Materials Science

Virtual 2020

September 21-22, 2020

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MATERIALS SCIENCE VIRTUAL 2020

SEPTEMBER 21-22, 2020

Theme:

A dynamic approach to enhance and forecast M3

INDEX

About MAGNUS GROUP

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

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

About Materials Science Virtual 2020

"Materials Science Virtual 2020" during September 21-22, 2020 with the theme "A dynamic approach to enhance and forecast M3" will offer you an impressive roaster of speakers, quality attendees and compelling content and is an excellent opportunity for leading academicians and scholars from universities and institutes to interact with the world-class scientists. You can increase your professional skills in this free time and discuss the practical challenges encountered and the solutions adopted.

KEYNOTE FORUM

DAY 1

SESSIONS ON:

CATALYSIS

MATERIALS SCIENCE VIRTUAL 2020

SEPTEMBER 21-22
2020

Tharwat M. EL-Sakran

American University of Sharjah, United Arab Emirates

An exploration of textual similarities and differences between two genres: The engineering research article (RA) and its subsequent poster

This study contributes to a growing body of research which emphasizes the importance of designing clear academic posters. It proposes practical guidelines for academic poster design and contents. A total of 48 published RAs with their subsequent posters from the engineering field were analyzed to see what elements of the RAs were modified, changed or totally removed. Several software packages were used for this investigation. A correlation was found between the length of the RA and the amount of RA contents retained in the poster. Analyses also show that function words, the literature review section and the list of references were the main victims of heavy reductionism. However, comparisons of RAs and their related posters revealed that visuals were the least sacrificed textual items in the reduction process. It is proposed that poster contents may reflect the original RA structure with more emphasis allotted to new information in the research. Such a practice will help reduce the limitations that the poster space may impose on the contents, allow the poster presenter more freedom to use a bigger font size, and most importantly; interact and engage actively with the interested audience. The research concludes with limitations and recommendations for further research.

Biography

Dr. Tharwat M. El-Sakran's research interests are in the fields of Teaching English as a Foreign Language (TEFL), Teaching English to Speakers of Other Languages (TESOL), Teaching English for Specific Purposes (TESP), Discourse Analysis, intercultural communication and forensic linguistics. He has published four books and a substantial number of research papers in peer-reviewed journals. Along with his colleagues, he has been engaged in the teaching of technical communication skills through engineering multidisciplinary projects. In such projects the focus is on teamwork, personality management and development, and student-centered learning. Dr. EL-Sakran is one of the associate editors for the Asian ESP Journal. He is also a Certified Fraud Examiner.

SPEAKERS

DAY
1

SESSIONS ON:
CATALYSIS

MATERIALS SCIENCE VIRTUAL 2020

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2020

MATERIALS SCIENCE VIRTUAL 2020

Dr Ratnakar R Chitte
SPTMC, India

Microbial enzymes and their potential impact on human life

There are many diverse microbial enzymes are discovered still today for their application in various field, such as human health, agriculture and environment. In health care sector many enzymes are of now used for treating diseases, one of example such as Urokinase enzyme is beaning used for Cardiovascular disease. Depth of the research carried out on thermostable, alkaline metalloproteases fibrinolytic enzyme name as actinokinase from thermophilic Streptomyces sp. Its isolation purification, detail characterization was carried out. In vitro efficacy studies are carried out, for therapeutical point of view Another alkaline thermostable keratinase also characterized and studied for environmental waste treatment, specifically on hairs to generate into useful amino acids Many chemical and pesticides are having toxic effects on human beaning when such chemicals used for agriculture crop and vegetables. Such pesticides and chemicals are consumed through the food and vegetables which leading cause of cancer. The use of organic foods generated by microbial biofertilizers and biopesticides, are safe for consumption for better health, environment for controlling pollution etc Microbial enzymes plays vital role in human life in broad aspects.

Biography:

Dr Chitte studied M.Sc Microbiology in 1997 from North Maharashtra University, Jalgaon. Ph.D Microbiology in 2002 from Savitribai University Pune. He did Post doc in 2003 -2006 supervised by Dr William Furey from University of Pittsburgh US. In 2006 work as 'Research Scientist' at ARI, Pune and then joined as 'Scientist C' in 2010-2014. He presented research work in National and International Conferences & awarded Young Scientist Travel award from IUBMB UK 2000. Also awarded Scientist of year 2003 by Rotary Club Pune. He published two book chapter in Springer publisher & 16 Papers National and International reputed Journals, having two patents. Currently he is workin as Assistant Professor in Microbiology Deparatment at SPTMC, Vanita Vishram Surat

Nezihe Ayas
Eskişehir Technical University, Turkey

Characterization, activity, stability of Ni/CeO2-ZrO2 catalyst via bioethanol steam reforming for H2 production

Industrialization, environmental problems, climate change, increasing fuel demand, and limited energy resources; lead to the search for new, high-reserve, easy-to-use, clean, and renewable energies. Hydrogen will become an important fuel in the future, as it has the flexibility to be efficiently converted into other forms of energy for use in different energy applications such as fuel cells. Among the various feedstocks that have been proposed for hydrogen production, bioethanol stands out due to its various advantages such as obtaining from renewable resources, high hydrogen content, non-fossil resource, low toxicity, easy storage, and transportation. Steam reforming has recently become a promising method for producing hydrogen-rich gas, as it has a higher theoretical H2 yield than other thermochemical methods. The challenge is to develop catalysts that are resistant to coke formation, exhibiting high stability and activity for bioethanol steam reforming. The most important factors affecting the activity of catalysts are the selection of suitable active metal and support material and the preparation methods. In this work, the effects of CeO2, ZrO2 different loading on H2 selectivity, and catalytic performance of Ni/CeO2-ZrO2 in steam reforming of bioethanol were investigated. The catalysts were synthesized by the wet impregnation method on the support material consisting of CeO2, ZrO2 prepared by the co-precipitation method. Ni/CeO2-ZrO2 catalysts with different loading content of CeO2 and ZrO2 were selected as 40,50,60%wt CeO2 and 45,35,25,15% wt ZrO2. Catalysts were characterized using XRD, XRF, SEM, BET, TGA, and FT-IR techniques. The activity tests were carried out at a 3:1 S:C molar ratio, 0.05 L/gcat.h LHSV and a reaction temperature of 600°C. The results showed that 15/75/15is the ideal loading as 15Ni/70CeO2-15ZrO2 performed the best performance with the highest H2 selectivity of 85.46%. It was observed that the catalyst remained stable for 42 hours.

Audience Take Away:

- It is observed that the reactor used in activity studies provides low-cost results in a short time.
- The detailed characterization of catalysts was performed.
- Activity studies of catalysts were carried out in obtaining a hydrogen-rich gas product with steam reforming of bioethanol. It has been observed that bioethanol can be used as a source of hydrogen.

Biography:

Professor Dr. Nezihe AYAS started her career at Anadolu University in 1991 and continues at Eskişehir Technical University Chemical Engineering Department. She is the Head of the Department of Thermodynamics and Basic Operations and Head of the Chemical Engineering Department. Under the supervision of Prof. Dr. Nezihe AYAS, 8 master's and 2 doctoral theses have been completed, 5 master's and 1 doctoral thesis are ongoing. She contributed to the literature by writing 3 book chapters.14 of her studies in the field of energy published in international refereed journals. In addition, 39 of the studies in this field have presented at international congresses.

Salima Bouteraa
University of Sciences and Technology of Oran, Algeria

Mixed metal oxide derived from Lanthanum-containing Zn-Fe-CO3 Layered double hydroxides: Promoting visible light photocatalytic activity

The objective of the present study was to investigate the synthesis of La-containing ZnFe-Layered double hydroxide (LDH) with various Zn/Fe/La molar ratios by co-precipitation method at constant pH and was used as a precursor of La-containing ZnFe-mixed metal oxide (MMO). The photocatalytic activities of the samples were evaluated by degradation of Indigo Carmine (IC), as the main model organic pollutant in this study from aqueous solution, under visible light irradiation. The crystallinity of the layered materials decreases as the Zn/Fe/La ratio increases, probably due to the distortions introduced by the large difference in the ionic radii of the cations. DRS analysis demonstrated decreasing in the band gap energy of La-containing LDH and MMO compared with the pristine ZnFe-LDH. The photocatalytic degradation efficiency of IC dye with ZnFeLa-MMO exceeded the ZnFe-MMO under the same conditions. The high photocatalytic activity of the sample was attributed to the addition of La (III). Finally, the possible mechanism of photocatalytic degradation of IC by ZnFeLa-MMO was discussed.

Audience Take Away:

- The modification of the photocatalyst results in beneficial effects due to the separation of electrons and holes.
- Non-toxic catalyst used.
- The development of systems capable of operating under visible or solar light, which is abundant and free; visible light sensitive photocatalysts are more preferable in the field of photocatalysis.
- Total mineralization possible of persistent organic pollutants.

Biography:

Dr. SalimaBouteraa, A chemist researcher and PhDstudent in inorganic materials chemistry at the Oran-MBUniversity, Algeria with considerable industrial and analytical operations experience gained from working in the industrial and laboratorial sectors. She received her Engineer's degree in 2010 at the same institution. After two year gaining magister's degree by Dr Bettahar.N at the Inorganic Materials Chemistry and Application Laboratory. She has published some research articles in SCI(E)journals.)

Saad Saeed
NFC Institute of Engineering & Technology, Pakistan

Thermal performance analysis of sugarcane bagasse pretreated by ionic liquids

This work investigated the pretreatment effect of four ionic liquids (ILs) on sugarcane bagasse (SCB) through reactivity, kinetic, and thermodynamic analysis. The ILs used in this study were 1-butyl-3- methylimidazolium chloride ([Bmim][Cl]), 1-butyl-3-methylimidazolium methylsulfate ([Bmim][MeSO4]), Tris (2- hydroxyethyl) methylammonium methylsulfate ([MTEOA][MeSO4]), and trihexyltetradecylphosphonium chloride ([P66614] [Cl]). Pretreatment was carried out at 150°C and 30 min, followed by thermal analysis of samples in a thermogravimetric analyzer (TGA). The activity parameters were obtained using TGA data. [P66614] [Cl] was completely absorbed in SCB, which strongly influenced the thermochemical behavior of [P66614] [Cl] treated sample. Results revealed that IL pretreatment greatly reduced ash content and increased the higher heating value (HHV) of SCB. Chemical composition analysis showed delignification of SCB by [Bmim][Cl], [Bmim][MeSO4] and [MTEOA][MeSO4]. However, [P66614] [Cl] increased lignin content indicating thermal stability. The obtained values of activation energy (Ea) for [Bmim][Cl], [Bmim][MeSO4], and [MTEOA][MeSO4] were much lower than that for untreated SCB, suggesting destruction of the lignocellulosic structure. Higher entropy change (ΔS) values after IL treatment implied higher disorder due to the breakage of SCB structure. The study demonstrated that the nature of cations and anions strongly influence the pretreatment potential of ILs for biomass undergoing thermochemical conversion processes.

Audience Take Away:

- Comparative pretreatment potential of ionic liquids (IL) for sugarcane bagasse (SCB) undergoing thermochemical conversion.
- ILs differ in their ability to alter the thermal profile of SCB, indicating that the cations and anions play a pivotal role in determining the pretreatment effectiveness.
- Hydrophobic IL, [P66614] [Cl], showed the highest reactivity and pyrolysis factor.
- Besides the common and expensive imidazolium-based ILs, there is need to explore the thermal degradation potential of relatively low-cost ILs containing different cations.

Biography:

Saad Saeed graduated as chemical engineer in 2009 from NFC Institute of Engineering & Technology, Multan. He obtained MS from the University of the Punjab, Lahore in 2012. He is a PhD scholar and working on the ionic liquid pretreatment of coal and biomass for thermo-chemical conversion under the supervision of Prof. Dr. Mahmood Saleem. He has authored more than 10 research papers in high quality SCI (E) and Scopus indexed impact factor journals. He has also collaborated with researchers from Yeongnam University (South Korea) and Dalian University of Technology (China).

POSTERS

DAY 1

SESSIONS ON:
CATALYSIS

MATERIALS SCIENCE VIRTUAL 2020

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2020

Aliyah Alsharif

University of Liverpool, UnitedKingdom

Gas-phase dehydroisomerization of alpha-pinene to para-cymene catalyzed by metal oxides

Zn(II) and Zn(II)-Cr(III) oxidesare demonstrated to be an efficient, noble-metal-free catalystsfor one-step dehydroisomerization of alpha-pinene to para-cymene in the gas phase. This is an example of the use of heterogeneous catalysis for the conversion of renewable feedstock into value-added chemicals. The reaction was carried out in a fixed-bed reactor at 350-370 oC to yield 90% of para-cymene at 100% alpha-pinene conversion. The catalysts showed stable performance for over 24 hours. The proposed reaction mechanism involves acid-catalyzed alpha-pinene isomerization followed by dehydrogenation of para-cymene precursors.

Audience Take Away:

- Importance of ρ-cymene and how to produce it catalytically from renewable feedstock.
- Optimization of the synthesis of ρ-cymene through systematic variation of reaction parameters.
- Proposed mechanism of α-pinenedehydroisomerization.

Biography:

Aliyah Alsharif is a 1st year PhD student in the University of Liverpool, UK. She received her MS in 2015 from King Saud University KSU in Saudi Arabia. Then she obtained a scholarship to study for a PhD in the UK. She joined research group of Prof. Ivan Kozhevnikov at the University of Liverpool.

Juan Daniel Diaz Santibanez
Universidad de Concepcion, Chile

Synthesis and Characterization of POMs with Keggin-type Structure of [PVXMo12-XO40](3+x)-; X= 1, 2: Effect of the Calcination Temperature on Structure and Texture Properties

Polyoxometalates POMs are a large family of nanometric inorganic clusters of ionic character (usually anions) and are mainly formed by three or more transition metal oxides joined together sharing oxygen atoms to form closed 3D lattices, the chemistry of these compounds is related to the nature of heteropolyanion. Polyoxomolybdovanadates PMVs are a type of POMs where a Mo atom has been replaced by a V atom. PMVs have been reported to be used as catalysts in oxidation reactions, either supported or unsupported. Although there is literature information on the use of phosphomolybdovanadates (PMoV) with vanadium inclusions and the effect that the degree of substitution has on thermal stability, it is difficult to find information on works where the calcination temperature is studied, more specifically its effect on the Keggin-type structure and on the textural properties of these heteropolyanions. Here we synthesized and characterized a series of POMs [PVXMo12-XO40](3+x)-, Keggin-type structure making inclusions of vanadium V (X=0,1,2) instead of Mo. To study the effect of the calcination temperature at two temperatures: 200 and 250 °C, was carried out a structural and textural characterization of the calcinated vanadium- included POMs. We observed through characterization by PXRD, FT-IR, DRS, Pyr FT-IR and BET isotherms, the formation of the Keggin structure and checked the vanadium inclusions for V= 1 and 2. We also observed that this structure does not degrade with calcination at 200 and 250 °C, however, we observed a decrease of the surface area and the lower amount of pores, probably due to the exit of water molecules from the secondary structure. The knowledge of this information can be particularly useful in the study of the reactions catalyzed by these compounds and can give us useful information about the mechanisms involved in these reactions.

Audience Take Away:

- The audience will be able to use what they have learned in the evaluation of calcination temperatures on the effect it has on the structural and textural properties of POMs catalysts.
- The audience will be able to differentiate the effects of the substitution of Mo by V in the Keggin structure of the POMs and compare them with the effects of calcination.
- The audience will be able to choose the most suitable temperature for the calcination of their POM catalysts including vanadium, without affecting their properties.

Biography:

Juan Daniel Diaz Santibanez is a Chemist and Bachelor in Chemistry from University of Chile. He worked four years in private sector laboratories and five years in the University of La Frontera. Nowadays, he is a 3rd-year student in the program Ph.D. in Sciences, Mention in Chemistry, at the University of Concepción. Because his interest in green chemistry and chemistry of materials, he is doing his thesis in heterogeneous catalysis, specifically in lignin valorization using polyoxometalates catalysts. This thesis is associated with a Sustainable Chemistry project. The scientific production during these years were 5 scientific peer-reviewed articles (ISI) and 12 conferences.

Muhammad Usman
King Fahd University of Petroleum and Minerals, Saudi Arabia

Electrochemical CO2 reduction in aqueous medium by a water-stable MOF (CAU-1-NH2)

As carbon levels continue to rise (414 ppm in August 2020), it has become primitive to put a combination of efforts, including carbon capture, utilization, and storage (CCUS) technologies, to reduce atmospheric CO2. The direct electrochemical CO2 reduction reaction is a promising technology for mitigating and converting CO2 into chemicals and fuels. However, it still a great challenge to develop a highly efficientelectro-catalyst. Metal-organic frameworks (MOFs), as relatively new emerging crystalline porous materials, are promising heterogeneous catalysts or supports/precursors in designing and synthesizing various catalytic materials for addressing these challenges. One main challenge is the fabrication and stability of the MOF electrode in aqueous solution under electrochemical studies. Herein, we prepared a water-stable aluminum-based MOFs knows as CAU-1 for electrochemical CO2 reduction. The MOF was prepared hydrothermally and characterized using XRD, SEM and FTIR. Then10 mg MOF catalyst was suspended in 1 mL ethanol with 20 µL Nafion (5 wt%) to form a homogeneous ink. Then, 500 µL of the solution wasspread onto the FTO glass (1×1 cm-2) surface by a micropipette and then dried under room temperature. The electrochemical studies were tested in Potentiostat (CHI 660E, Shanghai CH Instruments Co., China). The working electrode shows a stable behavior during electrochemical studies. The low overpotential (-0.40 V) and high current density under CO2-saturated KHCO3solution was higher compare to the Ar-saturated KHCO3 solution, demonstrate the potential behavior of CAU-1 MOF for electrochemical CO2 reduction.

Biography:

Dr. Muhammad Usman received a Master's degree in Chemistry from the University of Peshawar, Pakistan in 2009. Dr. Usman earned a Ph.D. in 2014 from the Institute of Process Engineering, Chinese Academy of Sciences, China. He has four years of postdoc research experience from Tsinghua University China and Berkeley Global Science Institute at KFUPM. At present, Dr. Muhammad Usman is serving as a Research Scientist (~ Assistant Professor) in the Center of Excellence in Nanotechnology, King Fahd University of Petroleum and Minerals, Saudi Arabia. Dr. Usman's expertise included zeolite for heterogeneous catalysis, adsorption kinetics, catalytic modeling designing & application. Dr. Usman holds four US patents, published >30 peer-reviewed international journals (like ACS catalysis, J Mat Chem A, Chemical Eng J, AIChE) in addition to several conference proceedings/presentations.

Cristina Giorgiana Coromelci

Alexandru Ioan Cuza" University of Iasi, Romania

TiO2/PEDOT systems for Visible Light Degradation of Organic Pollutants

The use of titanium oxide (TiO2) is a promising reactive technique for the removal of pollutants from air or water as self-cleaning surfaces because of the biological and chemical stability, high photoactivity, low-toxicity and low cost of TiO2. However, one of the current key issues is re-designing TiO2 photocatalysts that can be activated by absorbing radiation from the visible area of the electromagnetic spectrum and thus increase the photocatalytic activity. The conjugated polymers and their derivatives can act as photosensitizers and have shown excellent stability due to their extending π-conjugated electron systems. During this study, the synthesis of TiO2/conjugated polymers systems was accomplished by coating the metal oxide nano-architectures with poly-3,4-ethylene-dioxy-thiophene (PEDOT [-C6H4O2S-]n) which is a low-band polymeric semiconductor. First, a non-doped TiO2 sample was synthesized using the US-assisted sol-gel method, involving F127 as a surfactant, followed by conventional or microwave calcination.

TiO2 / PEDOT systems were obtained post-synthesis because the heat treatment could have damaged the structure and composition of the polymer. For comparison, a conventionally calcined TiO2 sample was synthesized, at 450°C, 4h, but also a 30 minute microwave calcined sample, finally obtaining the TconvPEDOT and T-MW-PEDOT samples respectively. Following the synthesis of the composites, a characterization step included investigating the surface chemistry of the samples (FTIR), morphological properties by SEM and TEM, the study of optical properties, using UV-Vis DR spectroscopy, structural characteristics by XRD, but alsotextural properties by the nitrogen adsorption/desorption technique. The synthesized composites confirmed their mesoporosity through the type IV isotherms, with ink-bottle interconnected pores (H2hysterezis). Also, the pore diameter was in the range of 3-7 nm, with an average of 4.38 nm (when conventional TiO2 was used in the synthesis) and 4.61 nm respectively (in the case of the T MW PEDOT sample). The specific surface areas calculated by BET method revealed higher values in the case of composites, this being due to the initial mesoporosity of the titanium oxide. Since these characteristics qualify the synthesised samples as favourable photocatalytic materials, their response was studied for the degradation of Congo Red dye, with remarkable results for both UV and Visible light.

Audience Take Away:

- During this study, photocatalysts for wastewater cleaning were obtained.
- These photocatalysts could be used as starting points in the development of new indoor air treatment techniques (e.g. self-cleaning coatings for wood furniture or interior design ceramic objects), but also easy to maintain clean surfaces (windows, walls).
- They could also be deposited as thin films for wastewater treatment, overcoming this way the limitation created by particle agglomeration in continuous flow reactors.

Biography:

Dr. Cristina COROMELCI is a young researcher, specialized in the field of nanomaterials, more specifically in the wastewater advanced treatment using nanophotocatalysts. She studied Environmental Engineering at Faculty of Chemical Engineering and Environmental Protection from "Gh. Asachi" Technical University of Iasi graduated as MS in 2010. She received her PhD degree in 2015 at the "Al. I. Cuza"University of Iasi, Romania.During her 2 years postdoctoral fellowship supervised by prof.dr. Palamaru at the Materials Chemistry Laboratory at UAIC, she obtained the position of Scientific Researcher within ICSI, UAIC. She has published 11 research articles according to SCOPUS Database.

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SPEAKERS

DAY 1

SESSIONS ON:
CHEMISTRY

MATERIALS SCIENCE VIRTUAL 2020

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2020

MATERIALS SCIENCE VIRTUAL 2020

Vasily Lutsyk*, Vera Vorob'eva, Anna Zelenaya, Marina Lamueva, Maria Parfenova

Computer-Aided Materials Design Sector, Institute of Physical Materials Science/ Siberian Branch of the Russian Academy of Siences, Ulan-Ude, Republic Buryatia, Russia

Computer 3D & 4D models of T-x-y & T-x-y-z diagrams of the Ternary & Quaternary Systems as a Novel Tool in Chemistry & Materials Science

The assembled 3D and 4D computer models of T-x-y and T-x-y-z diagrams permit to verify and validate the data on phase equilibriums and to design the microstructure of the heterogeneous material, including the materials genome decoding. "Phase Diagram (PD) as a Tool of Materials Science", http://ipms.bscnet.ru/labs/skkm.html , is focused on the following topics: concentration fields of different dimension with the different solidification schemes and microstructures, correction of PD graphics, multi-component systems polyhedration, 3- and 4-phase regions with the reaction type changing, competition of crystals with different dispersion in the invariant regrouping of masses, mathematical approximation of PD, assembling of PD' computer models, 3D prototyping of the phase regions and concentrations simplexes for the exploded PD and for the concentration complexes of the reciprocal quaternary systems, simulation of DTA spectra and X-ray analysis spectra in the training programs for specialists in the field of physics-chemical analysis. Computer models of PD are the wonderful addition for the thermodynamicaly assessed experimental PD. This work was been performed under the program of fundamental research SB RAS (project 0336-2019-0008), and it was partially supported by the RFBR projects 19-38-90035, 20-21-00056.

Biography:

Dr. Lutsyk is a head of Materials CAD Sector, IPMS SB RAS and professor of Banzarov Buryat State University. Session Organizer and Session Chair: "Phase Diagram as a Tool of Materials Science" - for the 2d, 3d, 4th, 5th International Conferences on Competitive Materials and Technology Processes IC-CMTP, (Hungary, Miskolc, 2012, 2014, 2016, 2018). Invited Lecturer: 2011 & 2012 International Youth Industrial Forums "Engineers of the Future" (Russia, Goloustnoye); 3d International Conference HighMatTech (Ukraine, Kiev. 2011); 2d & 4th International Conferences on Competitive Materials and Technology Processes IC-CMTP2 & IC-CMTP4 (Hungary, Miskolc, 2012 & 2016); 12th International Conference on Fundamental and Applied Aspects of Physical Chemistry (Serbia, Belgrade, 2014); International Conference on Oxide Materials for Electronic Engineering – fabrication, properties and application OMEE-2017 (Ukraine, Lviv, May 29 – June 2, 2017).

Simone Carradori
"G. d'Annunzio" University of Chieti-Pescara, Italy

New chemical scaffolds as carbon monoxide releasing molecules (CORMs) for the management of inflammation

A novel library of Carbon Monoxide Releasing Molecules (CORMs) has been designed, synthesised and tested in order to enlarge the knowledge of these multitarget compounds as promising tools for a large plethora of diseases with particular attention to inflammation. The general structure is characterized by three distinct portions:
1) A chemically tunable chemical organic scaffold to modulate the pharmacokinetics and other additional biological activities;
2) The "linker" is represented by different heteroatoms (S, O);
3) The CO-releasing portion obtained by reaction of an alkyne with an organometallic compound, dicobalt octacarbonyl.

The ability of these compounds to slowly release carbon monoxide was investigated by means of a CO-Release assay measuring the carbonylation of the deoxymyoglobin at selected wavelengths. Biological data (MTT assay, TNF-α expression, LPS treatment) in RAW 264.7 mouse macrophages confirmed the low cytotoxicity and anti-inflammatory potential of these compounds with respect to N-acetylcysteine as a reference drug.

Audience Take Away:

- Clear description of chemical syntheses to obtain reproducible results
- Biological data were obtained from standardized assays
- An international network cooperated to the project
- New interesting approaches for the treatment of inflammation-related diseases
- Carbon monoxide useful for therapeutic applications

Biography:

Dr. Simone Carradori completed his PhD in "Pharmaceutical Sciences" at Sapienza University of Rome (Italy). Dr. Simone Carradori has collaborated and still collaborates with several departments abroad. Now he is assistant professor in Medicinal Chemistry at the Department of Pharmacy at "G. d'Annunzio" University of Chieti-Pescara (Italy). The scientific activity is mainly focused on the characterization and synthesis of heterocyclic derivatives with potential biological activity, and is documented from about 181 papers in international peer-reviewed journals, one patent and participations in numerous conferences. He is in the Editorial Board of several peer-reviewed journals.

Dr. K. M. Lokanatha Rai
University of Mysore, India

Synthetic and analytical applications of chloramine-T

Chloramine-T in the hydrate form has been used in various types of chemical reactions. This prompted us to utilize chloramine-T as mild oxidant for oxidizing alcohol to aldehydes. Allylic amination of β-apopicropodophyllin and epoxidation of podophyllotoxone were successfully achieved by chloramine-T in presence of selenium/copper catalyst and dimethyl sulphoxide respectively. Generation and isolation of unstable intermediates such as nitrile oxide and nitrile imenes were achieved for the first time by the reaction of aldoximes and phenyl hydrazones respectively with chloramine-T in ethanol as solvent, which later underwent 1,3-dipolar cyloaddition reaction with alkenes to form the corresponding heerocycles. Similarly we have used chloramine-T for the [4+2]-cycloaddition of α-nitrosoolefins and azoalkenes with alkenes starting from ketooximes and ketohydrazones respectively in almost quantitative yield. Besides this, aziridination of alkenes were successively achieved by treating alknes with chloramine-T in presence of silver nitrate as catalyst. The synthesized products such as isoxazolines, isoxazoles, pyrazolines, pyrazoles, 1,3,4-oxadiazole, 2-amino-1,3,4-oxadiazole, 1,2-oxazine, 1,2-diazine derivatives were screened for various biological activity and liquid crystalline properties.

Besides the synthetic application of chloramine-T, we have successfully utilized this simple reagent for the determination of iodine value of an oils, number of keto group in many carbonyl compounds, keto-enol contents in β-keto dicarbonyl compounds and molecular weight of oximes, neutral amino acids, ascorbic acid iodometrically. Some of the methods were successfully adopted in M. Sc., and B. Sc., practical classes in few Indian universities.

Biography:

Prof. Lokanatha Rai, born in 1954, in Madavu village of Puttur taluk. He received his M. Sc., and Ph. D degrees from the University of Mysore. He joined Department of Studies in chemistry, University of Mysore as Lecturer in 1982, and moved upto become Reader in 1995 and Professor in 2003. He was a post-doctoral fellow at Bar-Ilan University, Israel from 1987-89. Dr. Rai has done outstanding research in the field of synthetic organic chemistry, particularly in the field of podopyllotoxin, solvothermal reactions, 1,3-dipolar cycloaddition reactions and [4+2] hetero Dies alder cycloaddition reactions. His contributions in different areas of chemistry reflect in the form of over 204 research publications in reputed National and International journals with over 3062 citations, h-index of 29 and i10 index 61. Most of his research papers are well cited in Books, National and International journals including Fieser's "Reagents for Organic Synthesis, Merck Index, Chemistry of Lignans, Aldrich and Lanchester Chemical catalogue. He served as an associate editor for many International Scientific journals of high repute. So far he has successfully guided 24 students for Ph. D., degree, and 05 students for M. Phil degrees. Dr. Rai was instrumental in developing M. Sc., Organic chemistry at Manasagangotri Campus. Prof. Rai has taught reaction mechanism, photochemistry and pericyclic reactions, bonding in organic chemistry, natural products, spectroscopy for M, Sc., students.

Vera Isaeva*[1] and Leonid Kustov[2]

[2]N.D. Zelinsky Institute of Organic Chemistry, Russian Academy of Sciences, Russia, [1]*National University of Science and Technology, Russia

The role of the morphology and dispersion of catalysts based on metal nanoparticles and metal-organic frameworks (MOFs) in some practically important reactions

The creation and exploitation of the advanced catalysts with excellent activity, selectivity and stability contributes to the sustainable development of the modern industrial society. Nowadays metal nanoparticles (M-NP) are the most important industrial catalysts and have wider application ranging from chemical manufacturing to energy conversion and storage. The elaboration of the catalytic nanomaterials with controllable dispersion and shape needed for a specific process paves the bright avenue for the creation of the new generation catalysts possessing both high activity and selectivity. The design of the highly effective nanocatalysts involves the controllable formation of specific active sites with a distinct size, local geometry and morphology. In this context, the novel type of hybrid nanoporous materials – metal-organic coordination polymers (MOFs) shows a particular potential. MOF are metal-organic coordination polymers by nature. Their three-dimensional networks are composed of metal ions and polydentate organic molecules or linkers.

A high surface area and porosity along with rich functionality of metal-organic frameworks makes them advanced platform materials for functional nanohybrids in the form of M-NP embedded in MOF matrices that are efficient heterogeneous catalysts. This contribution deals with preparation of catalytic hybrid nanomaterials based on nanosized MOF matrices with different porous structure (micro/meso) containing encapsulated Pd, Co and Rh nanoparticles. The results of their investigation in practically important processes, such as carbonylation, hydroformylation and Fisher-Tropsch synthesis show that controllable specific dispersion and morphology of both metal-organic carriers and M-NP immobilized on them provide a pronounced cooperative effect influenced significantly on the activity and selectivity of this type hybrid catalytic nanomaterials.

Audience Take Away:

- The scientific audience could use this presentation in order to obtain new or brighten and deeper insight on the functional hybrid materials in form of MOF matrices containing embedded metal nanoparticles (M-NP@MOFs) with controllable characteristics and their potential applications. The audience will be informed about preparation routes and characterization techniques for these nanohybrids. In particular, new information of this presentation would allow one to prepare multifunctional hybrid materials using appropriate strategies and approaches in optimal way. Accordingly, the presentation will provide information, which could be used to expand their research skills and expertise.
- This work involves the knowledge in inorganic, organic and physical chemistry as well as chemistry of materials. The information from this presentation may assist to design the functional hybrid materials of this type for catalytic processes in fine and base organic synthesis as well as other practically important applications involving supported metal nanoparticles, such as drug delivery and bio-visualization, sensing, adsorption and energy storage. Probably, the audience may obtain new ideas relevant to search potential application fields for the M-NP@MOF nanohybrids.

Biography:

Dr. Vera I. Isaeva is a leading Researcher of the Laboratory of Development and Study of Polyfunctional Catalysts at the N. D. Zelinsky Institute of Organic Chemistry Russian Academy of Sciences and a senior researcher of the Laboratory of Nanochemistry and Ecology in National University of Science and Technology “MISiS”. Her research activity is focused on the development of nanostructured materials including MOFs and composites on their basis, from synthesis to application. She has over 100 research papers and reviews in peer-reviewed journals, 3 book chapters and is the co-author of about 20 national patents.

Elisa Jimenez-Izal
Euskal Herriko Unibertsitatea, Spain

Boosting the selectivity of Pt through Ge doping

With increasing environmental concerns worldwide as well as the scarcity and cost of noble metals, the use of nanocatalysts is a novel way to exploit resources more efficiently and minimize waste. They are also good models to look for catalysts with optimized properties. In this talk we will show our theoretical results on gas-phase and MgO supported size-selected Pt clusters, that exhibit size-dependent catalytic properties, and propose Ge doping to boost their catalytic performance. On the one hand, archetypal reaction of alkane dehydrogenation will be studied, due to the high relevance of light olefins as building blocks in the chemical industry. Platinum is not only the most active pure metal for the C-H bond cleavage, but it also exhibits a low reactivity toward C-C bond cleavage. However, it binds alkenes too strongly, promoting further dehydrogenation. As a consequence, coke deposits are built on the surface of the catalyst, deactivating it. Selectivity control is key to prolong the lifetime of Pt. On the other hand, CO poisoning will be tackled. This is a severe problem affecting the Pt catalysts in diverse applications, such as the hydrogen Fuel Cells, FCs. In FCs H2 is oxidized at the anode, that is made of Pt nanoparticles deposited on a carbon substrate. Nevertheless, the catalyst is highly susceptible to deactivation via CO poisoning. We propose that doping Pt with Ge would give rise to more selective catalysts towards both coke formation and CO poisoning, leading to more resistant and durable catalysts. In our studies the dopant concentration is pinpointed as a crucial factor to tailor the catalytic properties of Pt. Importantly, because Ge is more abundant and economic than Pt, the proposed strategy is an attractive solution for the design of cheaper and “greener” industrial catalysts. We will show that a proper size selection can change the properties of Pt and create a more robust catalyst. Finally, we will emphasize that the activity, selectivity, and poisoning of supported cluster catalysts are all ensemble-effects, and cannot be properly described on the basis of just one cluster structure, which has been the prevalent theoretical approach.

Audience Take Away:

- We present an effective, cheap and green way of tailoring platinum’s performance for alkane dehydrogenation and H2 dissociation.
- Doping Pt with Ge improves the coking and CO poisoning resistance of the catalyst.
- The catalytic activity of Pt is retained in the novel PtGe catalyst.
- We show that an ensemble of accessible catalyst states must be considered in property evaluations to achieve a correct theoretical description of the catalytic system.

Biography:

Dr. Elisa Jimenez-Izal received her PhD degree in 2014, under the supervision of Prof. Ugalde at the University of the Basque Country, Spain. She then moved to the University of California, Los Angeles (UCLA) to continue with her postdoctoral studies under the supervision of Prof. Alexandrova. After four years she obtained an Ikerbasque research fellowship at the University of the Basque Country and the Donostia International Physics Center, both in Donostia, Spain. She has experience working in Theoretical Chemistry groups in Mexico, Italy and France, and she has published more than 20 research papers during her short career.

E. Chinnaraja
CSIR-Central Salt and Marine Chemicals Research Institute, India

Metallohelicates: A Potential Catalyst for Asymmetric Synthesis

Helicates, the DNA inspired double-helical metal complexes gains significant importance in many applications and proved as the superior candidate. In the area of asymmetric catalysis, such enantiopure helicates are not yet well established. Synthesis of enantiopure helicates itself requires the special design of ligands, preparation of such ligand remains to be a big challenge. The various enantiopure binuclear helical complexes from different chiral ligands were synthesised from chiral-1,2-diphelyethylenediamine and chiral-binaphthyldiamine as a chiral source respectively. The extensive discussion will be on different synthetic techniques to achieve enantiopure helicates like [2+2]-close ended helicates, (2+4)-open frame complexes etc. The different physiochemical method used for characterization of the enantiopure helicates like chiroptical properties, detailed NMR analysis, and structural analysis including single crystal X-ray and also by computational Density Functional Theory (DFT) methods. Further, these helicates were successfully demonstrated various asymmetric transformations like nitroaldol reaction, desymmetrization of C2-symmetric meso diols to unsymmetrical monoester, asymmetric oxidative coupling of 2-naphthol to BINOL, and asymmetric Michael addition of 1,3-dicarbonyl compound to produce nitroalkanes. Finally, the helicate catalyst shown to synthesis of chiral drugs in high yield and enantioselectivity will be discussed in details.

Audience Take Away:

- This lecture will provide the information about how to design an enantiopure ligand as well as catalyst.
- The importance of enantiodivergent catalysis for achieving both the enantiomers individually by altering the reaction condition or catalyst.
- To choose a particular homogeneous catalyst as recoverable in other words recyclable for certain reactions.
- Importance of analyzing the structural part of the catalyst including X-ray analysis.
- Simplifying the synthetic procedure for the synthesis of chiral drugs.

Biography:

E. Chinnaraja has expertise in the field of asymmetric catalysis like C-C bond, C-H activation, control of axial chirality and design, multi-step synthesis, the discovery of supramolecular chiral ligands & complexes towards asymmetric synthesis of biologically active compounds. Recently, he has completed Ph.D thesis work at CSIR-Central Salt and Marine Chemicals Research Institute, India. He has presented his work and received two best poster awards. He also a recipient of CSIR-Senior Research Fellowship. His Ph.D thesis has been recognised as GSA-Best Thesis in Science Award & Gold Medal for the year of 2019 in Chemical Sciences by Gujarat Science Academy. He has published 10 papers in international reputed journals.

Raghda Ahmed El-Nagar*[1], C. E. El shafiee[2], M.I. Nessim[3], D.A Ismail[4], R. I. Abdallah[5], Y.M. Moustafa[6]

Egyptian Petroleum Research Institute, Eygpt*[1]

Application of green asymmetric dicationic ionic liquids for oil spill remediation in sea water

Three asymmetric dicationic ionic liquids; 1-(2-(1-dodecyl-2-methyl-1H-imidazol-3- ium-3-yl)ethyl)-4-methylpyridin-1-ium bromide, 1-(6-(1-dodecyl-2-methyl-1H-imidazol-3- ium-3-yl)hexyl)-4-methylpyridin-1-ium bromide and 1-(10-(1-dodecyl-2-methyl-1H- imidazol-3-ium-3-yl) decyl)-4-methylpyridin-1-ium bromide (Ia, Ib &Ic respectively) were synthesized and characterized via Elemental analysis, FT-IR, 1H-NMR, and Thermo- gravimetric analysis (TGA). Their surface activities were studied. The performance of the synthesized ionic liquids as oil spill dispersants were evaluated at different temperatures (10, 30 & 50 oC) and concentrations (750, 1500, 2000, 3000 ppm). Data reveals that the efficiency is ranked as follows: Ib > Ia > Ic with concentration of 1500 ppm.

Audience Take Away:

- How to synthesis new series of environmentally asymmetric dicationic ionic
- liquids.
- How to characterize the synthesized materials and deal with different tools of
- analysis.
- How to evaluate the synthesized materials as oil spill dispersant.

Biography:

Dr. Raghda El-Nagar, researcher in analysis and evaluation department in Egyptian Petroleum Research Institute (EPRI). I graduated from faculty of science Zagazig university, chemistry and biochemistry department (very good degree) and was completing my PHD in Ain Shams University, chemistry department which finished in October 2018 under title "Preparation of Different Types of Oil as Potential Base Stock for Production of Synthetic Lubricants." My researches focus on synthesis different materials and confirmation the structures by several tools of analysis (FT-IR, 1H-NMR, Elemental analysis & TGA), also applied them in different fields of applications.

Ichiro Imae
Hiroshima University, Japan

Donor-acceptor-type Polymers Having Oligothiophenes with Well-defined Structures

Donor–acceptor alternating conjugated polymers (D-A polymers) composed of electron-rich (donor) and electron-poor (acceptor) units have attracted a great deal of attention as one of the most successful low-bandgap polymers. The origin of the low bandgap is usually explained by the occurrence of a charge transfer band through an intramolecular charge transfer from the donor to the acceptor. Owing to the nature of the low bandgap, D-A polymers can span the optical absorption spectrum across the visible and near-infrared regions, so they can be widely applied to optoelectronic materials used in electrochromic windows, optical filters and lasers, biosensors, photothermal therapy, and organic photovoltaics (OPVs). Although many efforts to control the optoelectrical properties of D-A polymers have been made by changing the chemical structures of donor and acceptor units, the systematical fine-tuning of these properties has not been well investigated.

In this presentation, novel donor-acceptor (D-A) type polymers containing oligothiophenes with well-defined structures in the donor unit were developed. The optical and electrochemical properties of D-A polymers were investigated in relation to the conjugation chain length of the oligothiophene moieties and the type and number of substituents introduced into the oligothiophenes. We fond that the optical absorption bands of polymers showed red-shift by the introduction of electron-donating alkoxy substituents. On the other hand, the introduction of electron-withdrawing ester groups caused the negative shift of both HOMO and LUMO energies. The chain length of oligothiophene units also affected the optical properties. When the chain length changed from 5 to 7 units, the π-π^* transition bands showed red-shift, while the ICT bands showed blue-shift.

Audience Take Away:

- The audience can learn the effect of precise control the conjugated compounds.
- Also, they can learn the importance of the controlled structure of conjugated compounds for the application to organic optoelectronic devices.
- Finally, they can learn the concept of molecular design for the optoelectronic materials.

Biography:

Dr. Ichiro Imae received the Bachelor, Master and Doctor degrees (Engineering) from Osaka University in 1992, 1994, and 1997. Then, he joined with Japan Advanced Institute of Science and Technology (JAIST) as an Assistant Professor. Since 2006, he is an Associate Professor of Hiroshima University. Also, he worked as an Adjunct Lecturer of Muroran Institute of Technology and a Visiting Professor of Huazhong University of Science and Technology in 2018.

POSTERS

DAY 1

SESSIONS ON:
CHEMISTRY

MATERIALS SCIENCE VIRTUAL 2020

SEPTEMBER 21-22
2020

Lydia Bondareva*
Federal Scientific Centre of Hygiene, Russia

The hyperaccumulating and remediating potential of some plant species

This abstract presents the results of investigations into the ability of some hydrobionts of the Yenisei River to hyperaccumulate radinuclides and metals in contaminated water near zone influence of the Mining-and Chemical Combine of the State Corporation RosAtom. The plants were cultivated in containment bins which were irrigated using water collected from the mine settling ponds containing elevated levels of 241Am, isotopes of Pu and 3H and some metals. Water from an un-impacted creek near the mine site was used for the control bins. The bioconcentration factor (BCF), biological accumulation coefficient (BAC) and biological transfer coefficient (BTC) data obtained suggested the plants could be used for phytostabilization and phytoextraction.

The results of the research of kinetics and equilibria of heavy metals and sorption and desorption conditions were presented in order to repeatedly use the biomass, as well as the research on the influence of abiotic factors on sorption processes. However, the properties identified are different for each aquatic plant species and for the pollutant species. Additional studies including the use of chelating agents such as EDTA which have been shown to increase metal translocation into plant tissue thereby improving overall phytoextraction would be beneficial to areas in Yenisei River with short growing season. The results presented herein and carried out in many countries demonstrate that macrophytes can be successfully used in the biomonitoring of water environments and phytoremediation of waters and sewage; however, validation of these procedures requires more detailed research of the mechanisms, which accompany them.

Biography:

Lydia Bondareva. PhD in Chemistry, Association Professor.
Research Area: Environmental Safety (food and feed, water, soil. air), analytical identification of contamination, biological monitoring.
Number of Published papers: 178, books: 3.

Irmina Wojciechowska*[1], Kinga Filipowiak, Karolina Wieszczycka[3]
[1]Poznan University of Technology, Poland

Synthesis of vinylbenzyl bromide/divinylbenzene copolymer by post-polymerization functionalisation

Functional polymers have attracted attention in recent years due to their wide application and unique properties. The synthesis of such polymers may be influenced by several factors, such as the polymerization process, polymer composition and functionalization [1]. The functionalized polymer contains specific chemical groups that provide tailor-made and novel properties and offer advantages in many applications, especially in water purification processes. The presence of numerous chemical groups in functional polymers can improve their reactivity, stability and solubility. An extremely convenient carrier for modification is cross-linked chloromethylated polystyrene, obtained either by chloromethylation the St/DVB copolymer or by copolymerizing vinylbenzyl chloride and divinylbenzene (VBC/DVB). Much interest is devoted to the chloromethylation than other halomethylations, even though the incorporated chloromethyl group is less chemically reactive than iodo- and bromomethyl groups. Easily leaving the chlorine atom of the chloromethyl group in reaction with nucleophiles, such as amines or nitriles, enables convenient modification of the matrix [2]. Difficulties arise when the presence of bromomethyl group is necessary to synthesis of the final compound, then only a narrow group of reactions allows for such modification.

The methods mainly rely on an initial Friedel-Crafts alkylation of the aromatic polymer with bromomethyl methyl ether or paraformaldehyde with hydrogen bromide in the presence of ZnBr2, SnCl4, SnBr4 or AlBr3, by cleaving methanosulfonate with LiBr in the presence of 18-crown-6, or by an ion-exchange reaction using NaBr, DMF and CH2Br2 [3]. In this work, the goal is to study novel efficient method to synthesis copolymer of vinylbenzyl bromide and divinylbenzene (VBBr/DVB). For this purpose, the VBC/DVB copolymer was first polymerized by suspension polymerization methodology. The obtained copolymer was then subjected to Cl/Br ion-exchange reaction with lithium bromide in two-phase system. The effect of time, temperature, presence of selected phase-transfer catalyst, as well as water on ion-exchange efficiency was investigated. The reaction was monitored by FT-IR, Raman and NMR techniques. Thanks to this work, it was proved that post-polymerization functionalization is an easy approach to obtaining the bromomethylated copolymers. The obtained polymer materials can serve as templates for the production of new functional materials with the desired physical and chemical properties.

Biography:

M.Sc. Irmina Wojciechowska studied biological chemistry at the University of Adam Mickiewicz in Poznań (Poland) and obtained a master's degree in 2013. Then she joined the research group of D. Sc. Karolina Wieszczycka at the Institute of Technology and Chemical Engineering at the Department of Organic Chemistry of the Poznań University of Technology. She obtained the degree of engineer at the same university in 2014. Currently, she is a PhD student at the Faculty of Chemical Technology of the Poznań University of Technology. She is a co-author of 20 scientific articles with a total IF = 65.804.

KEYNOTE FORUM

DAY 2

SESSIONS ON:
MATERIALS SCIENCE

MATERIALS SCIENCE VIRTUAL 2020

SEPTEMBER 21-22
2020

Dave White

Climate Change Truth Inc, USA

Discovery: Reduction in photosynthesis correlation to carbon dioxide increase

Carbon dioxide emissions correlate to 363 ppm and are not the cause of the Atmospheric CO2 rise since 1957. The correct cause is deforestation of the Amazon Rain-Forest (0.99 by Pearson's regression). Since 1950, the Amazon Rain forest has been deforested. An average of 12 million hectare per year. This deforestation causes a minimum of 30% of the biomass burned. The burning of the biomass is adding billion of tons of carbon dioxide to the atmosphere. The carbon dioxide has overwhelmed the rain forest and caused massive decay. The rain forest has now become and oxygen sink and carbon dioxide producer. Now emitting 10 billion tons of CO2 annually. Also losing its ability to produce oxygen. To solve these issues the deforestation and burning needs to stop. Then after 10 years, the burning can continue 10% a year for 10 years. This will heal the amazon and bring down atmospheric carbon dioxide quickly by increasing photosynthesis consumption to 100 billion tons annually. Stop non- sustainable deforestation like the Indian and Amazon rain forests. Please native trees and shrubs all over the world. The residence time of atmospheric CO2 is 150 years. This is why there exists no signature to any recession or other lowering of CO2 emissions.

Significance Statement: Atmospheric CO2 has two possible issues. CO2 emissions are one. We have worked on that and have been flat at 36 billion tons annually since 2014. However the atmospheric CO2 concentration and residence time are still increasing. The atmospheric tank model is just like a kitchen sink. When the water rises and stays in longer, we know we have a plugged drain. That drain is photosynthesis.

Conclusion: We can never bring down Atmospheric carbon dioxide by working on emissions alone. We need to put even more effort into increased photosynthesis. This will reduce atmospheric carbon dioxide to 330 ppm by year 2031 to 2040.

Biography

Dave Is a Chemical Engineer with Masters studies in Statistics, currently working on Climate Change. He has 30 years' experience since graduation in 1984. Promoting responsibility to environment and health of all species. Dave White graduated in Chemical Engineering in 1984. During the time at Oregon State University Dave worked on a cross flow counter current scrubber for coal fired power plants. Additionally took masters level classes on statistics. Then he moved to Hillsboro with his wife and worked in Semiconductors. In 2007 Dave along with Dr. Tom Wallow produced a paper on ArF double patterning for semiconductors. This multi-pattering scheme is widely used in today's semiconductor manufacturing plants. In 2011 Dave started a consulting business for Semiconductors. In 2017 Dave Started Climate Change Truth Research Inc. Dave is seeking the truth about climate change. His research interests are evaporation from the ocean, rain forest destruction effects and diffusion of CO2 through the atmosphere.

magnus
Group

SPEAKERS DAY 2

SESSIONS ON:
MATERIALS SCIENCE

MATERIALS SCIENCE VIRTUAL 2020

SEPTEMBER 21-22
2020

Albulescu Radu
National Institute for Chemical-Pharmaceutical, Romania

Biocompatibility evaluation of biomedical materials

The topic to be discussed is the application of testing method in biomaterial testing, including both several case studies that were carried out in our organization, as well as a general discussion of similar studies presented in the literature. The subjects to be debated will be

1. In vitro studies on biocompatibility using the EpiDerm model for assessment of different nanostructured materials aiming for the dermal applications – such as Poly-urethane-polyvinyl-alcohol films, nano-cellulose thin films, colloidal silver, .
2. In vitro evaluation of collagen composites for in vivo applications (bone and cartilage reconstruction) – based on testing of cell cultures (on 3T3 cells), using MTT and LDL assays for viability, and also using xCelligence technology (real time measurement of electrical impedance of 3T3 cells) exposed to collagen based composites intended for tissue reconstruction (mainly, for connective tissue). These materials, as well as nanocomposites based on PLCA nanoparticles, PLCA-phosphatidylcholine nanoparticles, Si-Diamond Coated Silica Wafers, Hydroxyapatite-coated-Ti, were tested in different cellular environments, and using cancer cells vs. normal ones (like CaCo2 cells vs. normal colonic mucosal cells, U87 cells vs. normal astrocytes, Jurkat vs. normal T lymphocytes), or on other cell lines (like L929 and 3T3).
3. As expected, the experimental findings revealed some biomaterials to be well tolerated, for instance using the EpiDerm model, while some were demonstrated to have relevant toxicity.
4. Using the monolayer models of cells, we could characterize and establish toxicity hierarchies, and also rule out if some of the materials proposed for studies had particular effects (like antitumoral activity) when applied on dual system (tumoral vs. normal)
5. The analysis of literature revealed a solid group of scientists involved in similar research activities, and we are producing also a brief presentation of their results as well, with an outline for the groups desiplayng similar areas of research.
6. The investigations presented here were supported by research grants PCCDI 62/2018, PCCDI 1/2018 and PN 19-41 05 01/2018.

Audience Take Away:

- Part of the audience will find out methods and results to be applied in the examination of biomaterials, especially of those for medical uses. Hopefully, the audience will be composed both of groups performing similar assays, as well as of groups involved in preparation of such materials.
- Again, we have groups conducting testing, and we have groups involved in preparation of nanomaterials for medical applications. This research can be primarily used in expanding the research area, and most of the life science universities and institutes have laboratories involved in such researches.
- As long as one group can define critical issues (such as cytotoxicity, carcinogenicity, reduced biocompatibility), it can help the partners reanalyze the technological approach and redesign safer products.

Biography:

Dr. Radu Albulescu studied Biochemistry in University of Bucharest in 1979; he obtained a PhD degree in 1999 at the same institution. His career included 9 years of Pharmaceutical Industry, and since 1988 he is in the National Research Institute for Chemical Pharmaceutical R&D. She holds the position of Head of Department here, and also he is Head of the Scientific Advisory Board in the organization. He published so far 114 papers in journals present on SCI(E). He also holds a teaching position at "Titu Maiorescu" University, School of Medicine, chair of Histology.

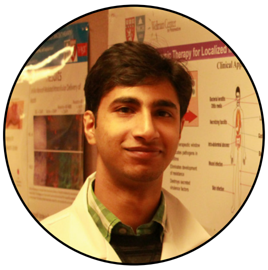
Seongwoo Woo
Addis Ababa Science & Technology University, Ethiopia

Reliability Design of Mechanical Systems Subject to Repetitive Stresses

The basic reliability concepts - parametric ALT plan, failure mechanism and design, acceleration factor, and sample size equation were used in the development of a parametric accelerated life testing method to assess the reliability quantitative test specifications (RQ) of mechanical systems subjected to repetitive stresses. To calculate the acceleration factor of the mechanical system, a generalized life-stress failure model with a new effort concept was derived and recommended. The new sample size equation with the acceleration factor also enabled the parametric ALT to quickly evaluate the expected lifetime. This new parametric ALT should help an engineer uncover the design parameters affecting reliability during the design process of the mechanical system. Consequently, it should help companies improve product reliability and avoid recalls due to the product failures in the field. As the improper design parameters in the design phase are experimentally identified by this new reliability design method, the mechanical system should improve in reliability as measured by the increase in lifetime, LB, and the reduction in failure rate,λ.

Biography:

Dr Woo has a BS and MS in Mechanical Engineering, and he has obtained PhD in Mechanical Engineering from Texas A&M. He major in energy system such as HVAC and its heat transfer, optimal design and control of refrigerator, reliability design of thermal components, and failure Analysis of thermal components in marketplace using the Non-destructive such as SEM & XRAY. In 1992.03–1997 he worked in Agency for Defense Development, Chinhae, South Korea, where he has researcher in charge of Development of Naval weapon System. He was working as a Senior Reliability Engineer in Refrigerator Division, Digital Appliance, SAMSUNG Electronics.



Rakkiyappan Chandran
Supreme Corporation, USA

Bio-mimetic Multimodal Nanostructured Surfaces Fabricated with Self-Assembling Biopolymer and its Applications

Composite surface topographies control and determine the properties of insect cuticles. In some cases, these nanostructured materials are a direct extension of chitin-based cuticles. The cellular mechanisms that generate these structures are unknown and involve complex cellular and biochemical "bottom-up" processes. A synthetic "top-down" fabrication nanosphere lithography techniques can generates surfaces of chitin or chitosan that mimic the native nanostructures surface of certain insect wings and eyes. Biopolymer chitin and chitosan are flexible, biocompatible and abundant in nature. The fabrication of nanostructured chitin and chitosan materials could enable the development of new properties in biopolymeric materials. Also, the ability to generate a self-masking thin film and leads to synthesis and formation of metallic nanoparticles, enables a novel and powerful new tool for generating structured composite biomaterials. These crystalline metallic nanoparticles then served as seeds for the solid-state formation of nanowires within a drop-cast thin film by providing a flexible biopolymeric/metallic nanocomposite material. This information provides insight into the mechanisms that are essential for in vitro nanoscale manipulation of polymer in hydrogels and other synthetic biomaterials. The biomimetic nanostructured surfaces (NSS) formed through biopolymer scaffolds have potential applications for various defense and biomedical technologies.

Audience Take Away:

- The topic will cover the area of polymer material and its composites with the understanding of natures nano structures and its topographies.
- The topic will cover on how to biomimetic the natures nanostructures using latest nanotechniques like colloidal lithography.
- The topic will cover the bio mineralization of polymer materials for various applications.
- The topic will cover an easy route of synthesis of nanoparticles using polymer materials
- This will help the audience to know that we can mimic the nanostructures surfaces that is present in the nature and how the polymer material plays a vital role in various structural organization and its applications.
- This method of fabrication will provides insight into the mechanisms that are essential for in vitro nanoscale manipulation of polymer materials in various formulation like hydrogels, thin films, synthesis of nanoparticles etc. The biomimetic nanostructured surfaces (NSS) formed through biopolymer scaffolds have potential applications for various defense and biomedical technologies.

Biography:

Rakkiyappan Chandran, a skilled polymer and formulation chemist with 7+ years of experience and specialized training from Harvard-MIT research laboratories in polymeric biomaterials science and encapsulation formulation. He is currently working as a Research and Development Scientist focusing on next generation smart and sustainable textile innovations at Supreme Corporation, USA.

He completed his doctoral degree from the Joint School of Nanoscience and Nanoengineering (JSNN) at the University of North Carolina, Greensboro.

He has authored 25+ publications in peer-reviewed journals with 1000+ citations in the areas of nanobiopolymers, photomedicine, material properties characterization of polymers and nanoparticle synthesis.

Afshin Abrishamkar
PSL Research University, Paris, France

How can microfluidics help material scientists in the field of Advance Materials?

Majority of investigations on crystalline materials, as an appealing category of advanced materials, study their self-assembly process under equilibrium conditions, where only the thermodynamically stable species can be obtained. This limitation not only hampers the proper understanding of the process, but it is a drawback for the effective formation of materials with desired properties. Microfluidic technologies are capable of tackling this limitation through providing superior control over chemical mixing and fluidic conditions as well as offering unique physical phenomena such as laminar flow condition. For instance, a continuous flow microfluidic platform can be designed to favor the desired chemical reaction. Such a platform will be capable of obtaining out-of- equilibrium crystal structures, which are not attainable through conventional synthesis approaches currently used for synthesis of materials. Employing this platform, crystalline structures of a coordination polymer that are unachievable through conventional approaches can be achieved. In such a system, altering parameters such as input flow rates, the self- assembly process and reaction conditions can be fine-tuned, and thus, advanced materials with desired properties, e.g. morphology, can be obtained.

Subsequently, controlling the reaction-diffusion area and concentration gradient of the reagents, and hence, the kinetics of the reaction, allows performing controlled synthesis of a spin crossover (SCO) material. These materials possess suitable chemical and physical properties that bring promises for their use in different applications, notably as sensors or molecular switches. While these materials can be synthesized using different methods, only microfluidic- based approach can enable synthesis of these materials at ambient condition with superior control over the properties of the final products with critical switching point near room temperature (unlike other reported similar materials where switching happens at elevated temperature, resulting in limiting their applications). Moreover, preparation of a SCO using a microfluidic platform under controlled synthetic conditions may reveal the interesting unprecedented growing pathways, which cannot be explored using conventional methods. Furthermore, crystalline materials are typically insoluble and unprocessable powders, which pose issues in their handling and application. To overcome this drawback, a microfluidic-based method may be employed to produce processable fibers of crystalline materials. Surprisingly, this approach also allows the controlled deposition and conformal printing of the produced fibers on various surfaces, enabling the application of these materials in advanced patterning technologies.

In summary, microfluidic approaches give rise to useful and promising platforms for controlled synthesis, in-depth study, and enhanced processing of materials. These features are not attainable through conventional methods currently used for chemical synthesis.

Audience Take Away:

- What microfluidics is and how microfluidic devices are fabricated.
- How a microfluidic platform can enable isolation of non-equilibrium structures of advanced materials.
- How microfluidic-based approaches unveil the unprecedented growth of crystalline materials.
- How does microfluidics facilitate fabrication of continuous fibers of functional porous materials, which are conventionally unprocessable powders

Biography:

Dr. Afshin Abrishamkar, is a Postdoctoral Fellow at PSL Research University, France. He earned his Ph.D. in Chemical Engineering from ETH Zurich, Switzerland. Prior to his Ph.D., in 2014 he obtained his M.Sc., with distinction, in Chemical and Process Engineering from Lappeenranta University of Technology (LUT), Finland. During his master studies, he moved to ETH Zurich conducting his master's thesis after being awarded of "LUT research fellowship". Prior to that, he received his B.Sc. in Chemical Engineering from Isfahan University of Technology (IUT), Iran in 2011, during which he spent an exchange period working on biodiesel production at CEFET-MG, Brazil.

SPEAKERS DAY 2

SESSIONS ON:

PHARMA

MATERIALS SCIENCE VIRTUAL 2020

SEPTEMBER 21-22
2020

Qingcheng Mao
Department of Pharmaceutics, School of Pharmacy, University of Washington, Seattle, Washington, United States

Key Drug Disposition Genes And Hepatic Metabolic Pathways are altered in germ-free mice during pregnancy

The microbiome and pregnancy are known to alter drug disposition and host metabolism of endogenous substances, yet the interplay of the two physiological factors on the expression and/or activity of drug metabolizing enzymes and transporters (DMETs) as well as host hepatic metabolic processes is unknown. This study investigated the effects of microbiome on host hepatic DMETs and metabolic processes in mice during pregnancy by comparing four groups of conventional (CV) and germ-free (GF) female mice and pregnancy status, namely CV non-pregnant (CVNP), GF non-pregnant (GFNP), CV pregnant (CVP), and GF pregnant (GFP) mice. Transcriptomic and targeted proteomics of hepatic DMETs and metabolic pathways were profiled and untargeted LC-MS/MS metabolomics of the maternal plasma was performed to assess the effects of pregnancy and the gut microbiome on hepatic transcriptome and untargeted plasma metabolome to describe changes in hepatic DMETs and hepatic metabolic processes as a result of both pregnancy and the lack of microbiome. CYP3A activities were measured by mouse liver microsomal incubations. The trend of pregnancy-induced changes in the expression or activity of hepatic DMETs in CV and GF mice was similar; however, the magnitude of change was noticeably different. For certain DMETs, pregnancy status had paradoxical effects on mRNA and protein expression in both CV and GF mice. For instance, the mRNA levels of Cyp3a11, the murine homolog of human CYP3A4, were decreased by 1.7-fold and 3.3-fold by pregnancy in CV and GF mice, respectively; however, the protein levels of CYP3A11 were increased similarly ~2-fold by pregnancy in both CV and GF mice. Microsome incubations revealed a marked induction of CYP3A activity by pregnancy that was 10 times greater in CV mice than that in GF mice. By integrating transcriptomics and metabolomics data, we identified 8 metabolic pathways that were significantly altered for differentially expressed genes associated with pregnancy in both CV and GF mice, four of which were further modulated in GF mice. The four pathways were retinol metabolism, arachidonic acid metabolism, linoleic acid metabolism, and steroid hormone biosynthesis, which are all critical for maternal health and fetal development. Notably, these four pathways were not affected by the germ-free status at all in non-pregnant mice, indicating that the alterations caused by the lack of microbiome are unique for pregnancy. This is the first study to show that the microbiome can modulate the expression and/or activity of hepatic DMETs as well as host metabolic processes critical for maternal health and fetal development during pregnancy.

Audience Take Away :

- We demonstrated, for the first time, that the microbiome and pregnancy can interplay to alter the expression and/or activity of hepatic drug metabolizing enzymes and transporters as well as overall hepatic metabolic processes
- This provides new information regarding the role of the gut microbiome in modulating drug disposition. Given the vast inter-individual variability of the gut microbiome, this study suggests that the gut microbiome may represent a new source of inter-individual variability in drug PK, efficacy and toxicity in pregnant women
- This study also suggests that the gut microbiome may play an important role in determining maternal health and fetal development during pregnancy by modulating key metabolic processes critical for maternal and fetal health

Biography:

Dr. Mao obtained his PhD degree from the University of Bern in Switzerland in 1995. He is currently an Associate Professor in the Department of Pharmaceutics at the University of Washington in Seattle, Washington. His primary research interests center on understanding how drug disposition, including fetal drug exposure, is altered during pregnancy by changing the expression and activity of drug disposition genes. He serves on the editorial boards of "Drug Metabolism and Disposition" and "Pharmaceutics". He has published more than 70 peer-reviewed research and review articles.

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The role of indocyanine green with near infrared imaging in the detection of sentinel lymph node in gynaecological cancers

Shigellosis is a public health threat in developed as well as developing countries like "India". While antibiotic therapy is the mainstay of treatment for shigellosis, current emergence of multidrug-resistant strains of Shigella spp. has posed the problem more challenging. Lytic bacteriophages which destroy antibiotic resistant Shigella spp. have great potential in this context and hence their identification and detailed characterization is necessary. In this study we presented the isolation and a detailed characterization of novel bacteriophage Sfin-1, Sfin- 2 and Sfin-3 which show potent lytic activity against multidrug-resistant isolates of Shigella flexneri, Shigella dysenteriae, Shigella sonnei obtained from shigellosis patients. They are also active against different strains of Escherichia coli. The purified phages are lytic in nature, exhibited absorption within 5-10 min, a latent period of 5-50 min and burst size of ~28 to ~908 PFU/cell. The isolated phages show stability in a broad pH range and survive an hour at 50 °C. Genome sequencing and phylogenetic analyses showed that Sfin-1, Sfin-2 and Sfin-3 are novel bacteriophages. The Sfin-1 genome is very closely related to T1-like phages (89.59% identity with Escherichia virus T1). In silico analysis indicates that Sfin-1 genome consists of double stranded linear DNA of 50,403 bp (GC content of 45.2%) encoding 82 potential CDSs, several potential promoters and transcriptional terminators (1). In case of Sfin-2, the genome size is 50,390 bp (GC content of 45.2%, 84 CDSs) and for Sfin-3, it is 50,309 bp (GC content of 45.4%, 85 CDSs). Under electron microscopy, Sfin-1 shows morphology characteristics of the family Siphoviridae with an isometric head (61 nm) and a non-contractile tail (155 nm). This study has identified lytic bacteriophages that are active against three of the most virulent multidrug-resistant Shigella species and therefore might have a potential role in phage therapy of patients infected with these pathogens.

Audience Take Away :

- Role of bacteriophage in antimicrobial resistance
- Characteristics of broad spectrum lytic shigella phages
- Genome comparison and relationship among closely related phages

Biography:

Dr. Nabanita Giri, is currently in the post graduate department of Microbiology, Acharya Prafulla Chandra College, Kolkata, India as an assistant professor. She started her journey from Bose Institute, Kolkata, India as a researcher in Life Science with her seminal work on Tuberculosis and Mycobacteriophages. Now as an environmental microbiologist, she is working on enteric diseases, antimicrobial resistance, phage genomics and phage therapy. Recently she has reported the first lytic shigella phage from India in popular journal "Frontiers in Microbiology". She has received many grants and awards till date.

C. SumathiJones
Asan Memorial Dental College and Hospital, Chengalpattu, India

Novel Nanonutraceutical formulations and its role in health as biomedicine

Nanotechnology is an emerging field with wide therapeutic potential in prophylaxis, diagnosis, and therapy of diseases. Nutraceuticals, the nutritional formulations with antioxidant, anti-inflammatory, anticancer, and antimicrobial activity can be administered in nanoforms as medicine and utilized in pharmacotherapy. Treatment with conventional drugs produces major toxicities moreover resistance develops gradually. Hence, ongoing research is to utilize natural products for boosting the host immunity, reduce the concentration of drugs so as to minimize the adverse effect. Nanotechnologically synthesized drugs reach the target efficiently and minimize the untoward side effects. Consequently, nowadays, Nanomedicines are used for imaging, eradication of microbial pathogens, cancer. And in dentistry Nutraceuticals in different formulations are actively involved in modulating the host immune defense mechanism. A combination of nutraceuticals and nanotechnology to synthesize nanonutraceutical will have dual benefits as a result of synergism. Classification of the nutraceutical based on source and chemistry, pharmacodynamics, nanonutraceutical formulations, biomedical application. future prospective of nanonutraceutical research will be presented in detail.

Audience Take Away :

- Nanotechnology, Nanomedicine, nutraceuticals- forms, mechanism of action and uses, existing nanonutraceutical formulations, possible research work in Nanonutraceuticals
- Audience: Pharma professionals, physicians, health care professionals, dental students, researchers
- Useful in gaining in-depth knowledge in nanotechnology and nutraceuticals which will aid them in teaching and research. Researchers can carry out research in this new area

Biography:

Dr. SumathiJones is academician cum researcher. She has completed her research in CSIR-Central Leather Research Institute. Her research work involves isolation of novel Probiotic bacteria Pontibacter sps, extraction its secondary metabolites and enzymes and evaluation of its industrial and biomedical applications. She has published more than 25 research papers in international journal and has a patent to her credit. She has been teaching pharmacology for 25 years, in reputed institutes and universities. She has been awarded as best teacher, scientific excellence Sr, teaching excellence Sr, HoD of the year 2019, distinguished researcher of the year and for contribution towards education community. She is well renowned Pharmacologist and toxicologist and a researcher in the field of probiotics and secondary metabolites biomedical applications She is Professor and Head, Department of Pharmacology, Asan Memorial Dental College and Hospital and a Guest Faculty in the Department of Pharmacology and Environmental Toxicology, University of Madras.

Tapashi Ghosh Roy[1*], Saroj Kanti Singh Hazari[2], Benu Kumar Dey[1], Debashis Palit[1], Lucky Dey[1] and Saswata Rabi[1]

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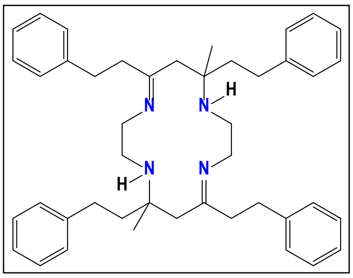
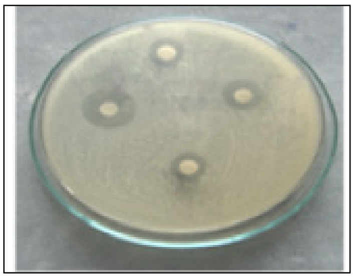
Syntheses, Characterization and Antimicrobial investigation on some new metal complexes of an aryl substituted multiazamacrocyclic chelator

The chemistry of macrocyclic compounds like Vitamin B12, hemoglobin, chlorophyll etc. has been a fascinating area of current research interest to the chemists all over the world. These compounds are also important for their uses in pharmacological, industrial and analytical field, above all, research on these complexes as antitumor and anticancer drugs have got top priority. Aza-type macrocyclic chelators appear very promising for potential use as antifertile, antibacterial and antifungal agents as well as biologically important components. Moreover recently these chelators are being used in application for neuclear waste decontamination. Thus in the present context, synthesis, characterization, antifungal and antibacterial activities of metal complexes of a new macrocyclic chelator (L) have been reported. Condensation of the ethelenediamine with benzyl acetone in presence of quantitative amount of perchloric acid produced a new methyl and ethylphenyl substituted macrocyclic chelator Me2(C6H5-CH2-CH2-)4[14]diene.2HClO4 which on extraction with CHCl3 at pH above 12 yielded free diene chelator Me2(C6H5-CH2-CH2-)4[14]diene. The diene chelator in its free state as well as in diperchlorate form undergoes facile complexation with copper(II), nickel(II) and cobalt(III) to furnish corresponding metal complexes. All these chelators and complexes have been characterized on the basis of different modern spectroscopic and analytical techniques. The antimicrobial activities of these chelators and complexes have been tested against bacteria and fungi. Antibacterial activities of synthesized compounds have been investigated against four gram positive and five gram negative bacteria. However antifungal activity of the same compounds has been tested against five fungi. The growth inhibiting activity of the chelators and complexes against bacteria and fungi were compared with the standard antibiotic Ampicillin and commercially important antifungal agent, Griseofulvin respectively. Among them some of these macrocyclic complexes were found to be more fungitoxic and antibacterial compared to standard antibacterial and antifungal agents as well to alkyl substituted macrocyclic complexes.

Audience Take Away :



Chelator L



Antibacterial disc

Antifungal disc

- Synthesis of concerned types of biologically active macrocyclic chelators and their complexes
- Characterizatiom of new compounds by modern analytical techniques
- Antimicrobial activities of concerned and related compounds
- Application in radioactive waste decontaminat

Biography:

Dr. Roy did her BSc Honors and MSc in Chemistry from the University of Chittagong, Bangladesh. She completed her PhD from the Indian Institute of Technology (IIT), Roorkee, India and post-doctoral fellowships from USA, Germany, Japan, Korea and Argentina. She obtained the position of Professor in the Department of Chemistry at the University of Chittagong, Bangladesh in 2005. She has published 75 articles in peer reviewed journals. Dr. Roy has been supervising M.S., MPhil and PhD students since 1994. She is also working as editorial board member and reviewer of many reputed journals.

Noha Eldeab Mohammed
King Abdulaziz University School of Medicine, Jeddah, KSA

Effect of Diclofenac on Doxorubicin-Induced apoptosis in breast cancer

Breast cancer is the most common disease in women worldwide. Studies in Saudi Arabia recorded significant increase in breast cancer incidence and occur earlier than Western countries. Doxorubicin (DOX) is a type of chemotherapeutic drug known as anthracycline and is highly effective in advanced breast cancer in the 1970s. Unfortunately, the cytotoxic effects of DOX affect normal and secondary effects of cancer cells. Scientists find a reusable medication as a solution to the production of medicines to mitigate the adverse effects of the chemical therapy. Diclofenac (DICLO) is an anti-inflammatory non-steroidal drug used to treat inflammation and pain. Studies proof of the effect of DICLO treatment on anticancer. Therefore, the aim of the present study was to study the effect of DICLO co treatment with DOX on MCF-7 breast cancer cell line and investigate the possible mechanism by studying apoptosis, cell cycle phase distribution, cellular uptake and p-glycoprotein inhibition in breast cancer cells to overcome the side effects and multidrug resistance of Doxorubicin treatment.

Materials and methods: In order to assess these effects, we have investigated the DOX effect on cytotoxicity, cellular absorption, p-glycoprotein function, apoptosis induction and cell cycle phase distribution when DICLO is present with different concentrations.

Results: The addition of diclofenac (10 and 100 µg / ml) increased the effectiveness of doxorubicin as it led to a significant decrease in IC50 by 16.4% and 86.55% compared to the cells treated with doxorubicin only. Cell cycle analysis showed that diclofenac(100µg / ml) significantly increased the percentage of programmed cell death from doxorubicin (0.25 µg / ml) 3.5% to 10.9% in addition to that significantly increased programmed cell death when adding diclofenac to doxorubicin to 40.2% compared to 15.6% doxorubicin.A programmed cell death test showed that combined treatment of diclofenac with doxorubicin (0.25 and 1) resulted in a significant increase in the rate of early programmed cell death to more than 12 times, 3 times greater than doxorubicin. Diclofenac increased the cellular absorption of doxorubicin significantly by 44% compared to doxorubicin alone (5 µg/ ml) and 63% from doxorubicin alone (10 µg/ ml). This is mediated by known p-glycoprotein inhibition.

Conclusion: In conclusion, diclofenac exhibits significant antitumor properties in the model of breast cancer that may lead to further advancement of treatment. Diclofenac's ability to induce apoptosis, enhance DOX cellular absorption and inhibit P-glycoprotein production. As an adjuvant to traditional therapies, DICLO has different potential benefits to reduce the adverse effects of many conventional therapies.

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