, highlighting the potential of the photocatalytic process to degrade microplastics. This system can be applied to the separation and photocatalytic treatment of nanoplastics from polluted water, offering a comprehensive solution to mitigate plastic pollution in aquatic environments. The integration of membrane and photocatalytic processes provides a scalable and efficient method to enhance the overall effectiveness of wastewater treatment, contributing to the protection of water bodies from plastic pollutants.

References:

[1] T. Poerio, C. Lavorato, A. Severino, B. Russo, R. Molinari, P. Argurio, A. Figoli, Journal of Environmental Chemical Engineering, 12, 5, 2024, https://doi.org/10.1016/j.jece.2024.113310.

Acknowledgments: The authors thank the project "Tech4You—Technologies for climate change adaptation and quality of life improvement"—National Recovery and Resilience Plan (NRRP), Mission 4, Component 2, Investment 1.5, funded from the European Union–NextGenerationEU, Identity code: ECS 00000009, CUP B83C22003980006; CUP H23C22000370006.

Biography

Cristina Lavorato has expertise on photocatalytic reactions for organic synthesis and degradation of pollutants in batch and membrane reactors. She received her PhD in Chemical and Materials Engineering from the University of Calabria, in collaboration with the Polytechnic University of Valencia, Spain. She continued her research activity as postdoctoral fellow and research fellow in Department of Environmental Engineering, University of Calabria, Italy. She received award for her research activity by the Anassilaos association and the best paper award in recognition of the paper:" The Evolution of Photocatalytic Membrane Reactors over the Last 20 Years: A State of the Art Perspective" from the Catalysts journal.

PYRIMIDIN-4(3H)-ONES: ANTIOXIDANTS, PROOXIDANTS, AND NEW DIRECTION IN TISSUE REGENERATION THERAPEUTICS

Stanislav A. Grabovskii
Ufa Institute of Chemistry, Russia

Abstract:

Pyrimidin-4(3H)-ones and related compounds are valuable substances in the fields of pharmaceutical and food chemistry due to their versatile applications and relatively straightforward synthesis methods. Their availability and simple modification approaches make them important building blocks for drug development and their application in other areas of chemical research.

Peroxyl radicals, hydroperoxyl radicals, and superoxide anion radicals are the most important reactive oxygen species. The most common type of antioxidants are phenolic compounds produced by plants. However, they are generally highly toxic, unlike pyrimidine derivatives, some of which have an acute toxicity up to 3 grams per kilogram. Therefore, studying these compounds as antioxidants is undoubtedly of practical interest. Various pyrimidin-4(3H)-ones were studied to identify the factors responsible for their antioxidant properties. Methods for evaluating the rate constants of active derivatives using DFT (Density Functional Theory) techniques were proposed.

Antioxidant properties are generally closely linked to prooxidant properties, often due to the presence of transition metals. Complexes of these compounds were studied using biogenic metals, particularly copper(II), and the activation of molecular oxygen on these complexes. Apparently, this process sheds some light on the antihypoxic action of these compounds to some extent.

Year after year, millions of injuries worldwide cause damage to bone and nerve tissue that require surgical intervention. However, there are still no widely accepted drugs that stimulate tissue regeneration after injuries. This area remains highly relevant and urgently needs further research. Success in this field could significantly reduce complications after injuries and accelerate the rehabilitation process. It has been established in male rats and goats that certain derivatives can significantly accelerate tissue regeneration. Specifically, this was demonstrated in skin burn injuries and post-traumatic regeneration of peripheral nerves. For the first time, it was discovered that these derivatives can stimulate bone tissue regeneration. Immunohistochemical studies showed an increase in the number of proliferating cells and osteoclasts.

In conclusion, pyrimidin-4(3H)-ones and their derivatives represent a promising class of compounds with significant potential in both antioxidant and tissue regeneration therapeutics. Their relatively low toxicity and versatile modification capabilities make them ideal candidates for further research and development. Given the ongoing global challenge of effectively treating tissue damage and promoting regeneration, the continued exploration of pyrimidin-4(3H)-ones could lead to breakthroughs that reduce post-injury complications and accelerate rehabilitation processes. Further research in this area is not only warranted but also essential for translating these promising findings into clinically viable therapies.

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Chemistry
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Keynote Presentations

SCALING TWO-PHASE GAS-LIQUID FLOW IN HORIZONTAL PIPES

Mohammad Amin Tarahomi, Mohammad Emamzadeh and Mohammad Ameri
Shahid Beheshti University, Iran

Abstract:

Two-phase flow in pipelines is analyzed by experimental facilities and also numerical analysis. The experimental facilities are designed by scale-down field pipelines. Therefore, the accuracy of experimental data is strongly dependent on the scaling method. In this research, an approach for downscaling field pipelines into experimental facilities is proposed. The fluid flows in different scales for various flow patterns including Stratified, Stratified Wavy, Slug, Plug and Bubbly are numerically simulated and validated against full-scale experimental data. The results of the scaled-down model simulation are in excellent agreement with the full-scale facilities, affirming the robustness of the downscaling method. This research enhances the understanding of scaled-down experiments for various flow conditions.

Biography

Mohammad Amin Tarahomi is an innovative and driven professional, renowned for his expertise in Mechanical engineering and his passion for sustainable Energy. With valuable experiences in the field, Mohammad has contributed to groundbreaking projects that have revolutionized the way we interact with engineering. His dedication to continuous learning and development is matched only by his commitment to mentoring the next generation of tech enthusiasts. Mohammad's vision for a greener, more efficient technological future continues to inspire his peers and makes a tangible impact in the community.

THERMOMECHANICAL PROCESSES AND PHASE TRANSFORMATIONS IN SHAPE MEMORY ALLOYS

Osman Adiguzel
Firat University, Turkey

Abstract:

Metals and many alloy systems have different phases with chemical composition at the phase diagrams in composition-temperature or composition-pressure space. A series of alloy systems, called shape memory alloys, exhibit a peculiar property called shape memory effect in β-phase region. This phenomenon is initiated with thermomechanical processes on cooling and deformation, and performed thermally on heating and cooling, with which shape of the materials cycle between original and deformed shapes in reversible ways. Therefore, this behavior can be called thermoelasticity. This is plastic deformation, due to the soft character of the material in low temperature condition, with which strain energy is stored in the materials and release upon heating, by recovering original shape. Shape memory effect is governed by crystallographic transformations, thermal and stress induced martensitic transformations. Thermal induced martensitic transformation occurs on cooling, with cooperative movement of atoms in <110 > -type directions on the {110} - type planes of austenite matrix, along with lattice twinning reaction, and ordered parent phase structures turn into twinned martensite structures. The twinned structures turn into detwinned martensite structures by means of stress induced transformation with stressing the material in the martensitic condition. These reactions are driven by lattice invariant shear.

These alloys exhibit another property called superelasticity, which is performed with mechanically stressing and releasing the material in elasticity limit at a constant temperature in parent phase region and shape recovery occurs instantly upon releasing, by exhibiting elastic material behavior. Stress-strain profile exhibits nonlinear behavior at stress-strain diagram, stressing and releasing paths are different and hysteresis loops refers to energy dissipation. This phenomenon is also result of stress induced martensitic transformation and ordered parent phase structures turn into detwinned martensite structure with stressing. Copper based alloys exhibit this property in metastable β-phase region. Lattice twinning and lattice invariant shear are not uniform in these memory alloys and gives rise to the formation of layered structures, like 3R, 9R or 18R depending on the stacking sequences on the {110} - type close-packed planes of the parent phase. Unit cell and periodicity is completed through 18 layers in 18R structures in ternary copper-based alloys. In the present contribution, x-ray diffraction and electron diffraction studies were carried out on copper based CuZnAl and CuAlMn alloys. X-ray diffraction profile and electron diffraction patterns exhibit super lattice scattering. Critical transformation temperatures of these alloys are over the room temperature, at which alloy samples are completed in the martensitic state. These alloy samples were aged at room temperature. X-ray diffractograms taken in a long-time interval show that scattering angles, peak intensities, and characteristics change with ageing at room temperature. This result refers to the rearrangement of atoms in diffusive manner.

Biography

Adiguzel graduated from Department of Physics, Ankara University, Turkey in 1974 and received PhD- degree from Dicle University, Diyarbakir-Turkey. He has studied at Surrey University, Guildford, UK, as a post- doctoral research scientist in 1986-1987, and studied were focused on shape memory effect in shape memory alloys. His academic life started following graduation by attending an assistant to Dicle University in January 1975.

He became professor in 1996 at Firat University in Turkey, and retired on November 28, 2019, due to the age limit of 67, following academic life of 45 years. He supervised 5 PhD- theses and 3 M. Sc- theses and published over 80 papers in international and national journals; He joined over 120 conferences and symposia in international level with contribution. He served the program chair or conference chair/co-chair in some of these activities. Also, he joined in last six years (2014 - 2019) over 60 conferences as Keynote Speaker and Conference Co-Chair organized by different companies. Additionally, he joined over 120 online conferences in the same way in pandemic period of 2020-2022. Adiguzel served his directorate of Graduate School of Natural and Applied Sciences, Firat University, in 1999-2004. He received a certificate awarded to him and his experimental group in recognition of significant contribution of 2 patterns to the Powder Diffraction File – Release 2000. The ICDD (International Centre for Diffraction Data) also appreciates cooperation of his group and interest in Powder Diffraction File.

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2024

Oral Presentations

THE EROSION OF THE NON-PROLIFERATION REGIME: CAUSES AND CONSEQUENCES

Barbara Gallo
Archivio Disarmo, Italy

Abstract:

Nuclear weapons officially entered in the human history in August of 1945, when the destructive power of two nuclear bombs, dropped by a US B29 bomber, and razed the two Japanese cities of Hiroshima and Nagasaki causing destruction and death. Since that tragic event the nuclear dossier has been a hot topic and after more than 80 years it is far from being closed. It is a fact that the NPT, over the course of over 50 years, has allowed a significant reduction in nuclear warheads, but in recent decades, due to the erosion of trust in multilateral international agreements and recent technological discoveries applied in the military field, the architecture of nuclear disarmament seems to be serious danger.

Biography

Freelance journalist since 2016, she graduated in Sociology at the University of Rome "La Sapienza". Since 2005, you have been dealing with issues related to the geopolitics of conflicts. She is the author of articles on topics such as human rights, the situation of women and children in conflict areas and on weapons of mass destruction. In 2019 in the role of International Relations Manager, she has been following the Stop Killer Robots International Campaig , as well as relations with the European Non-Proliferation and Disarmament Consortium. She lives and works in Rome.

BYUON ENERGY AND NEW ENVIRONMENTALLY FRIENDLY HEAT INSTALLATIONS

Baurov Yuriy Alexeevich
"Byuon Space Energy" LLC, Russia

Abstract:

In the results of experimental investigations of new non-gauge interaction (using high current magnets, torsion and piezoresonance balances, changes in the rate of β- decay of radioactive elements etc.) are described. The physical nature of the new force, in accordance with the Theory of Byuon (TB) (non-gauge theory of the formation of physical space and the world of ultimate particles on the basis of unobservable objects named "byuons" which containing a new fundamental vector constant – cosmologic vector potential A_g) is showed in. It was shown in that ultimate particle mass ($\Delta mc\ 2 \approx 33$ eV) is in party proportional to the modulus of summary potential AΣ (AΣ ≤ Ag = 1.95 × 1011 G cm). Variation in the modulus of due to other field potentials (ΔAΣ) should lead to the emergence of new natural force that is nonlinear and nonlocal and can be represented by a series in terms of ΔAΣ. In this report we shall discuss the heat installations which use byuon energy for heat of a water. The experiments were carried out in Italy and Russia (2012-2024). For realization the new force action (ΔAΣ) we used a gravitation potential. The results of experiments showed the ratio between the heat energy output and the electric energy input can be more 1.

Biography

Baurov Yu.A.- Ph.D. in 1978. He had worked at Cent. Res. Inst. Mach. Eng. (Korolev town, Russia) from 1972 till 2012, at Italy (2012 - 2015). In 2004 he was elected as a Fellow of Academy Cosmonautic Russia and also listed as one of most outstanding scientists of the planet in 2000.

3rd European Congress on
Chemistry and Applied Sciences
June 24-25, 2024 | Amsterdam, Netherlands

RCM ON PUMP SYSTEM: APPLICATION OF FUZZY LINGUISTICS AND FAILURE MODE EFFECT AND CRITICALITY ANALYSIS TECHNIQUE

Paul T Elijah[1,2] and Raphael O Edokpia[a]

[1]*University of Benin, Nigeria*
[2]*Nigeria Maritime University, Nigeria*

Abstract:

In order to preserve and boost the standard of production outcomes, it is necessary to assess and enhance production performance. Seamless processes is one degree of assessing the efficiency of production. Effective risk management techniques may help to support and sustain the firm production process to operate without interferences. The objective of this research is to identify, rank and recommend maintenance strategy for all the failure modes corresponding to the functional significant components of the pump system. This article offers an investigation on RCM with fuzzy logic and how it compares with the standard technique in order to explain the criticality analysis industrial pumps used in petrochemical industries. Failure mode effect cause and criticality analysis (FMECA) was combined alongside the fuzzy linguistics (FL) scale approach on the theoretical foundation of fuzzy logic. Following that, the risk priority number is calculated using the weighted Euclidean distance algorithm and centroid defuzzification. The results showed the criticality ranking for all failure modes of the pump system based the RPN scores, and suitable maintenance techniques were advised for each failure mode. It also shows that utilizing fuzzy logic with language rules to analyze failure mechanism can result in a more reliable ranking as compared to the conventional FMECA.

LEVONORGESTREL-INDUCED HEPATOTOXICITY AND NEPHROTOXICITY IN FEMALE WISTAR RATS

Catherine B Adeniji, Ighodaro O M, Adeosun A M and Saibu O
Lead City University, Nigeria

Abstract:

The recent increase in the intake of contraceptives in a bid to prevent unwanted pregnancy as a result of increased sexual activities among young adults is a cause for concern. This study was designed to evaluate the impact of indiscriminate use of a commercially available LNG on liver and kidney function using Wistar rats as an experimental model. Sixty (60) rats weighing 110 – 120 g were purchased and randomly placed in three groups; n= 20: Group A was treated with a human dose equivalent of 1.83 mg/kg/BW once weekly, Group B was given the same dose twice weekly while Group C served as control administered equal vehicle volume of 0.2 ml on treatment days. The drug was procured from a government-approved pharmacy in Ibadan, Nigeria. At the end of each month of treatment, 5 rats from each group were sacrificed, liver and kidney were collected, weighed, and processed for histological and biochemical analyses. The weights of rats were measured before treatment started and before each batch of sacrifice. The relative organ weights and histopathological assessments of the liver and kidney were determined. Hepatotoxicity was determined by measuring aspartate aminotransaminase (AST), alanine aminotransaminase (ALT), AST:ALT ratio, alkaline phosphatase (ALP), Total protein and gamma-glutamyl transferase (GGT) using standard spectrophotometric methods. Similarly, nephrotoxicity was determined via cystatin C, urea, creatinine, BUN, and the BUN-creatinine ratio levels. Administration of LNG to rats especially twice weekly caused a significant reduction in the relative weight of the liver, and total protein while concentrations of AST, ALT, ALP, GGT, Cystatin C, creatinine, and urea were significantly elevated in the serum with a concomitant decrease in the tissues. The histopathological examination showed hyperplastic degeneration, disseminated congestion, and extensive tubular necrosis in the liver and kidney of the treated groups. The data obtained from this study showed a dose- and time-dependent effect on the organs, especially the liver and this compromise was more pronounced in the rats treated twice weekly. It therefore suggests that excessive intake of LNG may result in some degree of liver function impairments.

Biography

Catherine B. Adeniji had just concluded her PhD in Lead City University, Ibadan, Nigeria where her research work focused on the toxicological assessments of contraceptive intake on reproductive and vital organs in the body using experimental animal models. She is interested in women's reproductive health and has continued to work with other scientists to ensure improved health and well-being for women. She is currently looking for post-doc opportunity to advance her career in women's reproductive health and fertility.

ENHANCING RAMIE FIBER PROPERTIES: EFFECTS OF SODIUM LAURYL SULPHATE (SLS) TREATMENT

Sivasubramanian Palanisamy
P T R College of Engineering & Technology, India

Abstract:

Green composite materials serve as a sustainable alternative to synthetic plastics, especially single-use plastics, and contribute to raising awareness about environmental conservation. Natural lignocellulosic fibers are increasingly adopted as reinforcement in polymer matrix composites, aiming for enhanced renewability and sustainability. This study investigates the impact of treating ramie fibers from Boehmeria nivea with sodium lauryl sulfate (SLS) surfactant. The SLS-treated ramie fibers underwent comprehensive analysis to assess their morphological, physical, thermal, structural, and mechanical properties using techniques such as powder X-ray diffraction (XRD), Fourier transform infrared (FTIR) spectroscopy, thermogravimetric analysis (TGA), scanning electron microscopy (SEM), and tensile testing. The treatment resulted in a density of 1.23 g/cc and a crystallinity index of 84.5%, alongside a remarkable cellulose content of 81.3%. This increase in cellulose content can be attributed to the dissolution of hemicellulose and loose particles. SEM images illustrated notable morphological changes in the treated fibers, with no significant damage observed on their surfaces. Additionally, the treatment facilitated an elevation in the onset of fiber degradation temperature, with degradation initiating above 250°C and culminating at 327°C. This thermal behavior suggests the suitability of the treated ramie fibers for manufacturing composites with widely used matrices. In summary, the utilization of SLS-treated ramie fibers holds promise for the development of environmentally friendly composite materials with improved properties, contributing to the ongoing efforts to mitigate plastic pollution and promote sustainability.

THE CLINICAL CHARACTERISTICS, ANTIVIRAL ACTION AGAINST RNA VIRUSES, AND HISTORICAL USAGE OF DOXYCYCLINE IN LOCAL MEDICINE

Rahul Hajare
Sandip University, India

Abstract:

The detrimental effects of viral infections on human health have made effective treatments for a wide range of viruses urgently needed. In order to combat a wide range of well-known viruses, such as SARS-CoV, Zika virus, Ebola virus, enteroviruses (EVs), rhinoviruses (RVs), and influenza A virus, doxycycline has evolved into a variety of macrolides. Interestingly, these viruses have raised worries about global health, which have been addressed by the many ways that doxycycline works. The novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) that causes COVID-19, a new zoonotic infection, has drawn increased attention to doxycycline recently. This is due to the fact that antibiotics are known to have immune-modulating and antiviral properties. The review aims to investigate in detail the structural properties of each of the aforementioned viruses as well as the molecular and clinical impacts of doxycycline against them.

Biography

Rahul Hajare is a student of Vedanta Institute Kolkata; he has completed his M.Pharm. in Distinction from Nagpur University. Professor Rahul Hajare obtained his PhD from the University of Vinayaka Mission Research Foundation, Deemed University. He has been a research fellow at KLE University, Bengaluru, for two years. He served as a group leader at Pune University, USA, before joining the Hindu University of America, where he has been a scholar. He is a professor at Sandip University. He is a postdoctoral fellow of the world-renowned and highly respected Dr. Ramesh S. Paranjape National AIDS Research Institute, Indian Council of Medical Research.

ALTERNATIVE FUEL PRODUCTION IN FISCHER-TROPSCH SYNTHESIS ON NOVEL BEA ZEOLITE CATALYSTS MODIFIED BY TRANSITION METALS (CO, FE AND NI)

Karolina Chalupka-Spiewak, R. Sadek, W. Maniukiewicz, P. Mierczyński, M. I. Szynkowska-Jóźwik, J. Rynkowski, J. Gurgul and S. Dźwigaj
Lodz University of Technology, Poland

Abstract:

The Fischer-Tropsch synthesis is known since 1920 when these two German scientists discovered and optimized the possibility of obtaining fuel from synthesis gas. The growth in interest in FTS is a consequence of depletion of oil resources and the protection of the environment, which continuous to be destroyed, but also of global demand for fuel and global transportation and environmental policies regarding air quality. FTS seems to be a good solution for these requirements. However, this synthesis also comes with a number of challenges that need to be solved for better industrial application. In our works we reported that the zeolite BEA catalysts modified by transition metals as Co, Fe and Ni and prepared by a two-step postsynthesis method makes it possible to obtain highly active catalysts for Fischer-Tropsch synthesis, resistant to metal particle sintering and exhibiting lower carbon deposition than the usual supported catalysts used in FTS. The present work focuses on the differences in the physicochemical properties of different series of catalysts and the role of metals ions placed in the framework positions of BEA zeolite and their effect on the activity of metallic BEA zeolite catalysts. The obtained results point that the preparation of MeBEA zeolite catalysts by two-step post-synthesis method allows to localized metal ions into BEA zeolite framework and in this way the obtaining very active, stable and selective catalysts for FTS process with high thermal resistance for sintering and carbon deposition. Moreover, these results show that the incorporation even high metal content into BEA zeolite does not destroy its original and unique structure with effect on the activity of catalysts. The difference in porosity of BEA zeolite does not influence on the activity of MeBEA zeolite catalysts in FTS but has impact on the kind of liquid products formed in this process.

Biography

Karolina Chalupka-Spiewak is assistant professor in Institute of General and Ecological Chemistry in Lodz University of Technology in Poland. Her scientific interests are focused on heterogeneous catalysis and the alternative fuel production processes as Fischer-Tropsch Synthesis, transesterification of vegetables oils and hydrocracking of algal oils. She specializes in designing of zeolites catalysts and their modification.

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Note:

Forthcoming Events

International Conference on **Oceanography and Marine Biology**
September 09-10, 2024 | Barcelona, Spain

International Conference on **Aquaculture and Fisheries**
September 09-10, 2024 | Barcelona, Spain

3rd International Conference on **Materials Science & Engineering**
September 26-27, 2024| Amsterdam, Netherlands

2nd European Congress on **Biomedical Science and Engineering**
October 07-08, 2024 | London, UK

2nd European Congress on **Human Genetics**
October 07-08, 2024 | London, UK

2nd International Conference on **Clinical Case Reports**
October 10-11, 2024 | London, UK

3rd International Conference on **Advanced Nanomaterials and Nanotechnology**
October 10-11, 2024 | London, UK

3rd International Conference on **Microbiology**
October 24-25, 2024 | Tokyo, Japan

3rd International Conference on **Infectious Diseases**
October 24-25, 2024 | Tokyo, Japan

Global Summit on **Climate Change & Environmental Sustainability**
October 28-29, 2024 | Rome, Italy

2nd European Congress on **Renewable Energy and Sustainable Development**
November 11-12, 2024 | London, UK

3rd International Conference on **Cancer and Oncology Research**
November 11-12, 2024 | Barcelona, Spain

3rd International Conference on **3D Printing & Additive Manufacturing**
November 14-15, 2024 | Rome, Italy

2nd International Conference & Expo on **Biofuels and Bioenergy**
November 14-15, 2024 | London, UK

3rd International Conference on **Addiction & Psychiatry**
November 18-19, 2024 | Rome, Italy

3rd International Conference on **Neurology and Brain Disorders**
November 18-19, 2024 | Rome, Italy

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