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6th World Conference on

ADVANCED MATERIALS, NANOSCIENCE AND NANOTECHNOLOGY

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6th World Conference on

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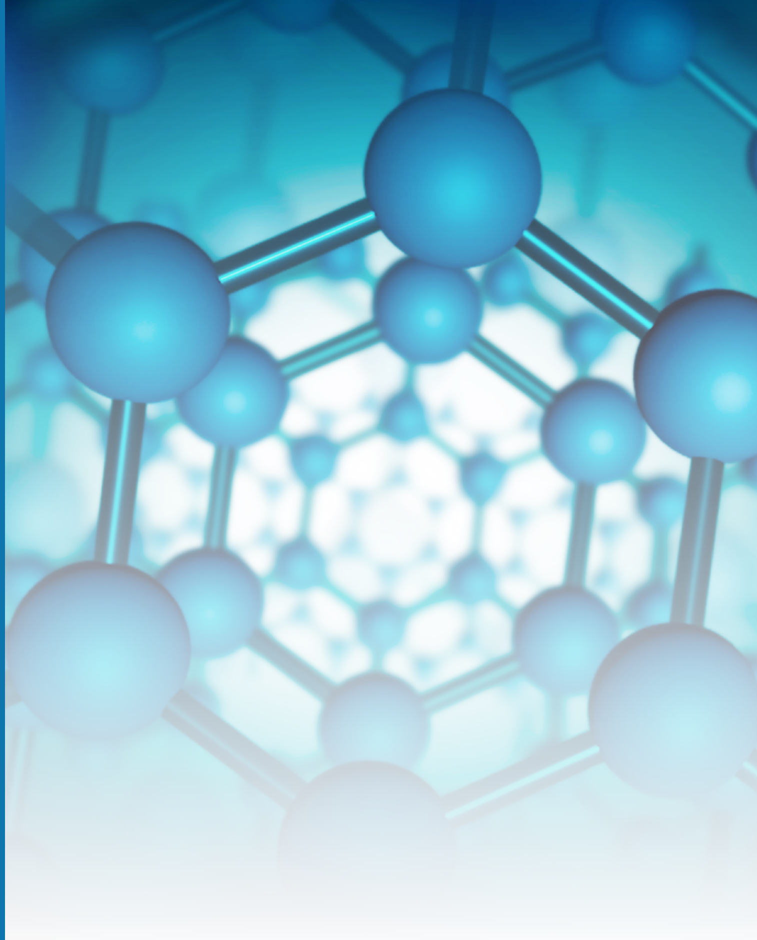

Book of Abstracts

OCTOBER 21, 2024
AMSTERDAM, NETHERLANDS

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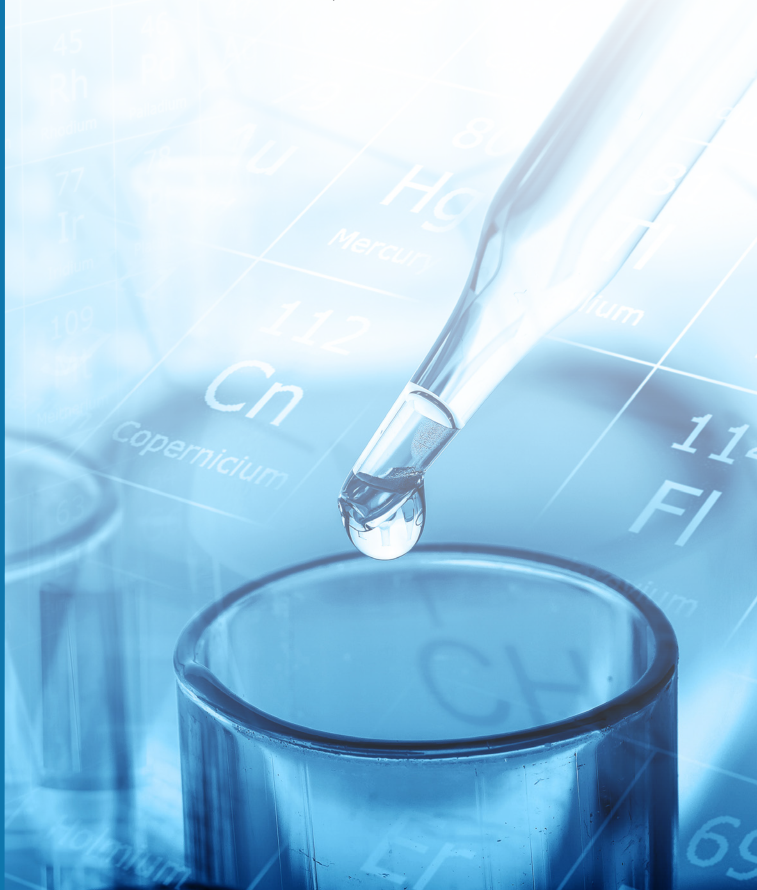

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6th World Conference on

CHEMISTRY AND CHEMICAL ENGINEERING

October 21, 2024 | Amsterdam, Netherlands

BOOK OF ABSTRACTS

Abstracts of the 6th World Conference on Advanced Materials, Nanoscience and Nanotechnology and 6th World Conference on Chemistry and Chemical Engineering

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ABOUT EURASIA CONFERENCES

Established in 2022, Eurasia Conferences has rapidly gained recognition for organizing high-quality conferences across a diverse range of fields including science, technology, social sciences, humanities, business and economics, life sciences, medicine, and healthcare. Our mission is to drive progress and innovation through dialogue and collaboration among professionals worldwide.

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SCIENTIFIC PROGRAM

09:20-90:30 @

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OCTOBER 21, 2024

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10:00-10:30	**Title: Nanocellulose as an Additive in the Pulp and Paper Industry** **Dr. R.A. Ilyas,** Faculty of Chemical and Energy Engineering, Universiti Teknologi Malaysia, 81310 UTM Skudai, Johor, Malaysia

Speaker Sessions

10:30-10:50	**Title: Optimizing the Average Distance Between a Blue Light Photosensitizer and a Harmonic Nanoparticle for Effective Infrared Photodynamic Therapy** **Refael Minnes,** Faculty of Natural Sciences, Department of Physics, Ariel University, Ariel, Israel
10:50-11:10	**Title: Revisiting the Influence of Metal Impurities and Structural Defects on the Intrinsic Paramagnetism of Graphene Oxide (Go).** **Giulia Fioravanti,** Department of Physical and Chemical Sciences, University of L'Aquila, L'Aquila, Italy

Tea and Refreshments Break 11:10-11:30

11:30-11:50	**Title: Significant Performance Enhancement of Triplet-Triplet Annihilation Upconversion Systems Based on Strong Light-Matter Interactions** **Mr. Hiromu Kushida,** Graduate School of Science and Technology, Nihon University, Chiyoda-ku, Tokyo, Japan

11:50-12:10	**Title: Enhancement of UC Quantum Yield by Combining Metal-Organic Frameworks (MOFs) and Localized Surface Plasmon Resonance (LSPR)** **Ms. Ayaka Kamikawaji,** Graduate School of Science and Technology, Nihon University, Chiyoda-ku, Tokyo, Japan
12:10- 12:30	**Title: Process Design and Strategies of Utilities and Offsite in the EPC Industries** **Pierree Angeli Gilbuena,** Abe Jun Clarito and Jant Erbert Garboso, Process Engineering Department, Fluor Inc., Muntinlupa City, Philippines

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KEYNOTE PRESENTATIONS

https://doi.org/10.62422/978-81-974314-2-5-001

Shape Reversibility and Energy Dissipation in Transformation Cycles in Shape Memory Alloys

Osman Adiguzel
Department of Physics, Firat University, Elazig, Turkey

Shape memory alloys take place in a class of advanced smart materials by exhibiting a peculiar property called shape memory effect. This phenomenon is initiated with thermomechanical treatments on cooling and deformation and performed thermally on heating and cooling, with which shape of materials cycles between original and deformed shapes in reversible way. Therefore, this behavior can be called Thermoelasticity. This is plastic deformation with which strain energy is stored in the material and releases on heating by recovering original shape. This phenomenon is based on thermomechanical transformations, thermal and stress induced martensitic transformations. Thermal induced transformations are exothermic reactions and occur on cooling with the cooperative movement of atoms in <110 > -type directions on {110}-type planes of austenite matrix, along with lattice twinning and ordered parent phase structures turn into twinned martensitic structure. Twinned structures turn into detwinned martensite by means of stress induced martensitic transformation with deformation. Also, reverse austenitic transformation is an endothermic austenitic transformation, and occurs on heating, and detwinned martensite structures turn into the ordered parent phase structure. These transformations are driven by lattice invariant shears. Martensitic and austenitic transformations are solid state transformation, and these transformations do not start at the equilibrium temperature at Gibbs Free Energy Temperature Diagram and a driving force is necessary for the transformations. These alloys exhibit another property called superelasticity, which is performed with stressing and releasing the material in elasticity limit at a constant temperature in parent phase region, and shape recovery occurs upon releasing, by exhibiting elastic material behavior. Stress-strain curve exhibit non-linear behavior, stressing and releasing paths are different, and hysteresis loop refers to the energy dissipation. Superelasticity is the result of stress-induced martensitic transformation, and parent phase structures turn into the completely detwinned martensite structures with stressing. Copper based alloys exhibit this property in metastable β-phase region, which has bcc-based structures. Lattice invariant shears and lattice twinning are not uniform in these alloys, and the ordered parent phase structures undergo long-period layered structures with martensitic transformation. These structures can be described by different unit cells as 3R, 9R or 18R depending on the stacking sequences on the close-packed planes of ordered lattice of parent phase. In the present contribution, x-ray diffraction and transmission electron microscopy studies were carried out on copper based CuZnAl and CuAlMn alloys. X-ray diffraction profiles and electron diffraction patterns exhibit super lattice reflections inherited from parent phase due to the displacive character of the transformation. X-ray diffractograms taken in a long-time interval show that diffraction angles and intensities of diffraction peaks change with the aging time at room temperature. This result refers to a new transformation in diffusive manner.

Keywords: Shape memory effect, martensitic transformations, thermoelasticity, superelasticity, lattice twinning and detwinning.

Biography:

Dr. Adiguzel graduated from Department of Physics, Ankara University, Turkey in 1974 and received PhD- degree from Dicle University, Diyarbakir-Turkey. He has studied at Surrey University, Guildford, UK, as a post-doctoral research scientist in 1986-1987, and studied were focused on shape memory effect in shape memory alloys. He worked as research assistant, 1975-80, at Dicle University and shifted to Firat University, Elazig, Turkey in 1980. He became professor in 1996, and he has been retired on November 28, 2019, due to the age limit of 67, following academic life of 45 years. He published over 80 papers in international and national journals; He joined over 120 conferences and symposia in international and national level as participant, invited speaker or keynote speaker with contributions of oral or poster. He served the program chair or conference chair/co-chair in some of these activities. In particular, he joined in last six years (2014-2019) over 60 conferences as Keynote Speaker and Conference Co-Chair organized by different companies. Also, he joined over 180 online conferences in the same way in pandemic period of 2020-2023. He supervised 5 PhD- theses and 3 M. Sc- theses.

Dr. Adiguzel served his directorate of Graduate School of Natural and Applied Sciences, Firat University, in 1999-2004. He received a certificate awarded to him and his experimental group in recognition of significant contribution of 2 patterns to the Powder Diffraction File – Release 2000. The ICDD (International Centre for Diffraction Data) also appreciates cooperation of his group and interest in Powder Diffraction File.

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Nanocellulose as an Additive in the Pulp and Paper Industry

R.A. Ilyas[1,2,3,4]
[1]Faculty of Chemical and Energy Engineering, Universiti Teknologi Malaysia, 81310 UTM Skudai, Johor, Malaysia
[2]Centre for Advanced Composite Materials (CACM), Universiti Teknologi Malaysia (UTM), Johor Bahru 81310, Johor, Malaysia
[3]Institute of Tropical Forest and Forest Products (INTROP), Universiti Putra Malaysia, Serdang 43400, Malaysia
[4]Centre of Excellence for Biomass Utilization, Universiti Malaysia Perlis, 02600, Arau, Perlis, Malaysia

The rising demand for sustainable and high-performance materials in the pulp and paper industry has spotlighted nanocellulose (NC) as a promising additive. Derived from natural cellulose, NC offers exceptional properties such as high mechanical strength, biodegradability, and a large surface area, making it a versatile and eco-friendly option for paper enhancement. This abstract presents an overview of NC's role as an additive in papermaking, focusing on its production processes, including the mechanical and chemical methods used to obtain cellulose nanofibers and nanocrystals. The integration of NC into paper products leads to significant improvements in tensile and burst strength, barrier properties, and overall durability. Additionally, NC enhances the surface quality of paper, making it suitable for advanced applications such as packaging, specialty papers, and nanofilms. The potential of NC to reduce environmental impact, improve the recyclability of paper, and create innovative products is also highlighted. Challenges in large-scale production, cost considerations, and the future outlook of NC in the paper industry are discussed, underscoring its role in driving the transition towards more sustainable and high-performance paper products.

Biography:

R.A. Ilyas is a senior lecturer in the Faculty of Chemical and Energy Engineering, Universiti Teknologi Malaysia, Malaysia. He is also a Fellow of International Association of Advanced Materials (IAAM), Sweden, Fellow of International Society for Development and Sustainability (ISDS), Japan, a member of Royal Society of Chemistry, UK and Institute of Chemical Engineers (IChemE), UK, Chair of Science Outreach for Young Scientists Network-Academy of Sciences Malaysia (YSN-ASM) 2023. He received his Diploma in Forestry, Bachelor's Degree (BSc) in Chemical Engineering, and Ph.D. degree in the field of Biocomposite Technology & Design at Universiti Putra Malaysia, Malaysia. R.A. Ilyas was the recipient of the MVP Doctor of Philosophy Gold Medal Award UPM 2019, for Best Ph.D. Thesis and Top Student Award, INTROP, UPM. He was awarded with Outstanding Reviewer by Carbohydrate Polymers, Elsevier United Kingdom, Top Cited Article 2020-2021 Journal Polymer Composite, Wiley, 2022, and Best Paper Award at various International Conferences. R.A. Ilyas also was listed and awarded among World's Top 2% Scientist (Career-Long Achievement) Year 2022, World's Top 2% Scientist (Subject-Wise) Citation Impact during the Single Calendar Year 2019-2022 by Stanford University, US, PERINTIS Publication Award 2021 and 2022 by Persatuan Saintis Muslim Malaysia, Emerging Scholar Award by Automotive and Autonomous Systems 2021, Belgium, Young Scientists Network-Academy of Sciences Malaysia (YSN-ASM) 2021, UTM Young Research Award 2021, UTM Publication Award 2021&2023, and UTM Highly Cited Researcher Award 2021. In 2021, he won Gold Award and Special Award (Kreso Glavac (The Republic of Croatia) at the Malaysia Technology Expo (MTE2022), Gold Award dan Special Award at International Borneo Innovation, Exhibition & Competition 2022 (IBIEC2022), and, a Gold Award at New Academia Learning Innovation (NALI2022). He was awarded with Best Scientific Book Award from COMSTECH, Organization of Islamic Cooperation (OIC), Pakistan and ModTech, Romania. His main research interests are (1) Polymer Engineering (Biodegradable Polymers, Biopolymers, Polymer composites, Polymer-gels) and (2) Material Engineering (Natural fiber reinforced polymer composites, Biocomposites, Cellulose materials, Nano-composites). To date he has authored or co-authored more than 600 publications on green materials related subjects.

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SPEAKER PRESENTATIONS

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Optimizing the Average Distance Between a Blue Light Photosensitizer and a Harmonic Nanoparticle for Effective Infrared Photodynamic Therapy

Refael Minnes* and Ayan Barbora
Faculty of Natural Sciences, Department of Physics, Ariel University, Ariel, Israel

Photodynamic therapy can be significantly improved by techniques utilizing light windows of higher tissue penetration depths with optimally matched photoactive agents to provide deep interstitial treatment. Classical blue light photosensitizers were photodynamically activated using infrared light via coupled harmonic nanoparticles with optimized intermediary distances using spacers. Upon 800 nm pulsed laser irradiation perovskite nanoparticles with optimized coupling to either curcumin or protoporphyrin IX reduced the viability of MCF7 breast cancer cells by 73 percent and 64 percent, respectively, while exhibiting negligible dark toxicity. The findings pave the way for clinical adaptation of ease-of-synthesis photodynamically active preparations operable under deep tissue penetrating infrared lights using commonly available otherwise infrared inactive classical blue light photosensitizers.

Biography:

Dr. Refael Minnes has completed a B.Sc. in Biophysics and a PhD in Physics from Bar Ilan University and postdoctoral studies from University of Pennsylvania School of Medicine. He is a faculty at Ariel University Department of Physics and the head of the Bio-electromagnetism Laboratory. In his research he explores the interactions of electromagnetic waves, specifically in the UV-Vis-IR range, with biological tissues and cells.

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Revisiting the Influence of Metal Impurities and Structural Defects on the Intrinsic Paramagnetism of Graphene Oxide (Go).

Giulia Fioravanti[1], Angelo Galante[2,3,4], Paola Fattibene[5], Laura Torrieri Di Tullio[5], Silvia Colacicchi[2], Gianni Profeta[1,4], Luca Ottaviano[1,4], and Marcello Alecci[2,3,4]
[1]Department of Physical and Chemical Sciences, University of L'Aquila, L'Aquila, Italy,
[2]Department of Life, Health and Environmental Sciences, University of L'Aquila, L'Aquila, Italy.
[3]National Institute for Nuclear Physics (INFN), Gran Sasso National Laboratory (LNGS), L'Aquila, Italy.
[4]CNR-SPIN, c/o Department of Physical and Chemical Sciences, L'Aquila, Italy.
[5]Istituto Superiore di Sanità, Core Facilities, Rome, Italy.

GO-based materials have recently attracted substantial attention in the biomedical field as effective contrast agents (CAs) in Nuclear Magnetic Resonance Imaging (NMRI). This study focuses on the importance of understanding the interplay between metal contaminants and structural defects on the paramagnetism of GO (Fig. 1).

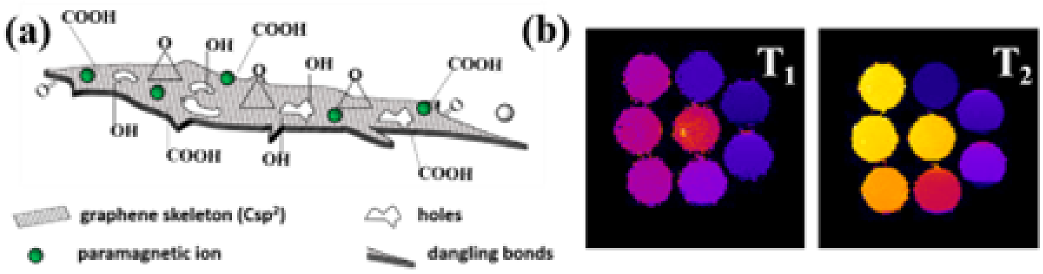

Figure 1. (a) A simplified diagram of the GO structure, containing the different oxygenated groups (hydroxyl, epoxy, and carboxyl), defects (holes, dangling bonds), and metallic contaminants, and (b) MRI of GO water solutions: T1 and T2 coloured maps, adapted from [1].

A combination of techniques, including morphology analysis, chemical composition evaluation, elemental analysis, various spectroscopies, and imaging, was employed to verify and quantify the presence of trace metal impurities and structural defects within the nanomaterial. Notably, X-band Electron Paramagnetic Resonance (EPR) and 1.0 T MRI measurements were utilized to confirm that the primary source of relaxivities in pristine GO nanosheets is structural defects, sometimes identified as dangling bonds. The results underscore the potential of GO as a versatile platform for developing advanced MRI contrast agents, paving the way for enhanced diagnostic capabilities in medical imaging and targeted therapies.

[1] G. Fioravanti et al. "Disentangling the intrinsic relaxivities of highly purified graphene oxide." (2024) Nanotechnology, 35(24), 245101. DOI: 10.1088/1361-6528/ad3253

Biography:

Graduated in chemistry at the University of Rome "La Sapienza" cum laude, I obtained my PhD in Materials Engineering, working on the preparation and characterization of materials for applied electrochemistry. I worked as a researcher at the University of Bologna dealing with synthesis and study of benzylamide Rotaxanes. Since 2008 I am a researcher at the University of L'Aquila, where I also teach "Chemistry" for Engineering and "Chemistry of Surfaces and Interphases" for Chemical Sciences. My research interests are surface modification and preparation and characterization of Graphene Oxide-based materials for nanotechnological applications.

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Significant Performance Enhancement of Triplet-Triplet Annihilation Upconversion Systems Based on Strong Light-Matter Interactions

Mr. Hiromu Kushida[1], Prof. Kosuke Sugawa[2]
[1]Graduate School of Science and Technology, Nihon University. (1-8-14 Kanda-Surugadai, Chiyoda-ku, Tokyo), Japan.
[2]College of Science and Technology, Nihon University. (1-8-14 Kanda-Surugadai, Chiyoda-ku, Tokyo), Japan.

Triplet-triplet annihilation upconversion (TTA-UC) is a technique that converts low-energy light into higher-energy light and has garnered significant attention for its wide range of potential applications. In TTA-UC, porphyrins are commonly used as sensitizer molecules, but the method faces several limitations. These include a narrow excitation wavelength range, restricted by the molecules' spectroscopic properties, and a low molar absorption coefficient due to weak interactions with light. This study aims to significantly enhance TTA-UC performance by achieving strong interactions between light and sensitizer molecules through localized surface plasmon (LSP) resonance.

It is well-known that strong light-matter interactions can give rise to upper (UP) and lower (LP) polariton states. By utilizing these states, it is anticipated that the excitation wavelength range can be extended, and excitation efficiency can be improved through these enhanced interactions. To realize this, we employed a plasmonic structure composed of a 2D assembly of metal-polymer thin films and metal nanoparticles, designed to exhibit pronounced LSP resonance. This structure also facilitates macroscopic observation of upconverted emission through strong light-molecule interactions.

Additionally, based on synthetic methods from metal-organic frameworks, we fabricated an aggregate structure of sensitizer molecules (Pd porphyrin derivatives) and integrated them with the plasmonic structure. These composite systems exhibited spectral characteristics indicating strong interactions between light and excitons in the sensitizer molecules, as evidenced by anticrossing behavior. Furthermore, the upconverted emission was found to be significantly amplified, demonstrating the potential of this approach for enhancing TTA-UC performance.

Biography:

I have studied nanoparticles, nanostructures and photochemistry at Nihon University for two years. I am very interested in the plasmons expressed by nanoparticles. Therefore, I am studying in detail the effects of nanoparticles expressing plasmons on molecules.

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Enhancement of UC Quantum Yield by Combining Metal-Organic Frameworks (MOFs) and Localized Surface Plasmon Resonance (LSPR)

Ms. Ayaka Kamikawaji[1] and Prof. Kosuke Sugawa[1]
[1]Graduate School of Science and Technology, Nihon University.(1-8-14 Kanda Surugadai, Chiyoda-ku, Tokyo), Japan

The triplet-triplet annihilation upconversion (TTA-UC) phenomenon holds great potential for various applications, as it not only converts long-wavelength light into shorter wavelengths but can also be driven by low photon density light, such as sunlight. For practical implementation, achieving TTA-UC in a solid-state system with high stability is desirable. However, performance degradation is inevitable due to the loss of molecular diffusion in solid-state environments. To address this, a method utilizing exciton diffusion instead of molecular diffusion has been explored. This approach employs metal-organic frameworks (MOFs), which prevent the molecular aggregation that would otherwise hinder exciton diffusion, while also allowing dense molecular accumulation, creating a structure that enables the development of high-performance systems.

However, during MOF synthesis, structural defects have been observed, leading to the trapping and deactivation of excitons nearby, which significantly reduces the fluorescence quantum yield. To mitigate this issue, we explored the use of localized surface plasmon resonance (LSPR) with metal nanoparticles. The integration of metal nanoparticles with molecules is known to reduce fluorescence lifetime due to the enhancement of electric fields, a phenomenon known as the Purcell effect. This effect improves the fluorescence quantum yield of MOFs and could potentially result in high TTA-UC quantum yields even in solid-state systems.

Biography:

I am currently a second-year master's student in a laboratory at Nihon University. I am interested in self-assembling materials such as MOFs. I am also interested in the LSPR phenomenon of metallic nanoparticles. I would also like to investigate structures that generate strong electric fields, which is necessary for my research. I am also interested in measuring instruments that can measure nano size particles, since I am currently studying nanoscale particles.

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Process Design and Strategies of Utilities and Offsite in the EPC Industries

Pierree Angeli Gilbuena[1] and Abe Jun Clarito[2], Jant Erbert Garboso[2]
[1, 2]Process Engineering Department, Fluor Inc., Muntinlupa City, Philippines

The successful operation of an oil and gas facility is highly dependent on the design of its utilities and offsites (U&O) component. EPC Companies, such as Fluor, need to provide a robust design of the U&O so that the facility can run efficiently and meets its objectives.

There are multiple U&O projects done by Fluor globally which are mostly for petrochemical complexes, refineries, and LNG plants. Solid experience in this U&O type of project is an advantage in any future projects with this scope.

Typical utility areas in a plant may include cooling water systems, air systems, steam and condensate, fuel, and nitrogen. Offsite facilities may include storage, flare systems, interconnecting piping, wastewater, and others. The process design of U&O requires a thorough understanding of the process units' requirements and the various scenarios the plant can operate under, including normal and startup cases. Typical designs include providing adequate allowances and margins in utility capacities.

Typical strategies in optimization of the U&O areas include these items: 1) feasibility study and selection of the type between the type of cooling or heating medium, 2) configuration of the equipment e.g. open or closed system and 3) flexibility considerations 4) sound basis and assumptions decided ahead of fully available information from inside battery limit (ISBL) areas.

In summary, the design of U&O is a significant part of EPC industry and is key to running an efficient and cost-effective plant.

Biography:

Pierree Angeli Gilbuena has twenty-two (22) years of Process Engineering experience in pre- FEED, FEED and detailed engineering in various units in petrochemicals, chemicals and utilities and offsites plants. She joined Fluor in 2005 as a Process Engineer. She is the local SME for hydraulics and utility systems and currently the Process Engineering Department Manager in Fluor Manila office.

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POSTER PRESENTATION

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Obstacle Mediated Reconnection of Straight Scrolls in an Excitable System

Dhriti Mahanta, Rituporna Kashyap and Sharifa Yesmin
Department of Chemistry, Gauhati University, Guwahati, Assam, India

Oscillatory chemical reactions are widely studied as laboratory models of wave propagation in complex biological systems, particularly the human heart where the presence of spiral and scroll waves can lead to cardiac arrhythmias [1]. Due to the complexity and cost of conducting in-vivo studies on cardiac waves, researchers often use models like the Belousov-Zhabotinsky (BZ) reaction as prototypes. It has been established that the 3D waves formed in a BZ-medium, called scrolled waves, can have different shapes and dynamics depending on their filaments which are nothing but the one-dimensional curves around which they rotate [2]. Here, we report the interaction of two straight scrolls having I-shaped filaments in the presence of a spherical obstacle placed midway between them.

The study is based on experiments with the BZ-reaction and numerical simulations using the Barkley model. We show that in presence of an obstacle, two parallel waves rotating within a specific distance from each other feel an attraction around the obstacle, cross over, and finally form two new U-shaped filaments. It was confirmed that this is solely caused by the obstacle because otherwise the scrolls continue rotating around their individual filaments forever, unaffected by each other. We believe these results will help to gain better insights into the phenomenon of reconnection, which is important from both a fundamental and biomedical perspective.

References

1. Cherry, E. M. and Fenton, F. H. New J. Phys. 2008, 10, 125016.
2. Mahanta, D., Dutta, S., and Steinbock, O. Phys. Rev. E, 2017, 95, 032204.

Biography:

Dr. Dhriti Mahanta completed her MSc in Chemistry from Gauhati University in 2012. She received her PhD from Indian Institute of Technology (IIT) Guwahati for her work on the complex dynamics of patterns formed in chemical systems. Then she joined Saint Louis University, MO, USA as a post-doctoral fellow. There she worked on the nonlinear dynamics of electrochemical systems under Prof. Istvan Z. Kiss. She joined the department of Chemistry, Gauhati University in 2022, where she currently teaches Physical Chemistry in the MSc level and has a research group that studies nonlinear dynamics of reaction diffusion systems.

Participants Index

UPCOMING CONFERENCES

8th World Conference on
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