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CATALYSIS, CHEMICAL ENGINEERING & TECHNOLOGY

September
11-13, 2025

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BOOK OF ABSTRACTS

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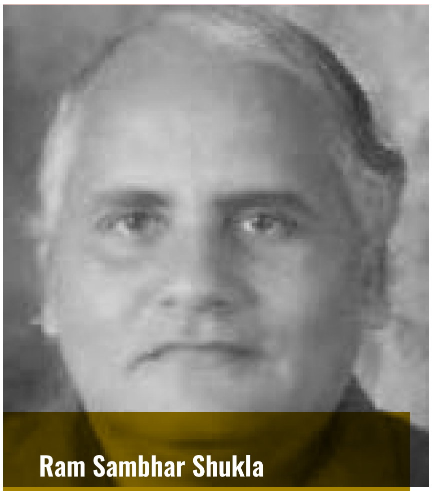
Keynote Speakers



Ram Sambhar Shukla

CSIR-Central Salt and Marine Chemicals Research Institute (CSMCRI), India

Tokeer Ahmad

Jamia Millia Islamia, India

Thank You All...

Welcome Message

Dear Congress Visitors

It is an honor and pleasure to invite you to CAT 2025 covering a wide range of topics including catalysis for energy, plasma catalysis, enzymatic pathways, renewable sources, and many more. These topics cover both academic and industrial value. This event will explore the latest research and developments across these areas, providing attendees with a holistic understanding of the current status and future potential of catalysis and chemical engineering.

Industrialization having been promoted since the 18th century has achieved a high level of material affluence, but resulted in a risky society in terms of serious environmental problems as much as threatening the existence of humans on the earth. As we know, sustainable development is promoted at a global level for overcoming the risky society.

In a broad sense, the topics of CAT 2025 cover a set of core technology-based means to achieve sustainable development, and approach the core means through a logical and systematic access, good problem-solving, creative abilities, and a scientific mind.

In addition, it is no doubt that CAT 2025 is a significant and important platform not only advancing the knowledge of this field through presentation and discussions, but also contributing to sustainable development at a global level through providing the advanced knowledge applicable to the field.

We are actively looking forward to welcoming you to the CAT 2025 and collectively exploring the frontiers for expediting the future endeavors in catalysis and chemical engineering as a means to achieve sustainable development.

Prof. and Dr. Dai-Yeun Jeong

Director of Asia Climate Education Center, South Korea
Emeritus Professor at Jeju National University, South Korea

Welcome Message

Dear participants,

It is my pleasure to welcome you to the 21st edition of CAT. Over the years, I have witnessed how this conference has fostered dialogue, collaboration, and in-depth exploration of critical topics that shape both the present and the future of global research. The opportunity to present and share your work with the scientific community is the beating heart of the research process. It drives the development of innovative technologies that enhance research methodologies and industrial processes, all while advancing our shared commitment to environmental sustainability. However, CAT is more than just a platform for dissemination. It is, above all, a unique opportunity to build connections—bridging the gap between researchers and industries from around the globe. This is a space where ideas are exchanged, partnerships are formed, and the seeds of future breakthroughs are planted. I encourage each of you to make the most of this occasion. Engage with your peers, forge meaningful collaborations, and strengthen the bonds that unite us in our common pursuit of knowledge and progress.

Dr. Enrico Paris

CREA-IT & DIAEE, Italy

Welcome Message

Dear congress visitors, it is a pleasure for me being part of the 21st edition of Global Conference on Catalysis, Chemical Engineering and Technology that will be held in Valencia, Spain, in September 2025. In relation to this, I would like to write you a few welcome notes drawing your attention to one of the most worrying effects of Climate Change, that is, water scarcity. As you may know, even more in the region of Valencia where the Dana effects were, unfortunately, devastating, water stress and water droughts are creating increasing concern not only at population levels but also at politics level. In this catastrophic scenario, finding alternative water sources becomes a critical issue. In this sense, and jointly with desalination practices, reusing treated urban wastewater must be considered as a sustainable and economically viable alternative. New European Regulation on the minimum requirements that treated urban wastewater must be fulfilled to guarantee its safe reuse on crop irrigation, is being adopted all over Europe provoking the update of urban wastewater treatment infrastructures to comply with such regulation. Existing and improved oxidation techniques for eliminating microcontaminants, pathogens and resistance to antibiotics will be summarized and deeply explained in my keynote, stressing the new challenges and future prospective of new sustainable technologies.

Dr. Isabel Oller Alberola

Plataforma Solar de Almería, Spain

Welcome Message

Dear Conference Attendees,

It is a great pleasure to write a few welcome notes for sessions devoted to Catalysis for Energy and Renewable Sources required to keep humans safely on the earth. A multi-disciplinary approach related to generation of hydrogen from biofuels and its usage in solid oxide fuel cells for efficient and reliable energy generation is based upon design of catalytic nanomaterials for structured catalysts of biofuels transformation into syngas and hydrogen, oxygen and hydrogen separation membranes and solid oxide fuel cells anodes operating in the internal reforming mode. These sessions offer a variety of research topics including new approaches to synthesis of nanocomposite catalytic materials, their detailed characterization with modern techniques to elucidate atom-scale factors controlling their activity and stability, testing in real operation conditions with mathematical modeling required for up-scaling. It will be a great opportunity for participants to gain knowledge with the up-to-date research in this field.

Vladislav Sadykov, Professor

Boreskov Institute of Catalysis, Novosibirsk State Unversity,
Faculty of Natural Sciences, Novosibirsk, Russia

ABOUT
MAGNUS GROUP

Magnus Group, a distinguished scientific event organizer, has been at the forefront of fostering knowledge exchange and collaboration since its inception in 2015. With a steadfast commitment to the ethos of Share, receive, grow, Magnus Group has successfully organized over 200 conferences spanning diverse fields, including Healthcare, Medical, Pharmaceutics, Chemistry, Nursing, Agriculture, and Plant Sciences.

The core philosophy of Magnus Group revolves around creating dynamic platforms that facilitate the exchange of cutting-edge research, insights, and innovations within the global scientific community. By bringing together experts, scholars, and professionals from various disciplines, Magnus Group cultivates an environment conducive to intellectual discourse, networking, and interdisciplinary collaboration.

Magnus Group's unwavering dedication to organizing impactful scientific events has positioned it as a key player in the global scientific community. By adhering to the motto of Share, receive, grow, Magnus Group continues to contribute significantly to the advancement of knowledge and the development of innovative solutions in various scientific domains.

ABOUT

CAT 2025

The **21st Edition of the Global Conference on Catalysis, Chemical Engineering & Technology (CAT 2025)** will be held from **September 11–13, 2025** online to accommodate a wider global audience. Under the theme *“Exploring New Horizons in Catalysis and Chemical Engineering,”* this international event brings together distinguished researchers, scientists, academicians, and industry professionals to share pioneering ideas and transformative research in the field.

CAT 2025 provides a comprehensive platform for discussing cutting-edge developments in catalysis and chemical engineering. From innovative methodologies to emerging industrial applications, the conference fosters collaboration across disciplines, encourages academic-industry partnerships, and supports knowledge transfer. Attendees can expect a rich scientific program featuring keynote lectures, oral and poster presentations, and networking opportunities that aim to drive future breakthroughs and technological progress in the field.

ABOUT

CPD Accreditation

CPD
APPROVED PROVIDER

Continuing Professional Development (CPD) credits are valuable for CAT 2025 attendees as they provide recognition and validation of their ongoing learning and professional development. The number of CPD credits that can be earned is typically based on the number of sessions attended. You have an opportunity to avail 1 CPD credit for each hour of Attendance.

Some benefits of CPD credits include:

Career advancement: CPD credits demonstrate a commitment to ongoing learning and professional development, which can enhance one's reputation and increase chances of career advancement.

Maintenance of professional credentials: Many professions require a minimum number of CPD credits to maintain their certification or license.

Increased knowledge: Attending CAT 2025 and earning CPD credits can help attendees stay current with the latest developments and advancements in their field.

Networking opportunities: CAT 2025 Conference provide opportunities for attendees to network with peers and experts, expanding their professional network and building relationships with potential collaborators.

Note: Each conference attendee will receive 24+ CPD credits.

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KEYNOTE PRESENTATIONS

Dai-YeunJeong

Asia Climate Change Education Center, Jeju City, Jeju Special Self-Governing Province, South Korea

Emeritus Prof. at Jeju National University, Jeju City, Jeju Special Self-Governing Province, South Korea

Human impact on natural environment and its implications

Industrialization being advanced from the 18thcentury has improved a lot of material affluence, and has polluted and/or destructed the original quality of nature in the processes of extracting resources from nature, and producing/distributing/consuming goods and services. The current status of nature being polluted/destructed is termed the crisis of nature. The crisis of nature does not end in itself, but is linked to the crisis of human survival on the earth in that nature can exist without humans, but humans can't survive without nature.

A wide range of human activities from lots of sources such as government, academia, enterprise, and NGO, etc. Are promoting to continue the improvement of material affluence while maintaining the original quality of nature. In a word, this is the human activity toward co-existence between humans and nature being promoted in the name of sustainable development. In a broad sense, CCET 2025 is also one of them.

In such a context, this paper aims at explaining human impact on nature and its implications. In order to achieve the objectives, this paper will be composed of four parts as below.

Part 1: Human being is a species living with other species on the earth. The position of humans on the earth will be explained in relation to other species in order to identify

Biography

Dr. Dai-YeunJeong is presently the Director of Asia Climate Change Education Center and an emeritus professor of environmental sociology at Jeju National University in South Korea. Dr. Dai-Yeun received BA and MA degree in sociology from Korea University (South Korea), and PhD in environmental sociology from the University of Queensland (Australia). Dr. Dai-Yeunwas a professor of environmental sociology at Jeju National University (South Korea) from 1981 to 2012. Dr. Dai-Yeunpast major professional activities include a teaching professor at the University of Sheffield in UK, the president of Asia-Pacific Sociological Association, a delegate of South Korean Government to United Nations Framework Convention on Climate Change (UNFCCC) and OECD environmental meeting, and a member of Presidential Commission on Sustainable Development Republic of Korea, etc. Dr. Dai-Yeun has published 60 environment-related research papers in domestic and international academic journals and 13 books including Environmental Sociology. Dr. Dai-Yeun has conducted what humans is on the earth.

Part 2: The effect of nature on humans will be explained. This is for understanding why humans can't survive without nature. Two effects of nature on humans will be explained. One is the ecosystem services nature provides to humans, and the other one is how nature determine the mode of human existence on the earth.

Part 3: As the main component of this paper, human impact on nature will be explained. This is the explanation about the emergence of environmental problems leading nature to be polluted and/or destructed. Two issues will be explained. One is the mechanism of nature being polluted and/or destructed by human activities in the process of improving material affluence. The other one is the current status of nature being polluted and/or destructed in terms of individual indicator and synthetic indicator.

Part 4: As concluding remarks, the implications of polluted/destructed nature will be examined in terms of two aspects. One is to review the implication of industrialization. The other one is to review the concept and implications of sustainable development.

100 unpublished environment-related research projects funded by domestic and international organizations.

Enrico Paris[1]*, Beatrice Vincenti[1,2], Francesco Gallucci[1], Carmine Cava[2], Domenico Borello[2]

[1]Council for Agricultural Research and Economics (CREA), Center of Engineering and Agro-Food Processing, 00015 Monterotondo, Italy

[2]Department of Mechanical and Aerospace Engineering (DIMA), La Sapienza University of Rome, Rome, 00185, Italy

Effect of bed material on syngas quality: Comparison of biomass gasification with different bed materials

The selection of suitable bed materials in Fluidized Bed Gasification (FBG) plays a crucial role in optimizing the process. Ideal bed materials must balance economic feasibility, thermal resistance, and minimal chemical interaction with biomass. However, the chemical interactions between biomass and bed materials at high temperatures are often overlooked. This study investigated the performance of commonly used bed materials (such as olivine, K-feldspar, etc) in FBG systems with different biomass types. The produced syngas was analyzed for composition (H_2, CH_4, CO, CO_2, O_2) and contaminants like Volatile Organic Compounds (VOCs), tars, and Heavy Metals (HMs).

The interaction between biomass and bed materials significantly influenced the quality of syngas and biochar. Olivine showed high performance with arboreal biomass, while K-feldspar proved effective for both arboreal and herbaceous biomasses. To assess metal contamination, a TGA-DSC setup with a bubbler system was employed, capturing HMs released during gasification. ICP-MS analyses provided insights into HM distribution in syngas and solid residues, highlighting that K-feldspar minimized

Biography

Dr. Enrico Paris studied Analytical Chemistry at La Sapienza University of Rome (Italy) and graduated as MS in 2017. In 2020 became a member of the Italian Association of Chemists. In 2022 Dr. Enrico Paris received his PhD degree cum laude in "Energy and Environment Engineering". Since 2022, Dr. Enrico Paris has been a Research Technologist at CREA-IT in the LASER-B (Laboratory for Experimental Activities on Renewable Energy from Biomass). In 2024, Dr. Paris achieved the National Scientific Qualification as an Associate Professor in the disciplinary field of 07/C1 - Agricultural, Forest, and Biosystems Engineering. Dr. Enrico Paris is a reviwer and editor of numerous international scientific journals and has been a member of the scientific committee of several international conferences.

HM release while maintaining stable performance.

This research underscores the importance of selecting appropriate bed materials in FBG processes to enhance syngas quality, reduce undesirable by-products, and improve the overall sustainability of the conversion system. It has been observed that metals, such as Ni, Cu, Zn, Cd, Sn, Ba and Pb, have higher concentrations in the syngas produced by using olivine as bed material rather than K-feldspar. In particular, heavy metals, such as Pb, Cu, Cd, Ni and Zn, show concentrations of 61.06 mg/Nm3, 15.29 mg/Nm3, 17.97 mg/Nm3, 37.29 mg/Nm3 and 116.39 mg/Nm3, respectively, compared to 23.26 mg/Nm3, 11.82 mg/Nm3, 2.76 mg/Nm3, 24.46 mg/Nm3 and 53.07 mg/Nm3 detected with K-feldspar. Moreover, a more hydrogen- rich syngas is obtained when using K-feldspar instead of olivine.

Isabel Oller[1,2]*, Ana Ruiz-Delgado[1,2], Ilaria Berruti[1,2], Alba Hernández-Zanoletty[1,2], Isabel Espinoza Pavón[1,2], Samira Nahim Granados[1,2], Patricia Palenzuela-Bolaños[2], Sixto Malato[1,2], Inmaculada Polo-López[1,2]

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[2]CIESOL-University of Almería, Almería, Spain

Solar heterogeneous photocatalysis and photochemistry for urban wastewater regeneration and reuse

Water scarcity, inadequate sanitation and the socioeconomic gap between urban and rural areas represent significant barriers to sustainable development and promote disparities regarding access to resources, opportunities and basic services. Addressing the world water crisis, conventional treatments could not be applied for the removal of Contaminants of Emerging Concern (CECs) or the inactivation of pathogenic microorganisms. Herein, solar photocatalysis with immobilized materials and solar photochemistry are currently investigated as a viable and simple-to-operate technologies for water treatment and reuse within specific atmospheric and operational environments.

The design, development and evaluation of new affordable photocatalytic reactors integrated with innovative sets of immobilized catalysts for the simultaneous disinfection and elimination of CECs from different wastewater matrices at pilot scale will be presented.

In addition, the performance and scaling up of solar photoreactors for photochemical applications for reusing urban wastewater in crop irrigation at DEMO scale will

Biography

Dra. Isabel Oller holds a PhD in Chemical Engineering from the University of Almeria (2008). She is Head of the Solar Treatment of Water Research Unit at the Plataforma Solar de Almeria (CIEMAT). Dra. Isabel Oller has more than 20 years of experience in the field of industrial and urban wastewater treatment, disinfection and reuse by using advanced oxidation processes (with and without solar energy) and their combination with physic-chemical pre-treatments, advanced biological processes, membrane systems and other conventional technologies. Dra. Isabel Oller is co-author of 181 publications in SCI Journals and more than 300 contributions to different International Congresses and Symposiums. H-index: 51 (Scopus).

be also shown. Potential improvements in combination of natural based solutions (mainly wetlands) with solar photochemistry in open photoreactors will be also widely discussed.

Nowadays challenges and overview on future perspectives and benchmarking technologies for urban wastewater reuse in different environments with different necessities, will be also tackled.

Osman Adiguzel

Department of Physics, Firat University, Elazig, Turkey

Thermomechanical processes and transformations governing reversibility in shape memory alloys

Shape memory alloys take place in a class of advanced smart materials by giving stimulus response to changes in the external conditions. These alloys exhibit dual memory characteristics in the β-phase region with chemical composition, shape memory effect and superelasticitywith the recoverability of two shapes at different conditions.

Shape memory effect is initiated thermomechanical processes on cooling and deformation and performed thermally on heating and cooling, with which shape of the material cycles thermally between original and deformed shapes in reversible way. Therefore, this behavior can be called thermal memory or thermoelasticity. Deformation in the low temperature condition is plastic deformation, with which strain energy is stored in the materials and releases on heating by recovering the original shape.

This phenomenon is governed by the thermomechanical transformations, thermal and stress induced martensitic transformations. Thermal induced martensitic transformations occur on cooling with cooperative movement of atoms in <110> -type directions on the {110} – type close packed planes of austenite matrix along with lattice twinning and ordered parent phase structures turn into the twinned martensite structures. Twinned structures turn into detwinned martensitic structures by means of stress induced martensitic transformations with deformation in the low temperature condition. Moreover, detwinnedmartensite structures turn into the ordered parent phase structures, by means reverse austenitic

Biography

Dr. Adiguzel graduated from Department of Physics, Ankara University, Turkey in 1974 and received PhD- degree from Dicle University, Diyarbakir-Turkey. He studied at Surrey University, Guildford, UK, as a post- doctoral research scientist in 1986-1987, and studied were focused on shape memory effect in shape memory alloys. 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 230 online conferences in the same way in pandemic period of 2020-2024. Dr. Adiguzel served his directorate structures on heating. Lattice twinning and detwinning reactions play important role in martensitic transformations and they are driven by internal and external forces by means of inhomogeneous lattice invariant shear.

Superelasticity is performed in only mechanical manner with 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. Therefore, this behavior can be called mechanical memory. Superelasticity is performed in non-linear way; stressing and releasing paths are different, and cycling hysteresis refers to the energy dissipation. Superelasticity is also result of stress induced martensitic transformation, and the ordered parent phase structures turn into the detwinnedmartensite structures with stressing.

Copper based alloys exhibit this property in metastable β-phase region. Lattice twinning and lattice invariant shear is not uniform in these alloys and cause the formation of complex layered structures. The layered structures can be described by different unit cells as 3R, 9R or 18R depending on the stacking sequences on the {110} - type close-packed planes of the ordered lattice.

In the present contribution, x-ray diffraction and Transmission Electron Microscopy (TEM) studies were carried out on copper based CuAlMn and CuZnAl alloys. X-ray diffraction profiles and electron diffraction patterns exhibit super lattice reflections. X-ray diffractograms taken in a long-time interval show that diffraction angles and intensities of diffraction peaks change with the aging duration at room temperature. This result refers to the rearrangement of atoms in diffusive manner.

Keywords: Shape Memory Effect, Martensitic Transformation, Thermoelasticity, Superelasticity, Lattice Twinning, Detwinning.

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.

Sergey Suchkov[1-6]*, Robert Langer[9], Daniel Scherman[10], Shawn Murphy[7,8], David Smith[11], Hiroyuki Abe[5], Arturo Solis Herrera[1], Holland Cheng[11]

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Personalized and Precision Medicine (PPM) as a unique healthcare model through biodesign-inspired & biotech-driven translational applications and upgraded business marketing to secure the human healthcare and biosafety

Traditionally a disease has been defined by its clinical presentation and observable characteristics, not by the underlying molecular mechanisms, pathways and systems biology-related processes specific to a particular

Biography

Sergey Suchkov was born in the City of Astrakhan, Russia, in a family of dynasty medical doctors. In 1980, graduated from Astrakhan State Medical University and was awarded with MD. In 1985, Suchkov maintained his PhD as a PhD student of the I.M. Sechenov Moscow Medical Academy and Institute of Medical Enzymology. In 2001, Suchkov maintained his Doctor Degree at the National Institute of Immunology, Russia. From 1989 through 1995, Dr Suchkov was being a Head of the Lab of Clinical Immunology, Helmholtz Eye Research Institute in Moscow. From 1995 through 2004 - a Chair of the Dept for Clinical Immunology, Moscow Clinical Research Institute (MONIKI). In 1993-1996, Dr Suchkov was a Secretary-in-Chief of the Editorial Board, Biomedical Science, an international journal published jointly by the USSR Academy of Sciences and the Royal Society of Chemistry, UK.

At present, Dr Sergey Suchkov is a Professor and RD Director of the National Center for Human Photosynthesis, Aguascalientes, México, and the Russian Academy patient (ignoring persons-at-risk). A new systems approach to subclinical and/or diseased states and wellness resulted in a new trend in the healthcare services, namely, Personalized and Precision Medicine (PPM).

To achieve the implementation of PPM concept, it is necessary to create a fundamentally new strategy based upon the biomarkers and targets to have a unique impact for the implementation of PPM model into the daily clinical practice and pharma. In this sense, despite breakthroughs in research that have led to an increased understanding of PPM-based human disease, the translation of discoveries into therapies for patients has not kept pace with medical need. It would be extremely useful to integrate data harvesting from different databanks for applications such as prediction and personalization of further treatment to thus provide more tailored measures for the patients and persons-at-risk resulting in improved outcomes and more cost effective use of the latest health care resources including diagnostic (companion ones), preventive and therapeutic (targeted molecular and cellular) etc.

of Natural Sciences, Moscow, Russia. He is a member of the: New York Academy of Sciences, American Chemical Society (ACS), American Heart Association (AHA), EPMA (European Association for Predictive, Preventive and Personalized Medicine), Brussels, EU; ARVO (American Association for Research in Vision and Ophthalmology); ISER (International Society for Eye Research); PMC (Personalized Medicine Coalition), Washington, USA.

Translational researchers, bio-designers and manufacturers are beginning to realize the promise of PPM, translating to direct benefit to patients or persons-at-risk. And thus both PPM and nanobiotechnologies are being integrated into diagnostic and therapeutic tools to manage an array of PPM-guided conditions to customize therapeutic management. Novel nanomedicines have been employed in PPM-driven treatment of several diseases, which can be adapted to each patient-specific case according to their genetic profiles. So, partnering and forming strategic alliances between researchers, bio-designers, clinicians, business, regulatory bodies and government can help ensure an optimal development program that leverages the academia and industry experience and FDA’s new and evolving toolkit to speed our way to getting new tools into the innovative markets.

Healthcare is undergoing a transformation, and it is imperative to leverage new technologies to support the advent of PPM. And it is urgently needed to to discover, to develop and to create new (targeted and/or smart/intelligent) drugs. And with the support of nanotechnology, new targeted therapeutic agents and biomaterials, or aid the development of assays for disease biomarkers and identification of potential biomarker-target-ligand (drug) tandems to be used for the targeting, PPM is making phenomenal steps in the future to come. This is the reason for developing global scientific, clinical, social, and educational projects in the area of PPM and design-driven translational medicine to elicit the content of the new trend. So, the grand change and challenge to secure our health and wellness are rooted not in medicine, and not even in science! Just imagine where?! In the upgraded Hi-Tech culture!

Keywords: Personalized &Precision Medicine, Biomarkers, Targets, Nanoparticles, Nanocarriers, Nanotheranostics, Nanobiomedicine, Nanotechnologies.

Tokeer Ahmad

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Multi-component heterostructures for scalable green H_2 production using overall catalysis

Advancedmaterials based heterogeneous catalysis involving photochemical and photoelectrochemical water splitting is an ultimate source of hydrogen generation as renewable green energy for tackling the ongoing fuel crisis. Carbon based materials are ideal for overall water splitting as a result of the excellent alignment of its band edges with water redox potentials. However, a single catalyst with a limited number of active sites does not exhibit significant photo/electrocatalytic activity for hydrogen production. Therefore, we have developed the semiconductor heterostructures of carbon materials with oxides, sulphides, selenides, other TMCs/TMDs NPs and QDs as the highly efficient nanocatalysts for enhanced hydrogen evolution reactions. The monophasic heterostructures have been designed in different weight ratios with fairly uniform distribution of nearly spherical particles and high specific surface area which creates an interfacial charge transfer between two semiconductors. As prepared heterostructures showed significant hydrogen evolution which is evident by observing high apparent quantum yield, low onset potential, lower overpotential and high electrochemical active surface area that will be presented in detail.

Biography

Prof. Tokeer Ahmad is graduated from IIT Roorkee and Ph.D. from IIT Delhi. Presently, he is full Professor at Department of Chemistry, JamiaMilliaIslamia, New Delhi since 2019. Prof. Ahmad has supervised 16 PhD’s, 88 postgraduates, 10 projects, published 228 research papers, one patent and three books with research citation of 10,010, h-index of 60 and i10-index of 186. Prof. Ahmad is active reviewer of 206 journals, delivered 220 Invited talks, evaluated 70 external doctoral theses and presented 139 conference papers. Prof. Ahmad is the recipient of CRSI Bronze Medal, MRSI Medal, SMC Bronze Medal, ISCAS Medal, Inspired Teacher’s President of India Award, Springer Nature Editor of Distinction Award, DST-DFG award, IIT Delhi Alumni Faculty Award, Distinguished Scientist Award, Dr. S. S. Deshpande National Award, MaulanaAbulKalam Azad Excellence Award of Education, Teacher’s Excellence Award, Elected Member of National Academy of Sciences India and Fellow of Royal Society of Chemistry (FRSC), UK. Prof. Ahmad has been figured in World Top 2% Scientists for consecutive five years since 2020 in both coveted lists including career long by Stanford University, USA.

Biography

V. A. Sadykov[1*], Y. N. Bespalko[1], N.F. Eremeev[1], E.M. Sadovskaya[1], E.A. Smal[1], V. E. Fedorova[1],M.N.Simonov[1], M.A.Mikhailenko[2], A.A. Bryazgin, M.V. Korobeynikov[3,1]

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630090, Russia

[3]Budker Institute of Nuclear Physics SB RS,
Novosibirsk, 630090, Russia

Design of nanocomposite materials for active components of structured catalysts for biofuels transformation into syngas, catalytic layers of membrane reactors with oxygen/hydrogen separation and anodes of solid oxide fuels cells operating in the internal reforming mode

Approaches to design, characterization and testing nanocomposite materials for oxygen and hydrogen separation membranes, solid oxide fuel cells and structured catalysts for natural gas and biofuels transformation into syngas are presented. These materials are comprised of mixed ionic-electronic conducting complex oxides nanoparticles (with perovskite, spinel, fluorite and Ruddlesden-Popper type structures), ionic conductors (doped ceria, zirconia etc. as oxide-ion conductors; tungstates, molybdates and scandates of lanthanoids etc. as protonic conductors), electronic conductors (nanoparticles of Ni-based alloys, including those exsolved from complex oxides) and their nanocomposites,

VladislavSadykov is chief scientist at Boreskov Institute of Catalysis and Professor of Novosibirsk State University. His current research interest includes heterogeneous catalysis of red-ox processes for the energy production (including solid oxide fuel cells), catalytic processes of hydrogen and syngas generation, membrane reactors, technologies of nanophase and nanocomposite materials synthesis, solid state ionics. VladislavSadykov has published more than 500 papers in peer-reviewed journals, four monographs and 7 Chapters in books, his h-factor is 35. He is a member of the Editorial Boards of Applied Catalysis A, Open Chemistry (De Gruyter), member of the Materials Research Society (USA) and Russian Mendeleev Chemical Society.

either bulk or supported on mesoporous doped $MgAl_2O_4$ spinel. They weresintered by variety of methods including e-beam sinteringusing an ILU-6 accelerator. Metal substrates for structured catalysts were covered by protective $La_2Zr_2O_7$ - $LaAlO_3$ layers sintered by e-beam. Nanocomposite catalytic layers were supported on metal substrates, membranes and metal foam supported fuel cell anode half-cells from suspensions, and after drying were sintered by e-beams. The real/atomic structure of nanomaterials was characterized by combination of modern structural and spectral methods, while oxygen/hydrogen mobility and surface reactivity were studied by isotope heteroexchange in the temperature- programmed mode. Co-existence of several channels of oxygen migration in these systems with diffusion coefficients differing by several orders of magnitude was demonstrated with fast channels corresponding to interfaces in nanocomposites, grain boundaries in complex oxides enriched by some cations as well as to cooperative mechanism of oxygen migration in oxides with asymmetric structures such as Ruddlesden-Popper one (Ln_2MeO_4), etc. Using e-beam sintering of supported layers allowedto decrease processing temperature, reduce internal thermal stresses and increasenanocomposite active component dispersion and metal-support interaction, thus helping to increase activity and coking/thermal shock stability. Materials optimized by the chemical composition, nanodomain structure and sintering conditions demonstrated a high and stable performance as SOFC anodes in the methane internal reforming mode with power density close to that obtained in the case of using hydrogen as fuel. Catalytic reactors with asymmetric oxygen or hydrogen separation membranes supported on metal foam substrates and covered by catalytic layers from the fuel side were successfully used for transformation of biofuels into syngas by oxygen transferred from the air side as well as for hydrogen extraction from syngas obtained by fuels reforming. Very high oxygenfluxes(up to 15cm3 O_2/cm2min) and hydrogen fluxes(up to 3.5cm3 H_2/cm2 min) were obtained in these reactors promising for the practical application. Optimized active components of catalysts demonstrated a good compatibility with all substrates as well as a high catalytic activity in fuels reforming (with syngas yield approaching equilibrium values at short contact times) and stability to coking. Mathematical modeling of processes in catalytic and membrane reactors was carried out using modern programs (COMSOL Multiphysics, CFD), stage-like schemes of catalytic reactions and mass transfer equations, which allowed to describe operation parameters required for modeling.

Support by the Russian Science Foundation grant 23-73-00045 is gratefully acknowledged.

21st Edition of Global Conference on

Catalysis, Chemical Engineering & Technology

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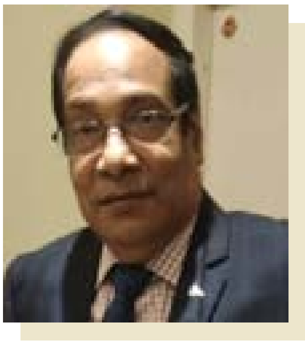
ORAL PRESENTATIONS



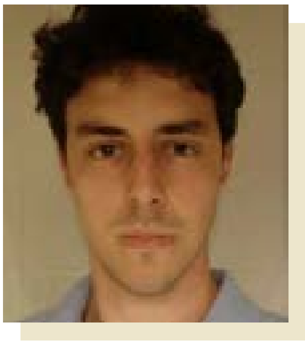
Dr. Ashanendu Mandal
Energy Expert and International Speaker, India
Former Chief General Manager ONGC, India

Application of solid waste materials for adsorptive removal of toxic phenol from wastewater to protect environment and also to generate circular economy

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 (5-500mg/L), initial pH (2-12), adsorbent dose (0.10-20gm/L), temperature (25-50°C) and contact time (30-600min). 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 modelisbest 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 modelings using Levenberg-Marquardt and scaled conjugate gradient algorithms establish that the experimental and predictive data are within allowable range. The studies of scale-up designs, the regeneration of adsorbents and the safe disposal of used adsorbents show that these adsorbents can be used for commercial applications. Further, the column study of phenol removal 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 to ensure water recycling in industry.

Biography

Ashanendu Mandal has graduated as B. Sc in Chemistry and B. Tech in Chemical Engineering from University of Calcutta. He has got his M. Tech Degree in Chemical Engineering from IIT, Kharagpur. AshanenduMandalhas acquired MBA degree in Finance from IGNOU, New Delhi and has undertaken an Advanced Management Program from IIM Calcutta. He has also acquired the Degree of Ph. D. (Tech) in Chemical Engineering from University of Calcutta. Dr. Mandal has worked in ONGC for more than 34 years and his experience includes commissioning, modifications, safety, operations, artificial lifts, pressure maintenance, EOR and planning in offshore and onshore oilfields. He has also vast experience in marketing of upstream and downstream petroleum products. Dr. Mandal has published technical papers in Chemical Weekly and research papers in many international journals. He has visited more than 25 countries for attending training programs and for participating in international conferences as invited speaker or panelist. He is a lifetime member of Indian Chemical Society and Indian Science Congress.



De Sa Peixoto P[1*], Delplace G[1], VellasquezA[1], Hiolle M[3], Hennetier M[2]

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[2]Ecole d'ingenieurs de PURPAN, Toulouse, France

[3]Ingredia Dairy Experts, Arras, France

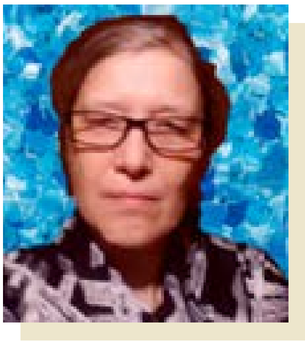
Guided microbial enzymatic catalysis for developing biocompatible, eco-friendly nanostructured smart materials

In modern day industry, building biocompatible, ecological friendly materials is one of the most wanted goals. These materials can be used as drug delivery devices, tissue injury replacements, or dietary replacements. However, these kind of materials, often derived from animal or plant extractions, show a complex composition and nano-structure, which leads to unwanted behaviors in different environments (low stability, low rheology, aggregation...).

A very promising strategy is the use of natural, microbial, authorized enzymes, like Transglutaminase (Tgase). The cross-linking created by such enzymes can potentially increase durability, stiffness, and reduce non-desired aggregation of the material. However, this strategy needs material-dependent, very fine-tuned physico-chemical conditions to avoid undesirable cross-links or an unnecessary use of enzymes (which increases the cost of the treatment). This is even more challenging since it is hard to predict the catalysis activity in more complex, often denser, materials. To avoid a time-costly and unnecessary empirical strategy of changing all physico-chemical parameters of Tgase for each material, our group has combined advanced analysis, like high magnetic field solid-state NMR, small angle scattering, or Asymmetric Flow Field Flow Fractionation (A4F), to understand the more general and universal underlying mechanisms of Tgase stabilization in very different environments. The rate of cross-link has been correlated to enzyme concentration, time of treatment, and with the material structural characteristics in terms of density, porosity, and with rheology data. These data show some surprising, repeatable, often non-linear dependencies that could be used as a guide to fast reach the optimal conditions.

Biography

Dr. Domenico Borello, Studied Biophysics and Chemistyin Sorbone University, Paris, and graduated in 2007. He joined the Laboratory of Chemistry of the Dense Matter in Paris and received PhD degree in 2010. After three years of postdoctoral fellowship he obtained the position of Researcher in the Laboratory of Material and Transformations, affiliated to Lillauniversity. He has published more than 33 articles in the best journals of the field (70% with a IF >5 and 30% with a IF>8). He is the inventor of two patents.



E.Milyute*, A.Milyus

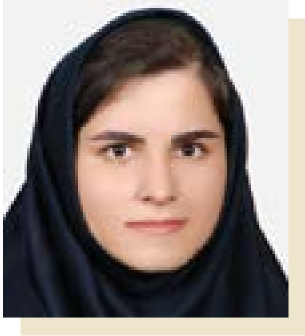
IRG“LITAVEM-3”, Vilnius, Lithuania

Vortex structure and polymorphism of crystals: Optical manifestations and dynamics of transformations

Complex potentials, derived from the interference patterns of quartz, calcite, andaragonite under polarized light, have suggested the presence of a "frozen" vortex structure embedded in the crystal. From this perspective, crystal polymorphism was re-examined, allowing for a deeper understanding ofphenomena related to the rates of polymorphic transformations and the existence of metastable states. Structural analysis of polymorphism, viewed through the lens of vortex dynamics in matter during crystallization, qualitatively reveals a broad range of transformation rates. These are governed by changesin bonding mechanisms—such as variations in the circulation of substance transfer within atoms, inclusion capture and embedding processes occurring during crystal formation, and the exchange of atomic angular momentum during bond formation. These processes are accompanied by the emergence of energy barriers associated with stable vortex atoms formed by the constituent elements during crystal growth. Analysis of polymorphism from the perspective of vortex-based crystal structure provides a physical basisfor explaining the formation of interference patterns in polarized light, which reflect the unique optical properties of crystals — specifically, the characteristic vortex-like features of their internal structure.

Biography

Dr. Elena Milyute, professional scientist in the field of natural science and higher mathematics.



Fatemehsadat Mirmohammadmakki[1*], Seyed Fathollah Mir Mohammadmakki[2], Nargessadat Mir Mohammadmakki[2]

[1]Medical Ethics and Law Research Center, Shahid Beheshti University of Medical Sciences, and Islamic Azad University, Science and Research Branch, Tehran, Iran

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Biosorption: A sustainable and practical effective technique for heavy metal reduction

Heavy metal pollution from industrial actions, mining and agriculture poses a severe challenge to environmental health and safety. Toxic elements such as lead, cadmium, nickel, chromium, and mercury accumulate in ecosystems, posing long-term risks to biodiversity and human health due to their persistence and toxicity. Traditional methods for addressing this issue, such as chemical precipitation and ion exchange, are expensive, energy-intensive, and can produce harmful by-products. This important issue highlights the necessity for cost-effective, innovative, and environmentally friendly solutions. Biosorption has become a recognized and sustainable method for reducing heavy metal contamination in various environments, including soil, water, and industrial waste. This technique utilizes natural materials such as agricultural and horticultural by-products, microbial biomass, algae, and industrial residues, providing an efficient and low-cost alternative for the removal of toxic metals. These biosorbents are biodegradable, widely available, and adaptable to different environmental conditions. The effectiveness of biosorption depends on several factors, including pH levels, temperature, metal concentrations, and the contact time between the metal and the biosorbent. Research has shown that materials like agricultural and horticultural by-products, fruit peels, and algae possess strong metal-binding properties, primarily due to their high surface area and the presence of chemical groups that enhance metal adsorption.

This research explores the practical applications of biosorption for heavy metal removal across various settings. It highlights the preparation and optimization of biosorbents, analyzes their effectiveness under different conditions, and compares their performance to conventional remediation techniques. While biosorption shows tremendous potential, challenges such as variability in performance across environmental conditions, competition between metals for adsorption sites, and the need for biosorbent regeneration remain areas for further study. Biosorption provides a sustainable and scalable approach to tackling heavy metal pollution on a global scale. Advances in biosorbent technology, combined with enhanced process optimization, could further improve the efficacy of this technique. Integrating biosorption into comprehensive environmental management practices can help mitigate heavy metal contamination, protect ecosystems, and foster healthier, cleaner environments for future generations.

Keywords: Heavy Metal Pollution, Biosorption, Sustainable Remediation, Biosorbents, Environmental Health, Agricultural By-Products, Heavy Metal Biosorption, Soil & Water Contamination, Sustainable Solutions.

Biography

Dr. Fatemehsadat Mirmohammadmakki earned her PhD in Food Industrial Engineering and Science - Food Chemistry from the Islamic Azad University, Science and Research Branch, in 2021. Following her doctoral studies, she joined the research group at the same institution, where her research has been focused on agricultural products, edible oils, and extracts, with a specialization in the development of biosorbents for reducing heavy metal contamination in food, soil, and the environment. In addition to her work in environmental research, Dr. Mirmohammadmakki is a researcher at the Medical Ethics and Law Research Center at ShahidBeheshti University of Medical Sciences. Her studies in this capacity are centered on food safety and food ethics, addressing critical issues such as ethical practices in food production and distribution, as well as ensuring the safety and sustainability of the global food supply chain. As an active lecturer and researcher, Dr. Mirmohammadmakki has made significant contributions to sustainable pollution control, environmental health, food safety, and food ethics. She has published many peer-reviewed research articles and participated in numerous national and international conferences, reflecting her expertise, commitment, and multidisciplinary approach to advancing food science, ethical practices, and environmental sustainability.

Yi Zhang[1,2], Guo-Wei He[1,2*]

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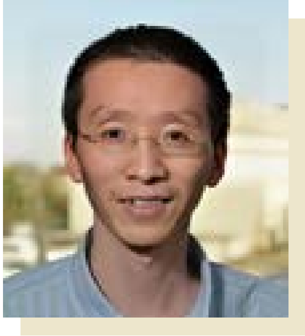
[2]Tianjin Key Laboratory of Molecular Regulation of Cardiovascular Diseases and Translational Medicine, Tianjin, China

Role of lysine propionylation of human right atrium and ALDH6A1-NADH pathway in new-onset atrial fibrillation after coronary surgery

Lysine propionylation modification (Kpr) plays an important role in the pathogenesis of several cardiovascular diseases, but the role of Kpr in Postoperative Atrial Fibrillation (POAF) is unclear. Here, we established an atlas of proteomics and propionylation proteomics in the atrial appendage tissues from 28 CABG patients, exploring the role of Kpr proteins in the occurrence of POAF. The Kpr of ALDH6A1 was most significantly increased on Lys113 (2.25 folds). The activity of ALDH6A1 increased due to higher binding energy of propionylated ALDH6A1 and NAD+, causing an increase in NADH levels in cells and triggering abnormal energy metabolism. Furthermore, the increase in NADH levels triggered the accumulation of reactive oxygen species, which may cause oxidative stress, resulting in the development of AF. This study reveals the important role of ALDH6A1-NADH pathway in POAF, and provides new insights for exploring the pathogenesis of POAF in CABG.

Biography

Professor Guo-Wei HE, MD, PhD, DSc, is Distinguished Professor of Tianjin University, China and Academician (Foreign Correspondence Member) at The National Academy of Medicine, France (2019-). Professor He is Vice President & Senior Cardiac Surgeon at TEDA International Cardiovascular Hospital, Tianjin University and Director of Institute for Cardiovasc Diseases, Tianjin University & Chinese Academy of Medical Sciences. He also holds Clinical Professor of Surgery at Oregon Health & Science University, Portland, OR, USA (2003-). In addition, Professor He is Director, Branch Center for National Clinical Research Center for Cardiovascular Disease and Director of Tianjin Key Laboratory for Molecular Regulation and Translational Medicine of Cardiovascular Diseases. He obtained Doctor of Science (2003) and Ph. D. (1989) from Monash University, Melbourne, Australia. Professor He was Chair Professor of Cardiothoracic Surgery, University of Hong Kong, 1995-2000 and Research Chair Professor, Chinese University of Hong Kong (2000-2009). Professor He was Director of Cardiovasc Res Lab, St, Vincent Hospital, Portland, OR, U.S.A. (1994-2012). Professor He is an active cardiac surgeon and he performed about 8,000 open heart operations. Notably, he is the first surgeon performing radial artery plus internal mammary artery in CABG at University of Hong Kong in Asia (1995) and is well known for “He Classification” and “He solutions” for CABG grafts. Apart from clinical practice, he is an active research on basic science at the molecular (genetic and protein) level and obtained more than 80 research grants and awards such as First Class Award, Tianjin Municipal Natural Science Award (2012), First Class Award, Prize of Science & Technology, The China Medicine Education Association (2021), exec. Professor He has supervised PhD students and postdoc for more than 30 years. He published 439 articles/reports in SCI-index international journals, including Circulation (IF:39.918) 5 articles, Nature Reviews Cardiology (IF:4), Signal Transduction and Targeted Therapy (IF:38.104), Lancet (IF:168.9), Lancet Digit Health (IF:36.615) exec. He ranks the top 0.05% of all scholars worldwide (ScholarGPS), World's Top 2% Scientists (2019-2024) by Stanford University and H-index of world top 1%. Professor He ranks world’s top 1% in Medicine, Chemistry, Genetics and Molecular Biology; He is Highly-cited Chinese Scholar in Clinical Medicine (Elsevier 2024).



Haibo Ge

Department of Chemistry & Biochemistry, Texas Tech University, Lubbock, TX, United States

Distal functionalization via transition metal catalysis

The ubiquitous presence of sp^3 C−H bonds in natural feedstock makes them inexpensive, easily accessible, and attractive synthons for the preparation of common and/or complex molecular frameworks in biologically active natural products, pharmaceutics, agrochemicals, and materials.However, the inertness of these bonds due to the high bond dissociation energies and low polarity difference between the carbon and hydrogen atoms makes them challenging reaction partners. Moreover, the desired site-selectivity is often an issue in reactions with multiple analogous sp^3 C−H bonds. To overcome these problems, transition metal-catalyzed C−H functionalization has been developed with the assistance of various well-designed directing groups which can coordinate to a metal center to deliver it on a targeted C−H bond through an appropriate spatial arrangement, enabling C−H activation via the formation of a cyclometalated species. However, the requirement of often additional steps for the construction of the directing groups and their subsequent removal after the desired operation severely hampers the efficacy and compatibility of the reactions. A promising solution would be the utilization of a transient ligand which can bind to the substrate and coordinate to the metal center in a reversible fashion. In this way, the directing group is installed, sp^3 C−H functionalization occurs, and the directing group is then removed in situ without affecting the substrate function after the catalysis is finished. Overall, the whole process occurs in a single reaction pot. Herein, we are presenting our studies on transition metal-catalyzed transient directing group-enabled C−H functionalization reaction.

Biography

Haibo Ge received his PhD degree in Medicinal Chemistry from The University of Kansas in 2006, and then moved to The Scripps Research Institute for postdoctoral study. In 2009, he began his independent academic career at the Indiana University – Purdue University Indianapolis and relocated to Texas Tech University in 2020. Research by his group is mainly focused on the development of novel methods for carbon–carbon and carbon–heteroatom bond formation through transition metal catalyzed C–H functionalization. His research focuses on transition metal-catalyzed cross-coupling reactions, aiming to develop efficient and sustainable synthetic methodologies. He has authored over 80 peer-reviewed publications in high-impact journals, including Nature Chemistry, Journal of the American Chemical Society, Chem, and Angewandte Chemie International Edition.

Prof. Dr.J.Somasekar

Professor and Program Head, Department of CSE(AIDD), Jain University, Bangalore, India

Predictive modelling for catalysis using supervised machine learning

The field of catalysis is undergoing a paradigm shift with the advent of data-driven methodologies that enable rapid prediction, screening, and optimization of catalytic processes. Supervised Machine Learning (ML), in particular, offers powerful tools to model complex, nonlinear relationships between catalyst features and performance metrics, transforming how researchers approach catalyst design and reaction engineering.

This keynote will explore the fundamentals and frontiers of supervised learning techniques applied to catalysis, showcasing how historical experimental data can be harnessed to build robust predictive models. From regression models estimating turnover frequencies to classification algorithms identifying optimal catalyst compositions, the session will cover a spectrum of ML approaches tailored to chemical engineering challenges. Through real-world case studies and research insights, the talk will highlight the integration of domain knowledge, feature engineering, and model validation strategies essential for creating interpretable and accurate models. Attendees will gain a deeper understanding of how machine learning can augment traditional catalysis workflows, reduce development timelines, and drive innovation in sustainable chemical processes. The session aims to provide researchers, engineers, and industry stakeholders with practical strategies and scientific insights to effectively apply supervised machine learning in catalytic research, thereby fostering faster innovation and more sustainable chemical processes.

Biography

Dr. J. Somasekar holds a Ph.D. in CSE from JNTUA and a postdoc from the University of South Florida, USA. He is a Professor and Head of the CSE (AIDD) program at JAIN University, Bangalore, India, and Research Fellow at INTI International University, Malaysia. With 18+ years of academic experience, he has delivered 250 invited/keynote talks across 10 countries and published 50+ papers, three books, and seven chapters. He has guided two Ph.D. scholars and is currently guiding six PhD scholars. An All India Rank 43 in the GATE exam, he received DST's International Travel Grant and multiple honours including Best Speaker and Innovative Researcher awards. His research focuses on AI, Machine Learning, Image Processing, Data Science, and ML for Cybersecurity.

Dr. Jeevan R. Dontulwar

Department of Chemistry, Shri Mathuradas Mohota College of Science, Nagpur
440024, Maharashtra, India

Biodegradable detergent and its impact on environment and economy

Global detergent consumption, projected to reach USD 110.65 billion by 2029, has amplified environmental concerns associated with conventional synthetic formulations. Traditional surfactant-based detergents—primarily derived from petroleum products, phosphates, and non-biodegradable additives—not only persist in the environment but also contribute to river foaming, aquatic ecosystem disruption, and long-term water quality deterioration. Addressing these challenges, our research introduces a fully biodegradable detergent formulated using Alpha-Olefin Sulfate (AOS) in combination with agro-based raw materials as sustainable replacements for petroleum-derived components.

This eco-innovative formulation leverages enzyme-based biocatalysis (cellulase, lipase, amylase, and protease) to enhance stain removal under mild washing conditions, thereby lowering energy consumption, reducing carbon footprints, and extending fabric life. Performance parameters—foam volume, surface tension, pH, viscosity, and cleaning efficiency—were systematically evaluated against commercial detergents. Results demonstrate that the AOS–agro-based blend not only matches conventional cleaning performance but also degrades rapidly, minimizes ecological toxicity, and effectively curbs persistent river foaming.

By replacing petrochemical surfactants with renewable agricultural feedstock's, the technology supports local manufacturing, promotes rural entrepreneurship, reduces petrochemical dependency, and strengthens the framework of a sustainable, circular economy. This study underscores the pivotal role of catalysis and chemical engineering in driving the next generation of green surfactant technologies for a cleaner and economically resilient future.

Biography

Dr. Jeevan R. Dontulwar is a distinguished academic leader, researcher, and administrator with 28 years of teaching. Specializing in organic polymers, he has published over 40 international research papers, authored two books, and also guided Ph.D. scholars. As a NAAC Assessor and seasoned principal, he has led institutions through successful NAAC accreditations, secured research grants and introduced innovative courses and modern infrastructure. His leadership emphasizes green campus initiatives, community engagement through Unnat Bharat Abhiyan, and flagship projects like Mission Green — a ₹99.97 lakh Western Coalfields Limited–funded initiative promoting entrepreneurship through wild native plant nursery training for students and farmers. Dr. Dontulwar is a life member of several national and international professional bodies and is widely recognized for promoting eco-friendly practices, quality education, and holistic student development.

Jorge A. Delgado[1*], Akira Yada[2], Raphael Wischert[1], Stephane Streiff[1]

[1]Eco-Efficient Products and Processes Laboratory (E2P2L), Shanghai, China

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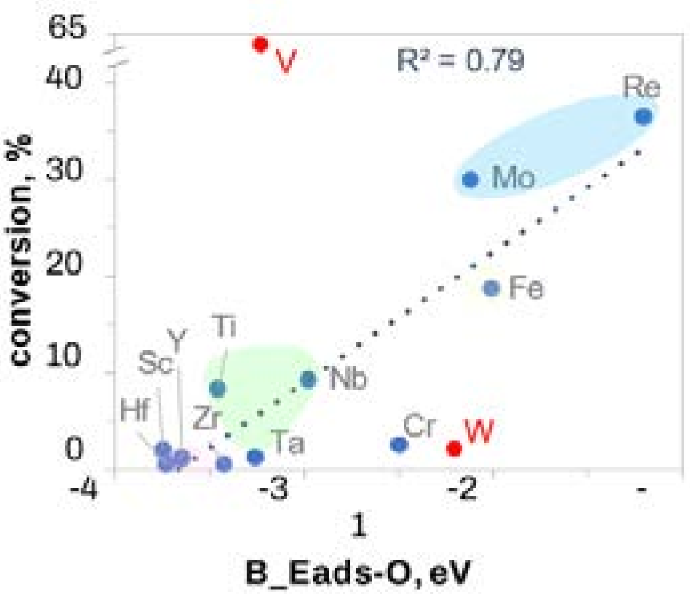
Bimetallic catalysts for the hydrogenation of amides: From experimental to data-driven insights

This work evaluates the impact of various parameters on bimetallic catalysts in the hydrogenation of amides to amines, using systematic experimental and data-driven methods. Bimetallic catalysts were synthesized via a sequential wet impregnation approach and tested on the hydrogenation of N,N-dimethyldodecanamide to N,N- dimethyldodecanamine. The choice of metal precursors, supports, and the oxophilic metal significantly influenced the catalytic performance. Data-driven analysis indicated that oxophilic metals with large electronegativity and weak O adsorption displayed higher conversion, whereas those with large enthalpy of fusion, higher amine selectivity.



Biography

Dr. Jorge A. Delgado studied Chemistry at the Universidad Nacional de Colombia. He joined the laboratory of Carmen Claver in Tarragona were conducted MS and PhD in catalysis which degree was received in 2014. Continued with a postdoctoral then researcher and finally assistant processor positions in the same team. In 2019 moved to the AIST in Tsukuba, Japan to conduct a postdoc in the field of applied AI in catalysis. In 2021 moved to Syensqo in Shanghai, China to start a position as research scientist which still holds. His research interests are related to unconventional catalysis, advanced materials and AI.

Ladapborlang Mawrie*, Fazlur Rahman, Sarifuddin Gazi

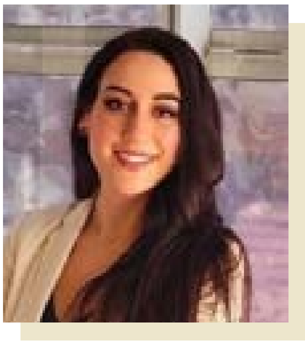
Department of Chemistry, School of Applied Sciences, University of Science & Technology Meghalaya, Techno City, Kling Road, Baridua 9th Mile, Ri-Bhoi, Meghalaya, India 793101

Who gives the hydrogen? A mechanistic study through isotope labeling in photocatalytic hydrogen evolution reactions using cobalt complexes as a catalyst under neutral pH

The growing global demand for energy has led to the excessive exploitation of non-renewable energy sources, especially fossil fuels. This heavy dependence on such sources significantly increases CO2 emissions in the atmosphere, resulting in serious environmental repercussions. Therefore, it is essential to innovate, develop, and implement economically feasible carbon-neutral energy production systems to tackle these energy-related issues. One promising strategy involves emulating natural photosynthesis to produce solar fuels, which enables the long-term and sustainable storage of the substantial amounts of renewable energy captured from sunlight. A key aim in artificial photosynthesis is the photocatalytic generation of hydrogen through the process of water splitting. To achieve this objective, it is necessary to develop efficient and stable catalytic systems that utilize earth-abundant elements to facilitate the conversion of protons from water into molecular hydrogen. Typically, these methods rely on the catalytic properties of metal complexes and organic dyes to transform visible light into chemical energy through an electron transfer process in an excited state. A less frequently mentioned yet effective method involves the use of in-situ generated active metal complexes to promote water splitting. Experimental analysis has shown that gas evolution occurs solely at neutral pH, with no gas production observed in acidic or basic conditions. The gas evolution is facilitated by earth-abundant metal complexes, referred to as catalysts or CAT, along with an organic photocatalyst in the presence of an electron donor. The synthesized catalysts (CAT-I to IV) demonstrated varying efficiencies for the gas-evolving reaction, as indicated by their Turnover Number (TON) and Turnover Frequency (TOF) values: CAT-I (53.69 and 2.7×10-3 s-1), CAT-II (62.50 and 3.2×10-3 s-1), CAT-III (68.45 and 3.5×10-3 s-1), and CAT-IV (82.73 and 5.10×10-3 s-1) for TON and TOF, respectively. The initial rate constants ((k)H) were also determined, yielding values of 20.38×10-3 min-1, 20.91×10-3 min-1, 24.89×10-3 min-1, and 25.14×10-3 min-1 for CAT-I through CAT-IV, respectively. A confirmatory test for gas evolution under photocatalytic conditions in an inert atmosphere was conducted using GC-MS analysis, which confirmed that the only gas produced was hydrogen, as indicated by the m/z value of 2. Additionally, understanding the sources of protons involved in these reactions is crucial, necessitating the implementation of isotope labeling studies. These studies have shown that the primary source of hydrogen evolution is the combination of water and methanol, with water playing a more significant role than methanol. More comprehensive results will be shared during the presentation.

Biography

Mr. Ladapborlang Mawrie completed his Master of Science in Chemistry at the University of Science & Technology Meghalaya, India, in 2020. Following his graduation, he became a member of Dr. Sarifuddin Gazi's research team at the Catalysis Laboratory within the same university. Currently, Mr. Mawrie is in the final year of his PhD program. He has authored two published papers, held one patent, and had three additional papers that are in the communication stage.



Lina Montuori

Institute for Energy Engineering, Universitat Politècnica de València, Camino de Vera s/n, 46022 Valencia, Spain

Thermo-fluid dynamics analysis of high-temperature solar thermal collector systems

Concentrated solar-thermal power technologies is a promising renewable energy technology gaining traction for the energy system hybridization. Among the developed concentrating solar power technologies, parabolic trough solar collector and solar tower are proven technologies for heating and power generation. Generally used for utility-scale projects, the solar thermal collector systems contribute to energy generation in a variety of industrial applications such as water desalination, food processing and chemical production. In spite of that, there are still multiple challenges that need to be addressed to promote the spread-out of this technology. The effectiveness and stability of the heat transfer fluids, the need of reliable energy storage technologies and the water management are crucial to reduce the levelized cost of energy to operate the power plant over its lifetime. In this framework, this paper deals with the thermo-fluid dynamics analysis of a high-temperature solar thermal collector whose configuration have been simulated and validated by ANSYS CFD software. The thermal behavior of the receiver has been tested under different boundary conditions (flow inlets/exits, velocity inlets, pressure Inlets, pressure outlets and outflows among other) by varying both the collector geometry and external temperature conditions. The analytical model implemented allowed to determine the non-uniform flux on the receiver aperture. Moreover, energy balance based on the implemented computational fluid dynamic model allows to predict the thermal performance and to study driven parameters of the coupled fluid flow and heat transfer in the internal and external flow. Both radiative and convective heat transfer in a solar thermal collector have been taken into consideration. Multiple geometries of the solar thermal collector have been analyzed. The thermal performance has been assessed by varying the concentration ratio, air flow rate and matrix thermal conductivity. Under baseline conditions, the outlet air temperature and heat losses have been determined. Finally, the transient thermal analysis of the solar thermal collector allows to determine the maximum operating temperature and frequency fluctuations at the operational conditions. Future studies will include in the analysis the effects of collector inclination angle based on steady-state energy balance.

Biography

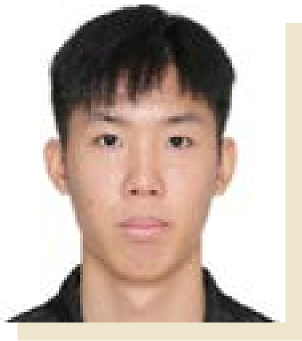
Lina Montuori obtained her Ph.D. in Industrial Engineering at the Polytechnic University of Valencia (UPV) in Spain. Previously, she received B.Sc. and M.Sc. degrees in Industrial Engineering at the University of Naples “Federico II” in Italy. Moreover, she holds an MBA by UPV and an Executive Master in Digital Marketing, Analytics and UX by the Catholic University of Avila (Spain). She is a dedicated professional with about than 15 years of experience in the energy sector with a demonstrated track of successful projects lead as Development Manager at international top brand companies such as Toshiba Mitsubishi-Electric Industrial Corporation, Solaer Group and ENEL Rete Gas. Moreover, she served as Guest Researcher at the Power Center for Utility Explorations at the State University of New York at Buffalo (USA). At present, she is a Professor at the Department of Applied Thermodynamics of the Polytechnic University of Valencia (Spain), where she is also a researcher at the Institute for Energy Engineering Institute (IIE). Moreover, she is an editor, reviewer and author of multiple and relevant publications in prestigious Q1 journals.

Mohammad Alobaid
Kuwait Institute for Scientific Research, Kuwait

The effect of Na2SO4 salt on the crystallization kinetics of Mordenite Framework Inverted (MFI) zeolite

Zeolites are crystalline aluminosilicate pores materials that are widely used in different applications such as catalytic cracking, ion exchange, and membrane separation. Since the beginning of their synthesis in the middle of the 20th century, scientists have made substantial efforts to understand and explicate zeolites' synthesis mechanism. Despite the tremendous ongoing efforts in understating zeolites' crystallization process, little is known about the complexity of this process. This created a considerable challenge encountered by multiple strategies and approaches. One of these approaches is to examine the effect of inorganic salts on the crystallization kinetics of zeolites. These inorganic salts composed of alkali cations and anions. The alkali cations (Na+, K+, Ca+2, etc.) act as charge neutralizers and structure-directing agents. The anions (SO-4, PO-3, Cl-, etc.) of the inorganic salt work as promoters for enhancing the nucleation and crystallization rates of zeolites and sequentially reducing their synthesis time.

The main aim of this study is to investigate the impact of adding Na2SO4 on the crystallization kinetics of MFI zeolite and morphological and physical properties using colloidal silica as raw material. The research activity was divided into multiple tasks. The first task is to establish a kinetic Formation window of MFI Zeolite, SiO2/Al2O3=50, without organic Template. This can be done by fixing the temperature and synthesis time at 170 ^{0}C for 24h. other factors like mixing rate and impeller type will be adjusted accordingly. The kinetic formation window of amorphous to MFI zeolite will be created based on upper and lower alkalinity limits. The second task involves the adjustment of the molar quantities of the reactive species. the molar quantities will be added and controlled based on the kinetic formation window obtained. The last task will be dedicated to characterize the synthesized zeolite. The crystal phases, types, and structure of the MFI zeolite will be identified via XRD. Meanwhile, the morphological properties of the obtained crystals will be determined via SEM. This research activity could be expanded upon changing experimental factors like silica to alumina ratio.



Pengju Wu[*] and Yangxian Liu

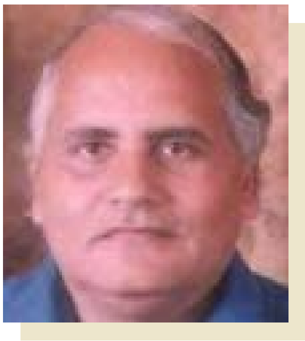
School of Energy and Power Engineering Jiangsu University, Zhenjiang, Jiangsu, China

Current research progress in alkali metals poisoning of Selective Catalytic Reduction (SCR) denitration catalysts

NO_x emitted from combustion devices pose significant risks to both the environment and human health. Among post-combustion denitrification methods, Selective Catalytic Reduction (SCR) technology is the most widely adopted, owing to its high efficiency, technological maturity, and lack of harmful byproducts. However, alkali metals such as K, Na, Ca, and Mg present in flue gas can poison SCR catalysts, leading to deactivation and reduced performance of the SCR system. Therefore, studying the alkali metal poisoning mechanism and anti-poisoning measures of the SCR catalyst is crucial for increasing the service life of a catalyst and reducing the operation cost of a SCR denitration system. This review provided a systematic examination of recent research on the poisoning mechanisms of alkali metals in SCR catalysts, with a focus on vanadium-based, manganese-based, copper-based, cerium-based, and iron-based catalysts. This review also summarized various strategies to counter alkali metal poisoning and some regeneration measures for alkali metal poisoning SCR catalysts. The results demonstrate that the deposits of alkali metals on SCR catalysts can reduce the specific surface area and pore volume of the catalyst and also destroy the active sites on the catalyst surface, which eventually lead to poisoning of the catalyst. The doping of the catalyst with other elements, rational design of catalyst structures, and effective use of catalyst supports can effectively improve the anti-poisoning ability of the SCR catalyst. Water washing, acid washing, and electrophoresis treatment are some common methods for the regeneration of alkali-poisoned catalysts.

Biography

Mr. Wu is a PHD student majoring in thermal engineering at the School of Energy and Power Engineering, Jiangsu University, China. He is mainly engaged in the research of coal-fired flue gas pollutants removal using biochar adsorption.



Ram Sambhar Shukla

Inorganic Materials and Catalysis Division, Central Salt and Marine Chemicals Research Institute, Council of Scientific and Industrial Research (CSIR, New Delhi), G. B. Marg, Bhavnagar – 364 002, Gujarat, India

Perspective of ruthenium comlpex catalyst system for selective oxidation of methane

The existing commercial process for producing methanol form methane, involves two-steps, in which the steam reforming of methane to synthesis gas occurs in the first step followed by the high pressure catalytic conversion of synthesis gas to methanol. The direct oxidation of methane to methanol has attracted great interests due to its importance as an industrial process and as model for alkane oxidation. Also methane is a greenhouse gas of high global warming potential In nature the methanotrophs are bacteria that live on methane as their only source of carbon and the first step in their utilization of this simplest saturated hydrocarbons is it`s selective conversion to methanol. The conversion of methane to methanol is catalyzed at the active site of a metalloenzyme known as Methane Mono Oxygenase(MMO) which is an iron based, binuclear μ-oxo(μ-hydroxo) iron complex, in which one atom of the molecular oxygen molecule is assimilated into the methanol and the other forms water. A ruthenium analogue of MMO catalyst system, binuclear bridged Ru-complex, bis–(μ–acetato)(μ–oxo) bis–salen ruthenium (III), [L2 Ru2 (μ–O)(μ–CH3COO)2] (L=Hsalen) 1, investigated for oxidation of methane was found to be efficient to produce selectively methanol form methane by using molecular oxygen as an benign oxidant at moderate pressure. Ru - Complex 1catalysed oxidation of methane afforded selective formation of methanol with small formaldehyde formation in a 1:1 (v/v) mixture of acetone-water (60 mL) solvent. In typical experiments performed in aauto clave of 100 mL capacity at 30°C and 15 atm. pressure (pO2=5 atm. and pCH4=10 atm.), 27 x 10-3 M methanol and 2.4 x 10-3 M formaldehyde were found to be formed with 5 x 10-4 M catalyst. Catalytic oxidation of methane was studied in detail as a function of total pressure, concentration of the catalyst and the pressures of methane and molecular oxygen in which oxidation is found to be favorably affected by these parameters. The rates of the oxidation of methane to methanol were linearly increased on increasing the concentrations of the catalyst, total pressure, and partial pressure of methane and molecular oxygen under employed reaction conditions showing first order dependence kinetics in each concentration parameter. Based on kinetics and experimental observations a non-radical, ionic mechanism was suggested for the oxidation of methane to methanol. The talk will account to present the research and development work on methane oxidation to methanol.

Biography

Dr. Ram SambharShukla received B.Sc. (1975), M.Sc. (1977), Ph.D. (1981) degrees and PDF of CSIR (1981-83) from University of Allahabad, India and joined Inorganic Materials and Catalysis Division of CSIR- Central Salt and Marine Chemicals Research Institute, Bhavnagar, India as research scientist since 1983. His specializations include catalyst materials, green organic transformations of O2, CO2, CO, H2 and CH4, high temperature-pressure material and catalysis. Dr. Shukla is Life Member of National Academy of Sciences-India, Allahabad and Catalysis Society of -India,Madras. He was Member of Indian Reference Materials, Delhi and was Chairman (Alternate), Inorganic Materials Sectional Committee of Bureau of Indian Standard, Delhi. As Bilateral Exchange of Scientists awardees visited France (CNRS,1993) and Korea (KOSEF, 2002) for collaborative research on the activity of C-H and CO2 respectively. Awarded brain pool scientist (2011) and researched in Korea on utilization of CO2 as soft oxidant. Performed as faculty Professor for Ph.D. course, of Academy of Scientific and Innovative Research (AcSIR), and of Bhavnagar University.He is reviewer for reputed journals for materials and catalysis and Ph.D. examiner for Indian universities. He credited: 100 papers, 5 patents, 2 reviews, 4 book/chapters, 53 invited lectures: 22 international and 71 national conferences, 17students guidance and 20 research projects.

Rukiye Oztekin

Dokuz Eylül University, Turkey

Production of nanocomposites from wastes to remove the pollutants

Disposal of waste and recycling for waste management. In this circumstance, scientists have done great ventures to transform different wastes into nanomaterials in a different way even focusing on green technology. Different types of nanodrug delivery systems including carbon dots, cellulose nanoparticles, nanogel, pH-responsive nanoparticles, redox-sensitive nanoparticles, self-emulsifying nanodrug delivery systems, nanocrystals, and nanofiber have been successfully prepared from agricultural (crops, vegetables, fruits, leaves, etc.), animal (cattle, marine animals, fish, human hairs), plastic, and industrial (silk industry, battery industry, electrical industry, etc.) wastes. The drug delivery aspects of waste-recycled nanomaterials have been expanded in the domain of diagnosis as well. Interestingly, few waste-recycled nanoparticles have been found beneficial for photothermal therapy along with theranostic characteristics which have been described in this review. Different governing mechanisms and methods used for the development of waste-based nanoparticles and nanocomposites for drug delivery have been discussed. The life-cycle viewpoint in the clinical translation and sustainable valorization of the wastes has been pointed out along with the general considerations.

Biography

Dr. Rukiye Öztekin is currently working as a Researcher at Dokuz Eylül University, Department of Environmental Engineering, İzmir/Turkey. She completed her undergraduate education at Ondokuz Mayıs University, Department of Environmental Engineering, Samsun/Turkey. [B.S. (Eng)]. She studied her master education at Dokuz Eylül University, The Graduate School of Natural and Applied Sciences, Department of Environmental Engineering, İzmir/Turkey. (MSc.). She completed her doctorate education at Dokuz Eylül University, The Graduate School of Natural and Applied Sciences, Department of Environmental Engineering, İzmir/Turkey. (Ph.D.). She completed her post-doctorate education at The Scientific and Technological Research Council of Turkey (TUBITAK) the Department of Support for Scientists (BİDEB) 2218-Domestic Postdoctoral Research Scholarship Program with a scholarship postdoctoral researcher, (Post-Dr.) at Natural (World) Sciences Program. She has many international publications.

S.R.Varadhan*

Independent Researcher, India

FTIR and Raman spectral analysis on kerosene and crude oil-adulteration in gaselione, adverse effects on nature during production and transportation

Crude oil is called as rock oil is gifted by the earth. But in return the same factor is adversely affecting her own rich and useful environment. In this connection, the oil spill in the sea and oceans has caused a great environmental impact on the entire marine eco-system. Recently in Nov oil spill occurred near Chennai coast affected people life and marine environment and also rising the inner temperature of the sea. This rise in temperature of the sea and oceans due to oil spill perishes corals, algae and finally animal kingdom of the sea. Govt of Tamil Nandu tried curb the oil spread but massive oil slick reached the shore and lot of money has been spent. This research devotes to the FTIR and Raman Spectral investigation on crude oil and kerosene oil. Kerosene oil is important hydrocarbon oil used for house hold purpose and for aviation. This research devotes to finger printing of Raman and IR bands of crude oil and kerosene.

- **The limitations of the Green revolution are as follows: -** The Green revolution resulted in the loss of soil fertility because of the microbes in the soil are killed by chemical fertilizers
- The major raw materials for fertilizer manufacture are hydrocarbon sources (mainly natural gas), Sulphur, phosphate rock, potassium salts, micro-nutrients, water and air.
- Most fertilizer blends consist largely of Nitrogen (N), Phosphorus (P) and Potassium (K). These three elements make up the largest bulk and cost of most blends.
- Nitrogen, Phosphorous And Potassium (N-P-K) are also present in plant tissue on a percentage scale on a dry weight basis.
- Toxicological investigations of pesticides largely focus on the declared active ingredient, which constitutes only between a few percent to around 50% of the total formulation. The complete formulations are unknown. For each declared active ingredient, there are dozens or hundreds of formulations. We demonstrate that petroleum has always been and is still always in pesticides.
- 16-priority Polycyclic Aromatic Hydrocarbons (PAHs).1, The admixture of PAHs in pesticides can be highly carcinogenic or toxic in the long term, even more than the declared active ingredient itself.

The present method is useful to identify the spilled oil with a limitation, because IR is opaque to water contained samples. The accuracy may be enhanced by internal reflectance spectroscopy.

The present study gives details about how oil seepage in to the ground during exploration and transportation. It is not only on the ground and also water bodies.Study gives information about hydrocarbon oils and IR spectral analysis.

Concluding on one point,the world economy is based on liquid gold(crude oil). Suddenly it is difficult to move to another economy based on other thing. At the same time we have to save the mother earth by the act of carbon cutting and moving towards green energy.

Biography

Dr. S.R.Varadhan did post-Graduation from Madras University in the year 1991. He received Doctorate Degree in the year 1998 from the same UUniversity. After Post Graduation he joined with eminent professorfor research. In the year 1992 he joined as a part-time lecturer. In the year 1997 he joined as a lecturer in a reputed college situated in Chennai. Dr.S.R.Varadhan was elevated as a Professor in Physics in Omar Muktar University, Libya.Then he worked as a professor in two African countries. He published Scientific works that are very much useful for the society and he published it in conferences and reputed journals.

Sai P. Katke*, Suresh D. Pawar

Department of Chemistry, University of Mumbai, Mumbai 400098, India

Solar-powered rod-shaped Cu-MOF photocatalyst with carboxylate double linkers for efficient Cr(VI) reduction and rhodamineB degradation

This study introduces an innovative rod-shaped Copper-based Metal-Organic Framework (Cu-MOF) synthesized using carboxylate-based double linkers, designed to address the persistent challenges of water pollution through dual photocatalytic action. The robust coordination between the copper centers and the carboxylate functional groups fortifies the structural integrity of the framework, rendering it highly resistant to thermal and chemical degradation. This exceptional stability not only prolongs the material's lifespan but also significantly enhances its photocatalytic efficiency under natural sunlight. The Cu-MOF exhibits remarkable performance in the simultaneous reduction of hexavalent Chromium (Cr(VI))—a highly toxic and carcinogenic heavy metal—and the degradation of the hazardous organic dye Rhodamine B, widely used in textile and industrial processes. Experimental investigations revealed an efficient photoreduction of Cr(VI) to the less toxic trivalent Chromium (Cr(III)) with a conversion efficiency of 83.40% in just 70 minutes. Concurrently, the material achieved a substantial photodegradation of Rhodamine B, breaking it down into mineralized, non-toxic end products with a degradation efficiency of 98.73% within 60 minutes. The outstanding catalytic activity is attributed to the unique rod-like morphology of the Cu-MOF, which maximizes the exposure of active sites and promotes efficient light harvesting and electron transfer. These features collectively facilitate the generation of Reactive Oxygen Species (ROS) such as hydroxyl and superoxide radicals under sunlight, which play a pivotal role in the oxidative degradation of pollutants. This study not only underscores the potential of structurally engineered Cu-MOFs for environmental remediation but also highlights a sustainable, sunlight-driven approach to detoxify water bodies contaminated with heavy metals and dyes. The work contributes significantly to the growing field of MOF-based photocatalysts, offering a practical, cost-effective solution for addressing real-world water pollution challenges.

Biography

Sai P. Katke is a dedicated professional researcher in the field of Chemistry, currently pursuing a Ph.D. from the University of Mumbai under the guidance of Prof. Dr. Suresh D. Pawar. His research focuses on the design, construction, and application of Metal-Organic Frameworks (MOFs) using carboxylate-based ligands, with applications in environmental remediation and energy storage. With eight international publications, he explores innovative approaches such as solar-driven catalysis and nuclear waste minimization using MOFs. Known for his scientific integrity and creative insight, he remains committed to developing sustainable materials that address real-world environmental and energy challenges.

Sajjad Ali

Energy, Water, and Environment Lab, College of Humanities and Sciences, Prince Sultan University, Riyadh 11586, Saudi Arabia

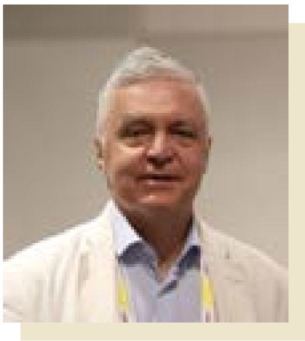
The role of hydrogen in sustainable energy solutions

Hydrogen (H_2) technology is rapidly emerging as a cornerstone for achieving global energy sustainability, offering clean solutions for sectors ranging from transportation to industrial applications. This presentation will explore the multifaceted landscape of H_2 technology, beginning with an overview of current H_2 production methods, including electrolysis and natural gas reforming, and their role in reducing carbon emissions. The discussion will then focus on advancements in hydrogen storage solutions, including solid-state and compressed gas technologies, which are critical for safe and efficient energy transport.Key challenges in hydrogen transportation will be examined, with a particular focus on innovations in pipeline infrastructure and the emerging potential of hydrogen liquefaction for long-distance delivery. The application of H_2 in various sectors, including automotive, aviation, and power generation, will also be highlighted, showcasing its versatility as an alternative fuel source.Additionally, the presentation will address the risks and safety concerns associated with H_2 technology, emphasizing the importance of safety protocols, material compatibility, and risk mitigation strategies. Finally, the business and marketing potential of H_2 as a key player in the global energy market will be discussed, exploring investment trends, government policies, and the potential for hydrogen to revolutionize the clean energy economy. By covering these critical aspects, this talk will provide a comprehensive understanding of the current state and future potential of hydrogen technology in the clean energy landscape.

Keywords: Hydrogen Production, Storage, Transportation, Applications, Risk And Safety, Business Strategies.

Biography

Dr. Sajjad Ali received PhD degree in Materials Science and Engineering from University of Chinese Academy of Science, China. He was working as a Postdoctoral Fellow in Southern University of Science and Technology, Shenzhen, China from 2019 to 2022. In 2022 he joined University of Electronic Science and Technology of China as a Postdoctoral Fellow. Currently he is working as a Assistant Professor at Energy, Water and Environment Lab Prince Sultan University. Dr. Sajjad has over 120 publications in well-reputed peer-reviewed international journals with citations over 3700 (h-index 38). He has been awarded various national and international honors and awards. He is currently a regular reviewer for over 10 journals from ACS, Elsevier, RSC, and Wiley. Dr. Sajjad is serving as Review Editor, and editorial board member for several journals. His research interests focus on understanding the structure, electronic, magnetic, and catalytic properties of 1D, 2D, and 3D materials, including MOFs and COFs, for energy storage materials, batteries, CO_2 conversion to valuable products, electrochemical reactions such as ORR, OER, HER etc.



Sergey Suchkov[1,2]*, Noel Rose[3,4], Aleksandr Gabibov[5], Arturo Solis Herrera[1], Holland Cheng[6]

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[4]Harvard Medical School and Boston Children's Hospital, Boston, MA, USA

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

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Through the view of bio- and chemical engineering - Antibody-proteases as translational biomarkers, potential targets and biocatalysts of the next step generation as applicable for precision medical practice

Biomarkers as being a part of the ligand-receptor tandems have induced an impulse to prompt the development of an upgraded concept of the targeted therapy. So, the identification, impact and implementation of diagnostic, predictive and prognostic biomarkers of the next step generation becomes the Holy Grail of platforms, algorithms and protocols, which are the crucial for Personalized & Precision Medicine (PPM).

High impact of Ab-proteases is valuable to monitor both clinical and subclinical courses of chronic autoimmune inflammation to predict stepwise transformations of the course, starting from the pre-illness and to prognosticate the clinical illness finally. This information would allow to design algorithms for combinatorial (preventive, prophylactic, therapeutic and rehabilitative) treatment, whilst developing unique tools for individually therapy for a number of diseases, such as a group of autoimmune diseases which holds a particular position.

Among the best-validated canonical biomarkers are autoimmunity-related ones (including antibodies/Abs) to predict and prognosticate risks of the chronification, complications and thus disabling. According to classical conception, Abs are specific proteins produced by the immune systems with exclusive function of Ag binding. But Abs against chemically stable analogues modelling the transition states of chemical reaction, can catalyse many different reactions, and were thus called Catalytic Abs (catAbs) or Abzymes (derived from Ab and enzymes), which thus to belong to Abs with a feature of functionality.

Abs endowed with enzymatic properties including DNA- and RNA-hydrolyzing Abs (DNA and RNA-abzymes) and Ab proteases, have been isolated from the serum of patients with different systemic autoimmune conditions. Regarding abzymes, their phenomenal property mentioned is buried in the Fab-fragment of the Ig molecule and is appearing to sound as a functional property of the Ab molecule. In this sense, Ab-proteases as a significant portion of the big family of abzymes represent Abs endowed with a capacity to provide targeted proteolytic effect.

The activity of Ab-proteases was registered in persons-at-risk at the subclinical stages of clinical autoimmune conditions 1-2 years prior to the clinical illness. And their activity revealed significant correlation with scales of autoimmune inflammation and the disability of the patients as well.

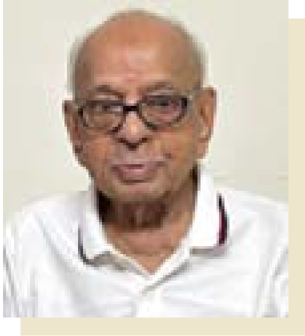
The primary translational potential of Ab-proteases and thus of this knowledge is in the rational design of new therapeutics to exploit the role of the key pathways in influencing disease. Of tremendous value are Ab-proteases directly affecting remodelling of tissues with multilevel architectonics (for instance, myelin or cardiac muscle). By changing sequence specificity one may reach reduction of a density of the negative proteolytic effects within the myelin sheath and thus minimizing scales of demyelination.

The traditional goal of Ab engineering is to combine various Ab domains to generate customized Abs that show specialized binding properties, optimal half-lives and desirable effector functions. Abs can be engineered to make proteins of higher affinity or smaller molecular variants that retain or change the functional properties of the original Ab. In this context, targeted Ab-mediated proteolysis could thus be applied to isolate from Ig molecules catalytic domains containing segments to exert proteolytic activity and then be used as therapeutic modifiers. Ab-based therapeutics have entered the central stage of drug discovery as a result of a major shift in focus of many biotech and biopharma companies. And as the outcome of the latest initiatives, modified recombinant Abs have been designed to be more cytotoxic to enhance effector functions (bivalent Abs), whilst integrating canonical cytotoxic and upgraded catalysing (proteolytic) features. So, Ab-protease engineering would offer the ability to enhance or alter their sequence-specific activity to expand the clinical utility of the absolutely new tools.

Ab-proteases can be programmed and reprogrammed to suit the needs of the body metabolism or be designed for the development of principally new catalysts with no natural counterparts. So, further studies on Ab-mediated MBP degradation and other targeted Ab-mediated proteolysis may provide biomarkers of new generations and thus a supplementary tool for assessing the disease progression and predicting disability of the patients and persons-at-risks. And the new approach is needed to secure artificial or edited Ab-proteases as unique translational probes to diagnose, to monitor, to control and to treat and rehabilitate autoimmune conditions patients at clinical stages and to prevent the disorder at subclinical stages in persons-at-risks to secure the efficacy of preventive, prophylactic and restorative manipulations.

Biography

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



Professor Shashikumar K Paknikar[1*], Professor Shailesh R Shah[2]

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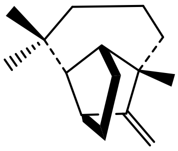
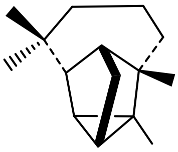
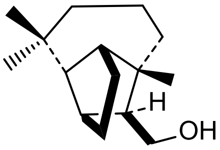
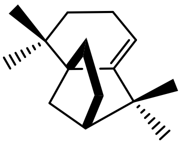
Acid catalysed transformation of (+)-longifolene and (-)-isolongifolol: Mechanistic aspects

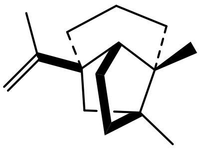
Though the structures of (-)-isolongifolene 4 and (-)-allo-isolongifolene 5 are well established, the mechanistic details of their formation are being proposed for the first time here.

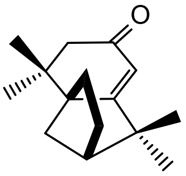












$$\underset{\text{(+)-Longifolene}}{\mathbf{1}} \xrightarrow[\text{(Site-specific catalyst)}]{BrCH_2COOH} \underset{\text{Minor}}{\mathbf{4}} + \underset{\text{Major}}{\mathbf{5}}$$

$$\underset{\text{(-)-Isolongifolol}}{\mathbf{3}} \xrightarrow[\Delta]{KHSO_4} \mathbf{4} + \mathbf{5}$$

(+)-Longicyclene 2 is an obligatory intermediate in these acid catalysed transformations. The present work shows a method for the preparation of (-)-isolongifolene 4 required for the large-scale preparation of (-)-isolongifolenone 6 which has biological properties such as mosquito and tick repellent activity.

Biography

Prof. Dr. S.K. Paknikar after getting a PhD from University of Pune under the supervision of Professor S.C. Bhattacharyya, Prof. Dr. S.K. Paknikar worked as a Research Associate in Organic Chemistry with Professor R. B. Bates the University of Arizona, Tucson and a visiting scientist at Czechoslovak Academy of Sciences, Prague, started his teaching career at Indian Institute of Technology, Mumbai and moved to Goa in1970. A Senior DAAD fellow at Pharmaceutical Institute University of Bonn, Germany and a National fellow of the University Grants Commission (UGC) India, while working as a Head, Department of Chemistry, Prof. Dr. S.K. Paknikar is a well known and respected name in the field of Natural products and Organic Chemistry. On the 26th June 2024, he completed 89 and at this young age, he continues his pursuit of excellence in Chemistry – having been a successful Industry Consultant with a few key industrial organizations, National & International for over 30 years post retirement. With a research experience of about 69 years that includes a teaching experience of 28 years, Prof. Dr. S. K. Paknikar has been a guide to 16 PhD students and published over 150+ research articles in peer reviewed National and International journals. He was a consultant with Merck, India (Goa) for 20+ years, with VERGO Pharma (Goa) for 7 Years & Siddharth Chemicals (Goa) for 25+ Years. Since 2022, he serves as the Honorary Research Advisor at Nishant Aromas, Palghar, India.

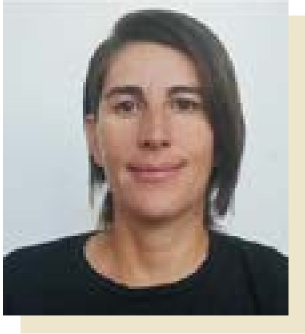
Tapati Bhanja Dey
Jain University School of Allied Healthcare & Sciences

Green chemistry in action: Enzymatic extraction of bioactive phenolics

Phenolic compounds are a diverse group of bioactive molecules with well-documented antioxidant, anti-inflammatory, and antimicrobial properties, widely distributed in plant tissues and have significant applications in food, pharmaceuticals, and cosmetics. Enzymatic extraction has gained attention as a sustainable green alternative to harsh chemical solvents, offering improved yield, selectivity, and bioactivity of phenolic compounds. This method utilizes hydrolytic enzymes such as cellulases, hemicellulases, and pectinases to break down plant cell wall structures, facilitating the release of bound phenolics. Many other hydrolytic enzymes including amylases, proteases, esterases etc are also used for the extraction of phenolic compounds. The efficiency of enzymatic extraction depends on several factors including enzyme type and concentration, substrate characteristics, temperature, pH, and incubation time. Enzymatic extraction has been successfully applied to various plant materials such as fruits, vegetables, and agro-industrial residues, supporting its potential for sustainable and value-added recovery of natural antioxidants. Recent advances in enzyme engineering and process optimization continue to refine enzymatic extraction techniques, making them a promising tool for sustainable production of phenolic-rich extracts. Further optimization and scale-up of enzymatic protocols may enhance industrial applicability and support the development of functional foods, nutraceuticals, and cosmeceuticals.

Biography

Dr. Tapati Bhanja Dey received her PhD degree in 2009 from IIT, Kharagpur and completed her Post Doctoral Research in 2016 from UDSC, New Delhi. She is a dedicated researcher and educator with over 10 years of experience in the fields of Biochemistry, Microbial Biotechnology, Downstream Processing, Fermentation Technology, and Food Technology. Her work has advanced the understanding of microbial production of bioactive compounds including industrial enzymes and phenolics, offering sustainable solutions for the food and pharmaceutical industries. She has authored 13 peer-reviewed publications in reputed international journals, accumulating over 1,200 citations, with her highest-impact publication appearing in a journal with an impact factor of 15.3. In addition to her research, Dr. Bhanja Dey is a highly enthusiastic teaching professional.



Martinez Yanina

Department of Nuclear Materials, National Atomic Energy Commission, 8400, Bariloche, Argentine

Spectrofluorimetric study of the reversible self-assembly of irinotecan in aqueous medium

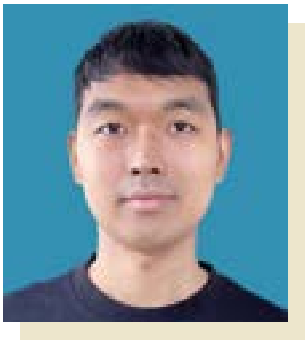
Factors like concentration, pH, or ionic strength induce self-aggregation in some drugs. It is important to study the self-assembly of drugs to relate the structure with their biological function. In this oral presentation I will share with you some experimental research related to the effect of decreasing Irinotecan commercial injectable solution concentration in the fluorescence intensity to study the aggregation behavior solely in an aqueous environment. Irinotecan intrinsic fluorescence emission was useful to track the emission variation along the different concentrations. In this sense, stock solution (34 mM) was serial diluted in physiological solution and as the concentration decreased from 34 mM to 0.85 μM of Irinotecan, the fluorescence intensity increased suggesting that the fluorescence emission was quenched at high concentrations. The spectrofluorimetric technique chosen for the present work was accurate to infer a possible change in the spatial conformation of the molecule because a blue shift with respect to the monomer of the maxima wavelength at 0.85 μM was observed and might be associated with H-aggregated forms, H stands for hypsochromic blue shifted emission bands. At 34 mM (2 mg/mL) a red shift of the maxima wavelength was associated with J-aggregates (J for bathochromic shift).

The disaggregation was only possible under serial dilutions and was not avoided in the presence of Bovine Serum Albumin (BSA) which is the most abundant soluble protein in the bloodstream of mammals and is responsible for the transport of many molecules such as ligands that bind to their receptors. It is important to study the binding of drugs to BSA for because a high affinity ensures a high drug biodistribution.

The aggregates were characterized by Scanning Electron Microscopy (SEM) and colloidal shapes of 5-7 micrometer were observed. Energy Dispersive X-ray Spectrometry EDS reports of the distribution of the elements confirmed C, O and N asigned to irinotecan molecule. Furthermore confocal microscopy studies showed crystal structures of 5 μm size not reported before. Nowadays, the therapeutic dose of irinotecan for cancer treatment range from 0.12 to 2.8 mg/mL so according to these results, the drug is administered as a self- assembled structure immersed in an aqueous solution or as a colloid. Further experiments should be conducted to relate the self-assembled structure with the biological function.

Biography

Dr. Martinez is a bachelor of Biotechnology, (National University of Quilmes) Buenos Aires, Argentine. She is a Dr. in Biological Sciences (National University of La Plata) Argentine. At present, her research area at the National Atomic Energy Commission focuses on the development of simple and double emulsions for health applications using non-ionic polymeric surfactants for controlled release studies. Besides, her interests reside in the study of the effect of the self-aggregation of therapeutic molecules on the kinetics release and the relationship of the structure with the biological function.



Ying Li* **and Yangxian Liu**

School of Energy and Power Engineering Jiangsu University, Zhenjiang, 212013, China

Research progress and future development trend of plasma technology in the field of mercury removal from flue gas

Mercury has attracted much attention due to its strong neurotoxicity and bioaccumulation characteristics. In particular, gaseous elemental mercury (Hg^0) has become a major focus in pollution control due to its high volatility and low water solubility. Plasma removal method can effectively eliminate Hg^0 from combustion flue gas by inducing active species, including ·O, ·OH and O_3, which has several advantages of simple and environmentally friendly process. Nevertheless, mercury removal using a single plasma technology has the disadvantages of big energy consumption, poor selectivity, and low free radical utilization, thus hindering its wide application. Compared to plasma removal technology, plasma coupling catalyst/adsorbent removal technology exhibits good development prospects owing to the obvious synergistic effect between plasma and catalyst/adsorbent, which is able to effectively overcome these shortcomings mentioned above in the plasma removal technology. Besides, plasma technology is also widely used for modifying catalysts/adsorbents to remove gaseous mercury by generating various active functional groups and sites on the catalysts/adsorbents surface, which shows considerable developing potential owing to its relatively clean and simple treatment process. In this paper, the latest development and advance of Hg^0 capture using different plasma-based processes/technologies (mainly including plasma removal technology, plasma coupling catalysts/adsorbents removal technology and plasma-modified catalysts/adsorbents removal technology) are introduced in detail. The mercury removal performance, adsorption/catalytic materials and removal mechanism are reviewed and discussed systematically in this review. Moreover, the existing main problems and future research recommendations in this field were also commented on. This review may provide some valuable information and inspiration for developing more economically and effectively plasma-based Hg from flue gas removal technologies.

Biography

Dr. Li is a PHD student of the research group led by Professor Yangxian Liu from the School of Energy and Power Engineering at Jiangsu University in Zhenjiang City, Jiangsu Province, China. The main research direction is the control of coal-fired flue gas pollutants and the utilization of biomass resources. At present, Dr. Li has published 6 search papers in SCI journals.

BOOK OF ABSTRACTS

21st Edition of Global Conference on

Catalysis, Chemical Engineering & Technology

SEPT
11-13

POSTER PRESENTATIONS

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Experimental Vapor-liquid equilibria of pure compounds and binary systems (furfural + γ-valerolactone or γ-butyrolactone) encountered in biorefineries

Furfural, obtained from lignocellulosic biomass, is considered a key platform molecule due to its reactive and versatile structure. It consists of a furan ring and an aldehyde functional group, which confer high chemical reactivity. Consequently, furfural serves as a precursor to numerous chemical products essential in various fields, including pharmaceuticals, fine chemicals, biofuels, and polymer industries.

Similarly, γ-valerolactone and γ-butyrolactone are biomass-derived compounds. They are widely used as solvents owing to their polarity, complete miscibility with water and many organic solvents, and, above all, their non-toxic and biodegradable nature, which makes them environmentally friendly "green" solvents. Moreover, lactones are known to enhance biorefining reactions by increasing the rate of furfural formation when used as solvents and by limiting the polymerization of furfural in the aqueous phase; a phenomenon that significantly reduces production yields.

The final step in furfural production is its extraction from the reaction medium (furfural–solvent mixture) by distillation. Reliable Vapor–Liquid Equilibrium (VLE) data are essential for optimizing this separation process. However, data for furfural–lactone systems are scarce in the open literature; only the isobaric binary system furfural +γ-valerolactone at 30 kPa has been reported by Pokki et al. This study extends the available data to lower pressures and temperatures for the furfural +γ-valerolactone system and provides, for the first time, VLE data for the binary system furfural +γ-butyrolactone, a homologous solvent to γ-valerolactone.

The investigated temperature and pressure ranges for the pure compounds and binary systems were 283-363 K and 5-10 000 Pa, respectively. For the pure compounds, experimental data were in very good agreement with literature values. For the binary systems, no prior VLE data were available for comparison. The experimental results were correlated using the NRTL and UNIQUAC activity coefficient models, yielding parameters valuable for the design and optimization of separation processes.

To this end, VLE measurements were performed using a static apparatus designed and built at the LMI laboratory (Université Lyon 1, France) (Fig. 1).

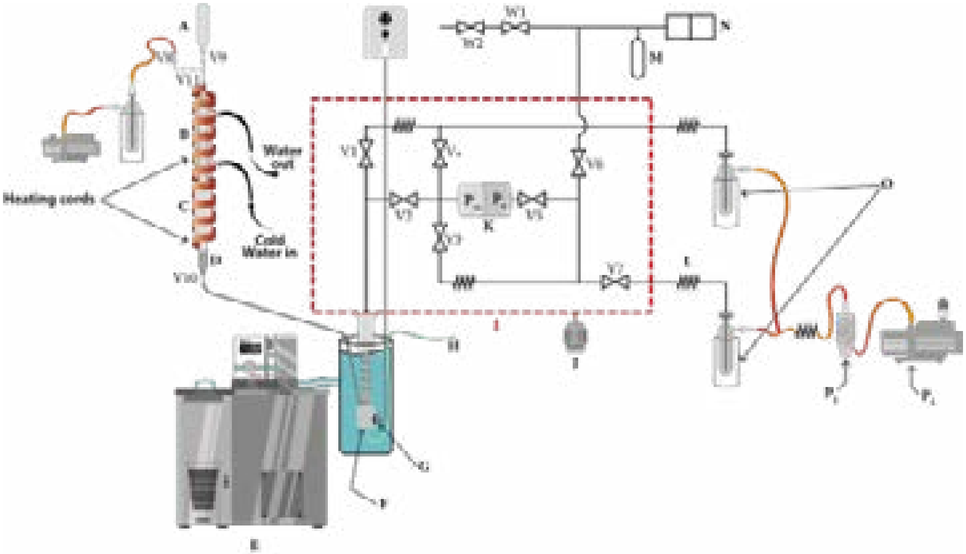

Fig. 1: Static apparatus designed for the measurement of vapor pressures: 1 Pa≤ P/Pa≤ 200kPa

The apparatus allows pressure measurements from 1 Pa to 200 kPa and operates in the temperature range of –30 °C to 150 °C.

The following platform molecules and systems were investigated:

1. VLE of pure compounds: Furfural, γ-valerolactone, and γ-butyrolactone.
2. VLE of binary systems: Furfural + γ-valerolactone and Furfural + γ-butyrolactone.

Biography

Ibtissem Guennoun is a is a PhD candidate in Physical Chemistry under a joint supervision agreement between the University of Tlemcen (Algeria) and Claude Bernard University Lyon 1 (France). Her research focuses on the vapor–liquid and liquid–liquid phase behavior of biomass-derived molecules for the optimization of separation processes. She combines experimental techniques with thermodynamic modeling, including NRTL and UNIQUAC models. She has previously presented part of her research at the RomeCat 2024 conference in Italy.

María Gómez Gómez*, María Dolores Murcia Almagro, María Claudia MontielMorte, Elisa Gómez Gómez, Asunción María Hidalgo Montesinos, JesúsGuerrero Méndez

Department of Chemical Engineering, Chemistry Faculty, Murcia University, Murcia, Spain

Removal of terephthalic acid, derived from polyethylene terephthalate plastics, using an advanced oxidation process based on a Kr Clexcimer photoreactor

The presence of plastics in the marine environment is currently a serious environmental problem and, ultimately, for human health. In particular, in recent years, there has been a growing concern around microplastics which, given their small size, pose a greater challenge from the point of view of their correct management. In this sense, it is essential to develop more effective processes for the treatment and disposal of plastics in wastewater treatment plants, in order to prevent their subsequent passage into natural water bodies.

Poly Ethylene Terephthalate (PET) is one of the most widely used plastics due to its excellent properties and diversity of applications, and due to its overconsumption and the difficulty of its disposal, it is present in large quantities in all water bodies. In its natural degradation, a series of secondary compounds are formed, including TerePhthalic Acid (TPA), one of its key monomers and the object of study of this work.

For the correct elimination of PET and its degradation products, new treatments have been proposed in recent years, highlighting Advanced Oxidation Processes (AOPs). In this work, an advanced oxidation treatment is used with a KrClexcimer lamp acting as a plug flow photoreator with complete recirculation, and with H_2O_2 as an oxidant, for the degradation of TPA.

Different experimental series have been carried out to optimize the process, varying the H_2O_2: TPA mass ratio, the initial concentration of TPA and the reaction volume. With standard conditions of initial concentration of TPA 100 mg/L and reaction volume 250 ml, the 3:1 mass ratio has been shown to be optimal, achieving 100% TPA conversions in about 80 minutes and obtaining the lowest values of Chemical Oxygen Demand (COD). With this optimum mass ratio, decreasing the initial concentration of TPA to 50 mg/L, or the reaction volume to 125 ml, total conversion is reached in around 40 minutes.

This research is an initial approach for the treatment of PET and its degradation products using lamps of excimer technology, with promising results that support the effectiveness of this technique.

Biography

Dr. Maria Gomez finished the Degree in Chemical Engineering at Murcia University in 2003 obtaining the Extraordinary End of Degree Award. She joined the Research Group "Analysis and Simulation of Chemical, Biochemical and Membrane Processes" to carry out her Doctoral Thesis, receiving the PhD degree in 2007. In 2018 she took the position of Associate Professor. She has collaborated in 2main research lines: "Removal of persistent organic pollutants through enzymatic treatments, membrane processes and photodegradation" and "Enzymatic synthesis of polymeric esters for application in industry". She has published more than 90 research papers and has an h-index of 23.

BOOK OF ABSTRACTS

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