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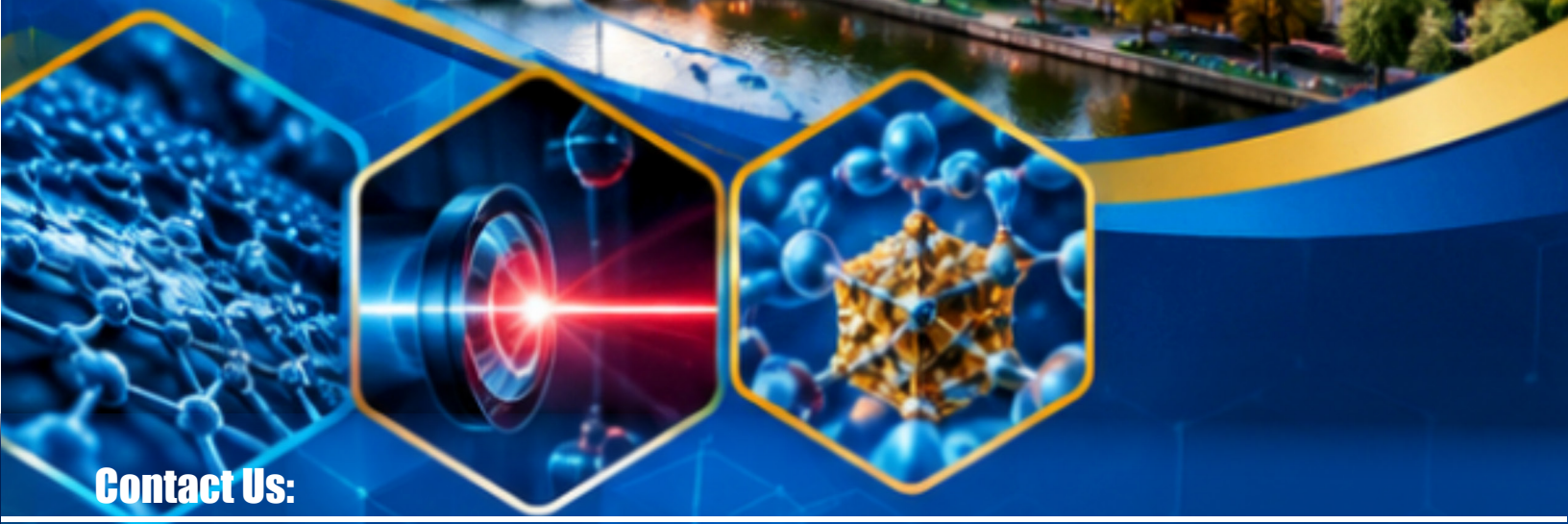
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3rd Global Event on MATERIALS SCIENCE AND ENGINEERING

October 29-30, 2026 **Berlin, Germany**

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Organizing Committee



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USA



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Sudip Chatterjee,
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India



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University of Chuka,
Kenya



Bulent Gultekin Akinoglu,
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Osman Adiguzel,
Firat University,
Turkey



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University of Regensburg,
Germany



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Institute of Technology,
Israel



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Catholic University of Brasilia,
Brazil



Erol Sancaktar,
The University of Akron,
USA

Thank You All

DAY -1

KEYNOTE PRESENTATIONS

OCTOBER 29-30, 2026

BERLIN, GERMANY



David Cooke,

Director of Sales at Vital Materials,
USA

Title: Compound Semiconductors and VCSEL Chips Technology and Applications

Abstract:

Compound semiconductors have emerged as pivotal materials in the advancement of high-performance optoelectronic devices, offering superior electron mobility, direct bandgap properties, and high thermal stability. Among their most impactful applications is the development of Vertical-Cavity Surface-Emitting Lasers (VCSELs), which leverage these materials to deliver efficient, compact, and high-speed optical solutions. This paper explores the underlying technologies of compound semiconductors and VCSEL chips, detailing their fabrication processes, performance characteristics, and integration into modern systems. Key applications in data communications, sensing, consumer electronics, and emerging fields such as LiDAR and quantum photonics are examined, highlighting the transformative potential of these technologies in shaping next-generation devices. This paper is a comprehensive review of compound semiconductor market. The paper will focus on the growth and trends of the key end-use applications including LEDs, RF components, and power devices. The paper will then focus on VCSEL chip technology and application. Finally, a review of Vital Group and Microelectronics Co. capabilities will be given to offer areas where Vital can support research groups.

Biography:

David Cooke is a Seasoned Sales Director with more than two decades of success driving technical sales across the electronics, semiconductor, polymer, and specialty chemicals sectors. Recognized for expanding global markets, accelerating revenue growth, and building highvalue partnerships with senior leaders, engineers, and technical teams. Proven ability to penetrate new markets, develop endtoend gotomarket strategies, and manage complex, multinational supply chains. At Vital Materials, supported the advancement and commercialization of critical metalorganic precursors used in VCSEL manufacturing, reinforcing the company's capability to supply materials essential for nextgeneration photonics and 3D sensing applications. Skilled in global key account management, consistently growing portfolios exceeding $20M annually. Experienced in M&A collaboration, crossfunctional leadership, and commercialization of advanced materials across APAC, EU, and the Americas. Early career roles in technical marketing, lab management, and government sales provide a strong foundation in chemistry, product development, and technical problemsolving. Holds a Ph.D. in Chemistry from Duke University.



Ying Jan Wang,

National Cheng Kung University,

Taiwan

Title: Alternative Testing Strategies for Nanomaterials Safety Assessment: From Mechanistic Studies to Regulatory Needs

Abstract:

Nanotechnology has driven rapid innovation in industrial and consumer products, yet concerns remain regarding the potential health risks associated with nanomaterial (NM) exposure. Traditional NM toxicity assessment relies heavily on animal testing, raising ethical and scientific concerns and underscoring the need for alternative approaches consistent with the 3Rs principles. However, the lack of standardized non-animal methods necessitates a deeper understanding of NM-induced toxic mechanisms and adverse outcome pathways (AOPs) to support the development of new approach methodologies (NAMs). Recent evidence identifies autophagy dysfunction as a critical key event in NM-induced toxicity. Our studies demonstrate that silver nanoparticles (AgNPs) and zinc oxide nanoparticles (ZnONPs) disrupt autophagic processes, contributing to downstream adverse outcomes. In particular, co-exposure of keratinocytes to UVB irradiation and ZnONPs induces lysosomal impairment and autophagy dysfunction, leading to increased exosome release. These exosomes are subsequently taken up by macrophages, promoting M1 polarization and enhanced inflammatory responses. Elucidating NM-induced autophagy-related AOPs provides a mechanistic basis for advancing NAMs and supports more ethical, efficient, and biologically relevant nanotoxicity assessment strategies.

Biography:

Ying-Jan Wang is a Distinguished Professor in the Department of Environmental and Occupational Health, College of Medicine, National Cheng Kung University. His research focuses on the molecular mechanisms underlying toxicity, induced by environmental toxicants. A major interest of his laboratory is elucidating the role of autophagy in nanotoxicity to support the development of alternative testing strategies and new approach methodologies. He has published over 200 peer-reviewed articles in international journals and has an h-index of 64.



Sudip Chatterjee,

Haldia Institute of Management,
India

Title: The Study of Einstein Relation in Quantum Wire Superlattices (QWSL) of Parabolic Semiconductors: Simplified Theory and Suggestions for Further Experimental Determination in Biomaterials

Abstract:

The semiconductor super lattices (SLS) have found wide applications in many electronic device structures and bio devices such as photo detectors, light emitters, avalanche photo diodes, compensatory transistors, tunnelling devices, genetic diodes etc. The most extensively studied SL is the one consisting of alternate layers of GaAs and Ga1-xAlxAs, owing to its fabrication. The GaAs layers form the quantum wells and the Ga1-xAlxAs layers form the potential barriers. We wish to note that, the afore mentioned SLS have been proposed with the assumption that the interfaces between the layers are sharply defined with zero thicknesses so as to be devoid of any interface effects. As the potential form changes from a well (barrier) to a barrier (well), an intermediate potential region exists for the electrons. Thus, the influence of the finite thickness of the interface on the carrier dispersion law becomes very important since, the carrier energy spectrum governs all the transport properties. In this paper, we shall investigate the DMR for the most interesting case which occurs in QDSLs of graded interfaces and compare the same with that of the constituent materials by formulating the respective one-dimensional electron dispersion laws.

Biography:

Sudip Chatterjee is presently working as the Principal of Haldia Institute of Management, India. He did his Ph.D. from Jadavpur university, India on some electronic transport properties of Nano materials and continued his postdoctoral research at Tu Delft, The Netherlands. He had worked as the Assistant Professor in The Sikkim Manipal University, India and as the Associate Professor at IFHE University. He has a total teaching and research experience of 26 years. Presently number of research projects has been continuing under his guidance. He has published 32 papers in different journals.



Thomas J Webster,

Brown University,
USA

Title: From Human Implants to 4D Printing: Pushing the Boundaries of Nanomedicine

Abstract:

Nanotechnology has revolutionized numerous industries from space exploration to medicine. Building off of our success developing nanotextured medical devices now in over 40,000 patients with no cases of failure (the industry average for non-nanotextured medical devices is 5 – 10% mostly failing due to infection), this presentation will highlight our use of 4D printed medical devices. 4D printing refers to 3D printed materials that can change shape with time after implantation. Here, we will present novel 4D printed materials used to reverse scoliosis (spine curvature), release antibiotics on demand to reverse infection, return motor function to spinal disc collapse, and more. This talk will cover in vivo assessment where simple near infra-red (NIR) stimulation of such materials causes them to change shape in a controllable and predictable manner to treat numerous diseases. In contrast to today's static implants which do not change shape with time, this study introduces a new field of medical devices (4D printing) destined for success.

Biography:

Thomas J. Webster's (H index: 135) degrees are in chemical engineering from the University of Pittsburgh (B.S., 1995; USA) and in biomedical engineering from RPI (Ph.D., 2000; USA). He has formed over a dozen companies who have numerous FDA approved medical products currently improving human health in over 30,000 patients. He currently serves as CSO of Novaurum whom is pioneering the use of ALD in medical devices. He is also currently serving as a professor at Brown University, Saveetha University, Hebei University of Technology, UFPI, and others. Dr. Webster has numerous awards including: 2020, World Top 2% Scientist by Citations (PLOS); 2020, SCOPUS Highly Cited Research (Top 1% Materials Science and Mixed Fields); 2021, Clarivate Top 0.1% Most Influential Researchers (Pharmacology and Toxicology); 2022, Best Materials Science Scientist by Citations (Research.com); and is a fellow of over 8 societies. Prof. Webster is a former President of the U.S. Society for Biomaterials and has over 1,350 publications to his credit with over 55,000 citations. He was recently nominated for the Nobel Prize in Chemistry. Prof. Webster also recently formed a fund to support Nigerian student research opportunities in the U.S.



DAY -1

ORAL PRESENTATIONS

OCTOBER 29-30, 2026

BERLIN, GERMANY



Shaowei He,

University of Electronic Science and Technology of China,
China

Title: Multispectral Thermal Imaging Enabled by Dispersion-Engineered Metalens

Abstract:

Multispectral imaging combines spatial resolution with spectral discrimination, enabling accurate imaging for applications such as object recognition, precision agriculture, and medical diagnostics. Metasurfaces provide a promising platform for compact and integrated multispectral imaging systems due to their subwavelength design flexibility. Existing metasurface-based approaches typically integrate metasurfaces with CMOS detectors and reconstruct spectral information from detector-encoded responses. However, these methods often reduce effective pixel utilization and suffer from energy loss caused by spectral filtering, resulting in lower efficiency and increased computational complexity.Here, we exploit metasurface dispersion engineering in a reverse manner by intentionally enhancing chromatic dispersion. Using an inverse-design strategy, we realize a metalens that simultaneously performs spectral splitting and imaging focusing, producing wavelength-dependent focal positions along the optical axis. Multispectral imaging is achieved by translating a CCD detector to different axial locations to capture images corresponding to individual wavelengths. This approach fully utilizes detector pixels while avoiding the energy loss associated with conventional spectral filtering schemes.Experimentally, a long-wave infrared metalens operating from 8–12 μm is demonstrated, with focal lengths of 70 mm, 50.0 mm, and 41.5 mm at wavelengths of 8 μm, 10 μm, and 12 μm, respectively. Broadband spectral imaging across the 8–12 μm range is also achieved. This work experimentally demonstrates metasurface-based multispectral imaging in the long-wave infrared regime and provides a promising route toward compact, integrated, and future hyperspectral imaging systems.

Biography:

Shaowei He obtained his PhD from Huazhong University of Science and Technology in 2008 and is currently employed at the School of Optoelectronic Science and Engineering, University of Electronic Science and Technology of China, as an associate researcher. He has published more than 15 papers in well-known journals.



Chengbing Qin,

Shanxi University,
China

Title: Noise-Resistant Single Photon Detection for Applications in Extreme Environments

Abstract:

Single-photon detection (SPD) technologies have been applied to detect extremely weak light signals under extreme environments. However, external photon noise, resulting from the natural light, hinders their further applications due to the extreme sensitivity of SPD and weakly received optical signal. Here, we want to introduce two proposals to overcome this limitation. Firstly, we introduce a new passive single-photon dynamic imaging method using its frequency information. This method utilizes the inherent randomness of photon radiation and detection to construct a compressive imaging system. It captures the broadband dynamic features of the point object through sparse photon detection and shows excellent noise resistance, achieving high-quality imaging with a signal-to-background ratio of 1/332. Secondly, we perform noise-resistance underwater correlated biphoton imaging (CPI) through a home-built super-bunching laser. Compared with a coherent laser, the probabilities of generated bundle N-photons of the super-bunching laser have been enhanced by at least several order of magnitude, enabling CPI under weak light intensity. We experimentally demonstrated CPI with reasonable imaging contrast under the noise-to-signal ratio (NSR) up to 105, and the noise-resistance performance has been improved by at least two orders of magnitude compared to the single-photon imaging technology. These results break the limits of underwater imaging through classical coherent lasers and may offer many enhanced imaging applications, such as long-range target tracking and deep-sea optical exploration under noisy environments.

Biography:

Qin Chengbing is a professor and doctoral advisor at State Key Laboratory of Quantum Optics Technologies and Devices, vice director of Institute of Laser Spectroscopy, Shanxi University. He has supported by the National Science Fund for Excellent Young Scientists. He has developed single-molecule quantum coherence spectrometer with independent intellectual property rights have been used in the areas of military aircraft early warning and air pollution monitoring. In the recent five years, he has also published 50 SCI-cited papers written as the first or corresponding author, including 14 papers published on JCR first zone journals.



Ruiyun Chen,

Shanxi University,
China

Title: Upconversion Luminescence Control of Lanthanide-Doped Nanoparticles and Its Application in Mid Infrared Detection

Abstract:

Lanthanide-doped upconversion nanoparticles (UCNPs) have drawn significant interest due to their unique optical properties which facilitate their use in super-resolution nanoscopy, volumetric displays, bioimaging, and lasing. All these applications rely highly on the size and brightness of UCNPs. However, there has long existed an inherent trade-off between the small size and high brightness of UCNPs. Here, we propose a Yb^{3+}/Y^{3+} synergistic cation exchange strategy to manipulate the luminescence of UCNPs by adjusting the energy transfer kinetics, thereby achieving high intensity and controllable luminescence emission while keeping the ultrasmall size. In our strategy, a high-temperature solution-annealing-assisted process generates a dense ultrathin Yb^{3+}/Yb^{3+}-containing shell region (~1.3 nm) on ultrasmall, highly Er^{3+}-doped $NaErF_4$ nanoparticles. Optically inert Y^{3+} ions improve the near-surface lattice environment and suppress nonradiative losses associated with surface defects, whereas Yb^{3+} ions act as sensitizers and energy-transfer bridges to increase pump-light harvesting and facilitate energy transfer to the Er-rich core. Futhermore, we have used UCNPs as nanotransducers that can convert broadband mid-infrared radiation into visible and near-infrared wavelengths. Specifically, Er^{3+}/Yb^{3+}/Nd^{3+} co-doped nanoparticles can simultaneously upconvert mid-infrared radiation to visible and near-infrared light, where the mid-infrared radiation can be detected by monitoring the intensity ratio of the emission band. Interestingly, we found that this ratiometric response is excitation wavelength dependent and may come from changes in the excitation energy transfer channel in UCNPs.

Biography:

Ruiyun Chen received his Ph.D. degree in 2014 from the State Key Laboratory of Quantum Optics Technologies and Devices, Shanxi University, China. He is currently a full professor at the Institute of Laser Spectroscopy, Shanxi University, China. His research primarily focuses on the measurement and control of photophysical properties of single quantum systems and functional nanomaterials, the enhancement of light-matter interactions through plasmonic effects, as well as the ultrafast dynamics and quantum coherence effects in single quantum systems.



Teodora Lloclla Aguilar,

National University of Engineering,
Peru

Title: Synthesis, characterization, antimicrobial, ecotoxicological, and compostability evaluation of keratin-silver nanoparticles composites (Keratin-AgNPs)

Abstract:

Keratin-Silver Nanoparticle Composite (Keratin-AgNPs) Derived from Poultry Feathers and Hylocereus megalanthus Peel for Antimicrobial and Ecotoxicological Applications: The increasing demand for sustainable nanomaterials has encouraged the development of multifunctional biopolymer-based systems with biomedical and environmental applications. In this study, a keratin-silver nanoparticle composite (Keratin-AgNPs) was synthesized using keratin extracted from poultry feathers and green-synthesized silver nanoparticles (AgNPs) obtained from Hylocereus megalanthus (pitahaya peel) extract. Keratin extraction was optimized through sulfitolysis using response surface methodology (RSM), achieving an extraction yield of 89% under optimal conditions (pH 9, 70 °C, 6 h). AgNPs synthesis was optimized at 34.8 °C, 39.2 min, and pH 8, producing stable nanoparticles with an average hydrodynamic size of 72.1 nm, PDI of 0.210, and zeta potential of -36.8 mV. Physicochemical characterization using FTIR, UV-Vis, DLS, TEM, SEM, Raman spectroscopy, and TGA confirmed keratin structural preservation, nanoparticle formation, colloidal stability, and favorable morphological features. The Keratin-AgNPs composite exhibited enhanced antimicrobial activity against Staphylococcus aureus, moderate antibacterial effects against Escherichia coli, and concentration-dependent antifungal activity against Aspergillus niger. Ecotoxicological evaluation using Daphnia magna, Artemia salina, and Lactuca sativa suggested low-to-moderate toxicity under controlled exposure conditions, supporting environmental compatibility compared with free nanoparticles. Compostability assessment further demonstrated favorable degradation behavior, highlighting the potential of Keratin-AgNPs as a sustainable nanomaterial aligned with green chemistry and circular economy principles for biomedical, antimicrobial, and environmentally responsible applications.

Biography:

Teodora Lloclla Aguilar is a researcher, university lecturer, and environmental project developer in chemistry, nanotechnology, environmental science, and sustainable technologies. She is a PhD candidate in Chemistry at the National University of Engineering (UNI), Peru, and holds a Master's degree in Chemical Engineering from the National University of Callao (UNAC). Her research interests include green chemistry, biomaterials, ecotoxicology, environmental monitoring, wastewater treatment, and sustainable nanotechnology. She has participated in multidisciplinary research and innovation projects and received national and international awards in environmental entrepreneurship and sustainability.



Zahid Hasan,

NCBAE: Alhamara University,
Pakistan

Title: Nanomedicine: Thermotherapy-Empowered Cognitive Gold Nano Thermo Robots for Targeted Arterial Plaque Removal

Abstract:

Cardiovascular diseases (CVDs) remain the leading cause of mortality worldwide, primarily due to endothelial dysfunction, arterial stiffening, and the progressive accumulation of lipid-rich plaque and calcified deposits within the coronary arteries. Although conventional treatments such as angioplasty, stenting, and bypass surgery are clinically effective, they are invasive, costly, and often associated with complications such as restenosis and tissue injury. Gold, due to its stability and easy surface functionalization, allows accurate targeting of atherosclerotic regions and is increasingly used to address complex medical challenges. It can efficiently convert near-infrared light into precise, localized heat that melts lipid deposits without damaging healthy tissue, making it a powerful and minimally invasive tool for thermo-based cardiovascular therapy. To address these challenges, the present study introduces a next-generation Thermotherapy-Empowered Cognitive Gold Nano-Thermo Robotic System (CGNTRS) developed for precision-guided arterial plaque removal. The system utilizes biocompatible gold nanostructures optimized for high NIR (near- infrared) absorption, enabling efficient photo thermal conversion and generation of localized hyperthermia. Each Nano-robot is integrated with cognitive bio sensing capabilities, allowing autonomous recognition of plaque composition, lipid density, hemodynamic flow patterns, and micro environmental parameters. This cognitive intelligence enables the CGNTRs to accurately navigate toward stenotic regions and interact only with pathological tissue. The proposed Nano-therapeutic platform integrates a Nano-sensor network, inter-body communication modules, and the Internet of Nano-Medical Things (IoNT) to continuously monitor, regulate, and optimize hyperthermic waves in real time under a "SEE and TREAT" strategy. Hyperthermia is generated via laser-induced irradiation of the Cognitive Gold Nano-Thermo Robots (GNTRs), where localized Coulomb explosions produce dispersed thermal waves. To transform these irregular heat pulses into a controlled and uniform therapeutic pattern, a Finite Difference Method (FDM)-based Adaptive Heat Control System is developed to maintain the therapeutic temperature between 50°C and 60°C, ensuring selective liquefaction of lipid aggregates while preserving endothelial integrity. Advanced computational and biophysical simulations confirm that cognitive thermotherapy significantly reduces plaque burden, enlarges lumen diameter, restores blood flow dynamics, and minimizes oxidative stress and inflammatory responses. Overall, CGNTRS offers a promising, minimally invasive alternative to traditional cardiovascular treatments and represents an important step forward in the future of smart Nano robotic therapies.

Biography:

Dr Zahid Hasan is a distinguished scholar in the field of computer science, currently serving as an Associate Professor since September 2024 and also holding the additional responsibility of Director of Advanced Study and Research (DASAR). He began his academic career as an Assistant Professor in September 2016 and earned his Ph.D. in Computer Science in 2024. Dr. Hasan's research encompasses a wide array of advanced technologies, including Nano medicine, Nanotechnology, Nano robotics, artificial intelligence, machine learning, computer vision, image processing, intelligent diagnostic systems, and soft computing. His interdisciplinary expertise positions him as a leader in innovative research that integrates AI with emerging technologies in Nano medicine and diagnostics. His several publications are in 'W' and 'X' categories.

DAY -1

POSTER PRESENTATIONS

OCTOBER 29-30, 2026

BERLIN, GERMANY



Matthew Jacobs,

University of Bristol,
UK

Title: Towards A Unified Nanoparticle Characterisation Technique by The Coupling of Polarimetry with Traditional Light Scattering Methods.

Abstract:

Nanoparticle-based products are finding an increasing range of applications including anti-cancer therapeutics, medical diagnostics, catalysis and quantum technologies. Accurate characterisation of their properties, dimensional and chemical among others, is required for their development, quality control in manufacture, regulatory compliance and end-of-life management. Available methods for characterising these particles include standard optical techniques to determine one or more of these key properties. Difficulties arise when a given measured optical parameter shows dependence on multiple properties of the particle, for example shape, size and material characteristics. Thus, a priori particle information must often be assumed to increase the accuracy of, for example, particle sizing measurements. The intention of this project is to develop an optical characterisation technique, simultaneously determining multiple geometric and compositional properties of nanoparticles, without the need for a priori measurement or assumptions. Polarimetric methods pose a promising complementary technique to traditional particle sizing methods, presented by way of comparison with traditional reflection ellipsometry. Explorations into this domain exist in literature, however possess a notable absence in application to the full characterisation of homogeneous colloidal suspensions of nanoparticles representative of the above detailed applications. Initial simulations reveal a theoretical upper bound on the provision of unique determination of size characteristics of nanoparticles, which can be understood by deconvolving the Mie scattering formalism into its multipolar contributions. Planned experiments and existing theoretical and experimental results are detailed, with a combined polarimetric and light scattering metrological method justified as excluding the need for a priori particle parameterisation within a theoretical limit.

Biography:

Matthew Jacobs is a PhD student with the University of Bristol and the National Physical Laboratory. His academic background is in Astrophysics and possesses industrial experience across material development, applied statistics and optical instrument design. Over his career he has been awarded the Keele University.



Wladyslaw Owsinski,

AGH University of Krakow, Poland

Radial Thulium Distribution and Local Structural Environment in A Multi-Ring Silica Fibre Laser Preform

Abstract:

Multi-ring thulium-doped silica fibres represent a promising architecture for active fibre devices operating in the 1.7–2.1 µm spectral range. Unlike conventional fibres with uniformly doped cores, this design employs a controlled radial distribution of active ions, offering opportunities to tailor the refractive-index profile and modal field distribution. However, preserving the intended dopant architecture during preform fabrication and subsequent fibre drawing remains a significant technological challenge. Broadening of doped-region boundaries, and changes in the local glass structure may alter the coordination environment of the active ions and affect the optical properties of the resulting fibre. This study investigates the radial distribution of Tm^{3+} ions and their local structural environment in a multi-ring silica fibre preform fabricated using Modified Chemical Vapor Deposition with Chelate Doping Technology (MCVD-CDT). Micro-area X-ray fluorescence (XRF) mapping and electron probe microanalysis (EPMA) are used to determine the radial dopant concentration profile and assess the preservation of the designed core architecture. Extended X-ray absorption fine structure (EXAFS) spectroscopy at the Tm L3-edge provides complementary information on the local coordination environment, including the Tm–O bond distances and coordination number. The measurements are performed at the PolyX beamline of the SOLARIS synchrotron in Kraków. By combining spatially resolved elemental analysis with local-structure spectroscopy, this work establishes an experimental basis for evaluating dopant-profile preservation and structural changes during preform fabrication. The findings are intended to guide process optimisation and the development of multi-ring active fibres for emission near 2 µm.

Biography:

Władysław Owsiński is a PhD student in Chemical Sciences at AGH University of Krakow in Poland. He graduated in 2024 from the Faculty of Physics and Applied Computer Science at AGH University of Krakow. His research focuses on thulium-doped silica fibres, their local structural characterisation, and the optimisation of fabrication processes for novel active fibre architectures. He is co-author of DOIs: 10.1051/epjconf/202638906001, 10.1364/OME.588270, 10.1117/12.3103407 and participated in STL 2026 and IQCLSW 2026.

DAY -1

KEYNOTE PRESENTATIONS

OCTOBER 29-30, 2026

BERLIN, GERMANY



Osman Adiguzel,

Firat University,
Turkey

Memory Characteristics and Crystallographic Basis of Reversibility in Shape Memory Alloys

Abstract:
Shape memory alloys take place in a class of advanced smart materials by exhibiting dual memory characteristics, Shape Memory Effect and Superelasticity with recoverability of two shapes in different conditions. Shape Memory Effect is initiated with thermomechanical processes on cooling and deformation and performed thermally on heating and cooling, with which shape of the materials cycles between original and deformed shapes in reversible way. Therefore, this behavior can be called Thermoelasticity. This is plastic deformation, due to the soft character of the material in low temperature condition, with which deformation energy is stored and releases on heating by recovering the original shape. This phenomenon is governed by crystallographic transformations, thermal, and stress induced martensitic transformations. Thermal induced martensitic transformation occurs on cooling with the cooperative movement of atoms in <110 > -type directions on {110}-type close packed planes of austenite matrix along with the 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 in the low temperature condition. Lattice twinning and detwinning reactions play important role in martensitic transformations, and they are driven by the internal and external forces, by means of inhomogeneous lattice invariant shears. Superelasticity is performed with mechanically stressing and releasing the material in elasticity limit at a constant temperature in the parent phase region, and material recovers the original shape upon releasing, by exhibiting elastic material behavior. Superelasticity is also result of stress induced martensitic transformation, and the ordered parent phase structures turn into the detwinned martensite structures by stressing in parent phase region.
Copper based alloys exhibit this property in metastable β-phase fields. Lattice twinning and lattice invariant shear is not uniform in these alloys and cause to the formation of complex layered structures. The layered structures can be described by different unit cells as 3R, 9R or 18R depending on the stacking sequences on the close-packed planes of the ordered lattice.
In the present contribution, x-ray and electron diffraction studies were carried out on two copper- based CuAlMn and CuZnAl alloys. X-ray diffraction profiles and electron diffraction patterns exhibit super lattice reflections. X-ray diffractograms taken in a long-time interval show that diffraction angles and intensities of diffraction peaks change with the aging duration at room temperature. This result refers to the rearrangement of atoms in diffusive manner.

Keywords: Shape memory effect, martensitic transformation, thermoelasticity, superelasticity, lattice twinning, detwinning

Biography:

Adiguzel graduated from Department of Physics, Ankara University, Turkey in 1974 and received PhD- degree from Dicle University, Diyarbakir-Turkey. He studied at Surrey University, Guildford, UK, as a post-doctoral research scientist in 1986-1987, and studied were focused on shape memory effect in shape memory alloys. 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 retired on November 28, 2019, due to the age limit of 67. He supervised 5 PhD- theses and 3 M. Sc- theses and published over 80 papers in international and national journals; He joined over 120 conferences and symposia in international 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. 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.

DAY- 2

KEYNOTE PRESENTATIONS

OCTOBER 29-30, 2026

BERLIN, GERMANY



Kunichi Miyazawa,

Nano Alloy Technology Inc,
Japan

Title: Sensor, Energy and Environmental Applications of Fullerene Nanowhiskers And Related Carbon Nanomaterials

Abstract:

Fullerene nanowhiskers (FNWs) are organic semiconductor materials which have very wide electronics, biomedical, energy and environmental applications in transistors, solar cells, fuel cells, superconductors, cell culture media, catalyst carriers and so forth. It was recently discovered that the electrical resistivity of C_{60}FNWs decreased when they were exposed to the gases with electric dipole moments [1]. This phenomenon is assumed to be caused by the dipole - induced dipole moment interactions between the gas molecules and the π electron systems of C_{60} molecules. Field-effect transistor (FET) type gas sensors using C_{60}FNWs, silicon substrates and graphite foil electrodes were developed, and their responses for organic gases such as methanol and ethanol were investigated as a function of source-drain and gate bias voltages. Short C_{60}FNWs were packed in a narrow groove between two graphite foil electrodes, and the source-drain current (I_{SD}) was measured through a resistor of 100 MΩ. The I_{SD} increased with the gas exposure time, and linearly varied depending on the gate voltage V_G. In addition, flexible FET type gas sensors using C_{60}FNWs and bamboo charcoal cloth were also developed, and their responses for gases such as water and ethanol were investigated as a function of V_G and source-drain voltage (V_{SD}). The FNW sensors will be widely applied to environmental, energy and biomedical fields in the future. K.

Biography:

Kunichi Miyazawa is now working with Nano Alloy Technology Inc. (Nagaoka, Japan), and also with Tokyo University of Science as a visiting researcher. He received Doctor of Engineering degree from The University of Tokyo in 1987. He was a lecturer in the School of Engineering at The University of Tokyo from 1989 to 2002, and moved to National Institute for Materials Science (NIMS) in 2002, where he studied various fullerene nanomaterials including fullerene nanowhiskers as the group leader of Fullerene Engineering Group.From 2016, he has been mainly engaged in the transmission electron microscopy study of fullerenes, carbon and metal nanomaterials.



Vladimir Chigrinov,

Hong Kong University of Science and Technology,
Hong Kong

Title: Azodye Photoaligned Nanolayers for Liquid Crystal: New Nanomaterial Application

Abstract:

Photoalignment and photopatterning has been proposed and studied for a long time [1]. Light is responsible for the delivery of energy as well as phase and polarization information to materials systems. It was shown that photoalignment liquid crystals by azodye nanolayers could provide high quality alignment of molecules in a liquid crystal (LC) cell. Over the past years, a lot of improvements and variations of the photoalignment and photopatterning technology has been made for photonics applications. In particular, the application of this technology to active optical elements in optical signal processing and communications is currently a hot topic in photonics research [2,3]. Sensors of external electric field, pressure and water and air velocity based on liquid crystal photonics devices can be very helpful for the indicators of the climate change. We will demonstrate a physical model of photoalignment and photopatterning based on rotational diffusion in solid azodye nanolayers. We will also highlight the new applications of photoalignment and photopatterning in display and photonics such as: (i) fast high resolution LC display devices, such as field sequential color ferroelectric LCD; (ii) LC sensors, including polarization sensors for polarimetric cameraas; (iii) LC lenses with a variable focal distance; (iv) LC E-paper devices, including electrically and optically rewritable LC E-paper; (v) photo induced semiconductor quantum rods alignment for new LC display applications; (vi)100% polarizers based on photoalignment; (vii) LC smart windows based on photopatterned diffraction structures; (vii) LC antenna elements with a voltage controllable frequency.

Biography:

Vladimir G. Chigrinov is Professor of Hong Kong University of Science and Technology since 1999. He is an Expert in flat-panel technology in Russia, recognized by the World Technology Evaluation Centre in 1994, and a SID Fellow since 2008. He is an author of 6 books, 31 reviews and book chapters, about 333 journal papers, more than 718 Conference presentations, and 121 patents and patent applications, including 50 US patents in the field of liquid crystals since 1974. He got Excellent Research Award of the HKUST School of Engineering in 2012. He obtained the Gold Medal and The Best Award in the Invention & Innovation Awards 2014 held at the, which was hosted in Kuala Lumpur, Malaysia, on 20-22 Feb 2014. He has been a Member of the EU Academy of Sciences (EUAS) since July 2017. From 2018 until 2020, he worked as a Professor in the School of Physics and Optoelectronics Engineering at Foshan University, Foshan, China. 2020-2024 Vice President of Fellow of the Institute of Data Science and Artificial Intelligence (IDSAI). Since 2021, distinguished Fellow of the Institute of Data Science and Artificial Intelligence.



Martin Grell,

University of Chuka,
Kenya

Title: Field Effect Transducers For Nano Sensors

Abstract:

Sensitisers for various sensor technologies often owe their sensitivity and selectivity to their nanoscopic structure, either on their surface, or in bulk. Examples include zeolites [1,2], metal- organic frameworks [3], ion exchange resins [4], catalysts [5], composite nanoparticles [6], proteins [7], and aptamers [8]. In addition, sensors also rely on transducers to convert analyte/sensitiser association into a read- out. Transducers may be optical, e.g. [9,10], but often detect the change of electronic properties under analyte/sensitiser association. Transducers for sensors in the aqueous medium include AC capacitive [11] and amperometric methods, e.g. cyclic voltammetry (CV) and differential pulse voltammetry (DPV) [6]. However, potentiometric (voltage- sensitive) transducers based on field effect transistors (FETs) offer sensors with the lowest instrumental footprint. These were first introduced by Bergveld as the 'ion- sensitive field effect transistors' (ISFETs) [12]. Later, the 'extended- gate field effect transistor' (EGFET) [13] and the 'water- gate thin film transistor' (WGTFT) [14] designs joined the FET transducer 'family'. We here review the classification of ISFET/EGFET/WGTFT [15], discuss their relative merits, and present examples from our work. Particular emphasis will be on our 'agar- bridged' EGFET concept that we consider the most convenient and flexible electronic transducer for the aqueous medium. Bridged EGFETs offer both, a universal sensitiser immobilisation strategy without covalent coupling, and DC potentiometric read- out. This 'liberates' nanosensor researchers from covalent immobilisation and optical or AC electronic read- out equipment, allowing focus on the preparation of highly selective sensitisers.

Biography:

Martin Grell graduated with a PhD from the University of Darmstadt in 1994 and subsequently worked as a researcher at Bangor and Sheffield Universities, as well as the Max Planck Institute for Polymer Research. From September 2000 to August 2019, he served as an academic at the University of Sheffield, UK. His research focused on organic and other solution-processed electronic and photonic devices, particularly thin-film transistors and optical sensors. Since September 2019, he has been working as a consultant, currently collaborating with Riyadh, Taif, and Tabuk Universities in Saudi Arabia, and Chuka University, Kenya, where he also holds an external chair. His recent work is primarily focused on sensor devices, mainly in aqueous media.



Bulent Gultekin Akinoglu,

Middle East Technical University,
Turkey

Title: Role of Mineralogical Phase-Change Anomalies in Modifying Snow Ice Mass Balance

Abstract:

The rapid melting of polar ice sheets and so, is one of the main unknowns. The instability is not due to a sole factor. It occurs due to the complex coupling of thermodynamic and mechanical issues. The physical- chemical and biological issues on these processes. One of the main issues is ocean level increase. The analyses on the surface energy balance and latent heat release from due to instability in the ice sheet and how these thermal anomalies become mechanical drivers. The link between Marine Ice Sheet Instability hypothesis and purely atmospheric forcing will also discussed by continuum mechanics perspective. The theoretical groundwork on the use of an integrated model of the non-linear response of ice sheets to climate warming will be outlined.

Biography:

Bulent Gultekin Akinoglu, is a physicist in Department of Physics, Middle East Technical University, Ankara-Turkey. He is also affiliated by Earth System Science Department (ESS-METU) and also a member of GUNAM (Center for Solar Energy Research and Application-METU). Dr. Akinoglu is co-founder of ESS and ISES Turkish Branch. He is currently working on determining the countrywide solar irradiation prediction schemes, energy efficient houses, long and short term PV module and array performance calculations, paleo estimation of solar irradiation, sustainable development and sustainable energy policy issues.



Bernd Blobel,

University of Regensburg,
Germany

Title: Managing Knowledge-Based Integration and Interoperability in Intelligent and Ethical Transformed Health and Social Care Ecosystems

Abstract:

Health and social care systems around the world undergo a transformation towards personalized, preventive, predictive, participative precision medicine (5PM), considering the individual health status, conditions, genetic and genomic dispositions in personal, social, occupational, environmental and behavioral context from the perspective of multiple domains. For enabling communication and cooperation between actors from different domains using different methodologies, languages and ontologies based on different education, experiences, etc., we have to advance design and management of the resulting complex and highly dynamic ecosystem from data to knowledge level. The challenge is the consistent, correct and formalized representation of the transformed health ecosystem use-case specifically from the perspectives of all domains involved including the legal and ethical ones, representing and managing them based on related ontologies. The resulting business view of the real-world ecosystem must be interrelated using the ISO/IEC 21838 Top Level Ontologies standard. Thereafter, the outcome can be transformed into implementable solutions. The different viewpoints are represented using viewpoint-specific ICT ontologies, thereby extending the views defined in ISO/IWC 10746 through the real-world business view. The solution is a system-oriented, architecture-centric, ontology-based, policy-driven, interdisciplinary ecosystem design and management approach as standardized in ISO 23903 Health informatics - Interoperability and Integration Reference Architecture, developed by the author. For any use-case, comprehensive communication and cooperation between all actors and systems through mutual understanding by knowledge system mapping, but also the correct adaption of any system component in any viewpoint such as for re-using standards, specifications and products, is enabled. Following the proposed model and framework, we can enable integration and interoperability between any ecosystem component as well as communication and cooperation between all actors from all domains including the subject of care, but also between any existing ICT component.

Biography:

Bernd Blobel studied Mathematics, Technical Cybernetics and Electronics, Theoretical Physics, Biocybernetics, Informatics, and Medicine at different universities in East Germany. He received the PhD degree in Physics with the PhD thesis "About the mechanism of information processing and energy transformation in bioreceptors – a general and membrane structure related transducer model". Furthermore, he received a habilitation in Medicine with a postdoctoral thesis "Implications of physical environmental factors on health", and a habilitation in Medical Informatics with a postdoctoral thesis "Analysis and Design for Secure and Interoperable Distributed Health Information Systems". He was Head of the Physical Laboratory in Environmental Medicine at the Medical University Magdeburg and thereafter Head of the Medical Informatics Department and then Director of the Institute for Biometrics and Medical Informatics at the Medical Faculty of the Otto-von-Guericke University Magdeburg. In 2004, he became Founder and Head of the Health Telematics Project Group at Fraunhofer Society, Institute of Integrated Circuits (IIS), Erlangen, and thereafter Head of the German National eHealth Competence Center (eHCC) and Head of the globally unique International Interdisciplinary PhD and PostDoc College at the University of Regensburg. He is the author of more than 600 scientific publications.



Dror Malka,

Holon Institute of Technology (HIT),
Israel

Title: AI-Optimized Green-Light WDM Multiplexer Based on Multi-core Polymer Optical Fiber

Abstract:

The increasing demand for compact and energy-efficient photonic systems operating in the green spectral region has accelerated the development of integrated wavelength-division multiplexing (WDM) solutions. However, conventional multiplexing approaches rely on discrete and bulky optical components, leading to increased insertion loss, limited scalability, and reduced integration capability. At the same time, emerging neuromorphic photonic architectures require multifunctional platforms capable of simultaneous wavelength multiplexing and optical weighting. In this work, we propose an AI-assisted design and optimization framework for a four-channel green-light WDM multiplexer based on multicore polymer optical fiber (AI-POF technology). The device employs a multicore structure with embedded polycarbonate (PC) cores arranged in a symmetric hexagonal lattice within a fluoropolymer matrix. Passive wavelength multiplexing is achieved through engineered inter-core coupling, enabling efficient operation across the 500–560 nm spectral range without the need for external gratings or lenses. Artificial intelligence–enhanced RSoft beam propagation method (BPM) simulations are utilized to optimize the coupling geometry and switching length, allowing a single coupling region to satisfy phase-matching conditions for all four wavelength channels simultaneously. The optimized 20-mm fiber segment demonstrates low insertion loss (0.13–0.55 dB), uniform 20-nm channel spacing, and strong resilience to thermal and wavelength variations. The AI-driven optimization further enables precise control of wavelength-dependent power distribution, supporting passive optical weighting analogous to synaptic functionality in neuromorphic systems. Beyond multiplexing, the proposed architecture allows adaptive tuning of the switching length to achieve controlled weighted summation at the output, effectively integrating WDM functionality with photonic computing capabilities. Experimental validation using a two-channel prototype at 500 nm and 540 nm confirms strong agreement with simulation results, demonstrating efficient spatial multiplexing and signal convergence within the fiber. The presented AI-POF-based design eliminates the need for multiple coupling sections and discrete optical elements, significantly reducing structural complexity while enhancing spectral efficiency. This work establishes a scalable and compact platform for green-band WDM systems and AI-driven neuromorphic photonic interconnects, highlighting the potential of combining polymer photonics with intelligent design methodologies.

Biography:

Dror Malka received his BSc and MSc degrees in electrical engineering from the Holon Institute of Technology (HIT) in 2008 and 2010, respectively, Israel. He has also completed a BSc degree in Applied Mathematics at HIT in 2008 and received his Ph.D. degree in electrical engineering from Bar-Ilan University (BIU) in 2015, Israel. Currently, he is a Senior Lecturer in the Faculty of Engineering at HiT. His major fields of research are nanophotonics, super-resolution, AI silicon photonics and fiber optics. He has published around 80 refereed journal papers, and 80 conference proceedings paper.



Paulo Cesar De Morais,

Catholic University of Brasilia,
Brazil

Title: Graphene Quantum Dots as a New Platform for Photodynamic Therapy

Abstract:

Halogen-decorated graphene quantum dots (X@GQDs) will be herein explored as a material platform for application in photodynamic therapy (PDT). GQDs have been extensively studied in biomedical areas such as bioimaging, bio-sensing and photothermal therapy due to their superior optical and physiochemical properties. Application of GQDs in PDT has been explored lately, but currently the main challenges are inadequate singlet oxygen (1O2) quantum yield (QY), poor solubility, and biocompatibility. In this talk, the synthesis of a new class of halogen (fluorine) containing GQDs (F@GQDs) will be described. The as-synthesized F@GQD sample demonstrates an average particle size below 3 nm with a fluorine doping content of around 2%. The synthesized F@GQDs show improved water solubility and biocompatibility, while emitting strong green fluorescence and QY slightly above 13%. Moreover, the photodynamic activity was successfully tested in bioassays (in vitro).

Biography:

Paulo César De Morais (H62), PhD, was full Professor of Physics at the University of Brasilia (UnB) – Brazil up to 2013. Appointed as UnB's (Brazil) Emeritus Professor (2014); Visiting Professor at HUST – China (2012-2015); Distinguished Professor at AHU – China (2016-2019); Full Professor at the Catholic University of Brasília (UCB) – Brazil (2018); CNPq-1A Research Fellow since 2010; 2007 Master Research Prize from UnB. He held two-years (1987-1988) post-doc position with Bell Communications Research, New Jersey – USA and received his Doctoral degree in Solid State Physics (1986) from the Federal University of Minas Gerais (UFMG) – Brazil. With more than 14,500 citations, He has published over 500 papers, presented more than 250 international invited talks (35 countries), and filled 16 patents.



Erol Sancaktar

The University of Akron,
USA

Title: Effective Partial Carbon Black Replacement by Pyrolyzed Soybean Hulls in Composites with High Density Polyethylene

Abstract:

Electrically conductive polymer composites have a variety of applications in electronics and packaging. This work focuses on effective (w.r.t. electrical conduction and mechanical properties) partial replacement of carbon black (CB) fillers by pyrolyzed soybean hulls (PSBH) in order to achieve a degree of ecological advantage. Low conductivity of biochar requires it to be coupled with higher conductivity fillers like CB. In this work, the effects of adding PSBH on the electrical conductivity and mechanical properties of high-density polyethylene (HDPE)/CB composites are presented. The results reveal that a certain percentage of the CB content (above 18 wt % CB level) can be replaced with PSBH, effectively providing higher conductivity even though the amount of the PSBH to be added needs to be higher than the amount of CB needed (i.e., 3% wt for CB vs 21% wt for PSBH) to achieve the same increase in conductivity. The reduction in tensile strength to achieve the same conduction level with and without adding (~ 21 wt %) PSBH is ~6% (a drop from ~50 MPa to ~47 MPa). The effects of processing parameters, including rate of mixing (rpm), mixing time, and processing temperature are also presented.

Biography:

Erol Sancaktar Professor Emeritus (University Akron – UA, Aug. 2020), (Ph.D.; Eng. Mechanics, Virginia Tech) is Fellow of ASME, served as ASME Technical Committee Chair for Reliability Stress Analysis, Failure Prevention (1997-2008; 2013-), Associate Editor for ASME J. Mech. Design (1995-2006) and Medical Devices (2006-2013) and organized 30 Conferences. He taught at the Mechanical Eng. Dept., Clarkson University during 1978 to 1996 before joining UA in 1996 as Professor of Polymer Engineering and Professor of Mechanical Engineering (starting 2009). He edited 25 books, authored >120 journal articles and 30 book chapters. He delivered 249 technical presentations and has 4 patents.

DAY- 2

ORAL PRESENTATIONS

OCTOBER 29-30, 2026

BERLIN, GERMANY



Manjushree Bhattacharyya,

Vidyasagar University,
India

Title: A Facile Highly Selective Colorimetric Detection of Pb2+ Ions Using Gold Nanoparticles as a Probe and its Application in Real Samples Analysis

Abstract:

In current times environmental pollution due to cause of heavy metal ions has reached one of the most demanding challenges on the earth. Among all heavy metals, lead ions are the most dangerous metal ions even at low concentrations. According to WHO the allowable level of Pb2+ in drinking water was less than 10 nM. Therefore, it's very much crucial to detect Pb2+ ions selectively. Here I have introduced a facile green tactic way for synthesis of gold nanoparticles for colorimetric recognition of Pb2+ ions. Various spectroscopic techniques such as UV-Visible, FTIR, TEM, EDX, XRD, SAED, AFM, DLS, FE-SEM, XPS, Zeta Potential were applied for characterization of the nanoparticles. The AuNPs exhibited a SPR peak 542 nm having diameter 25.26 nm with varying morphology like spherical, triangle, truncated triangles and decahedral. It shows very fast notable colorimetric identification of Pb2+ ions within 9 sec in naked eye. The synthesized probe displayed its maximum stability and sensing activity at a wide range of pH from 3.3 to 7.9, which was one of the most significant aspects of this research work. In addition, the probe exhibited very lower limit of detection (LOD =76.14 fM) by changing colour from red to violet with a prominent red shift of peak from 542 nm to 630 nm. Moreover, here no metal cations and anions are interfered. Besides, our synthesized probe was useful in real samples analysis and the results demonstrated it fitted large scale recovery with good precision.

Biography:

Dr. Manjushree Bhattacharyya has completed Ph.D. work in Chemistry as a Research Fellow (02/01/2019 - 02/01/2024) using the scheme of UGC- NET (JRF), All India Rank (AIR)-58. She has two notable publications and three preprint articles. She did her Master's (rank holder, 3rd rank) in Vidyasagar University with specialization of Organic Chemistry. She has carried out Bachelor of Science (B.Sc.) in Chemistry (Honours) with silver medal award. She has also qualified various national exam like JAM, Joint CSIR-UGC NET, GATE. Her major research interest is the development of nanoparticles-based sensors for detection of toxic metal ions through colorimetric approach.



Lucia Mergola,

University of Salento,
Italy

Title: Preparation Of Green Nanotools As New Photothermal Agents In Antimicrobial Disinfection And Cancer Care

Abstract:

Nanomedicine represents the most interesting and promising applications of nanotechnologies that exploit the peculiar characteristics of nanomaterials in the development of new and more effective therapies, from antibacterial to antitumoral treatments. Nanoparticles-mediated photothermal therapy (PTT) is an emerging treatment that exploits the unique optical characteristics of nanoparticles to generate heat when irradiated with light in the near-infrared region (NIR). In this work, green gold nanoparticles, obtained from Lambrusco winery waste extract, were tested as possible NIR-triggered photothermal agents in PTT. Reducing sugars and polyphenolic compounds, naturally occurring in grape marc waste, can act as reducing and stabilizing agents in gold nanoparticles formation instead of conventional toxic compounds. UV-vis spectroscopy was used to follow gold nanoparticles formation, confirmed from the appearance of a plasmonic band at 535 nm. A second peak at 286 nm, typical of phenolic groups, demonstrated the presence of a polyphenolic layer on the nanoparticle surface, also confirmed from FTIR studies. TEM and XRD analyses revealed their crystalline nature with an average diameter of about 30 nm. The presence of a third peak in the near infrared region (750 nm) makes synthetized gold nanoparticles good photothermal agents with a temperature increase of about 22.1 ºC after 10 minutes of NIR laser irradiation. Biocompatibility studies on human fibroblasts and breast cancer cells (MCF-7) demonstrated good biocompatibility also at high concentrations (400 **µg** mL-1) since the cell viability remains superior to 70% during 72 hours of studies. Finally, antibacterial and antitumoral effects of synthesized nanoparticles were observed after NIR laser irradiation with a cell viability inhibition at higher concentration of 41.7% and 52.5% in S. Aureus and E. Coli, respectively, as well as a reduction of MCF-7 viability to 37%.

Biography:

Dr. Lucia Mergola is an assistant professor at the University of Salento. She received her PhD degree (2013) from University of Salento in Materials engineering and structures, under the supervision of Professor Giuseppe Vasapollo (Emeritus Professor in Chemistry). She was a postdoctoral research fellow (2015-2021) in the Department of Engineering for Innovation at University of Salento. In February 2015, she contributed to the production of a published review titled "Molecularly Imprinted Polymer: Present and future prospective", that received the Best Paper Award 2015 of the International Journal of Molecular Science (MDPI). Moreover, in May 2017, she received the PJ ZEON Award for outstanding paper published in Polymer Journal 2016, announced by the Society of Polymer Science Japan (SPSJ). In 2022 she started a new experience as Researcher in the Department of Engineering for Innovation at the University of Salento. A lot of scientific works were disseminated worldwide through participation in international congresses. The research interests are mainly focused on green metal nanoparticles preparation and their application in water decontamination and biomedical field; ion imprinted technology; molecularly imprinted polymers for biomarkers detection; molecularly screen-printed electrode.



Dr. Sujit Kumar Bandyopadhyay,

Retired Scientist, Variable Energy Cyclotron Centre.,
India

Title: Role Of D Electrons In Multifunctional Materials

Abstract:

Multifunctional materials are of today's quest. A class of multifunctional materials display simultaneous ordering in different dimensions like magnetism, polarization etc. They are more known as multiferroics. Quite a significant number of them are based on perovskite structures having a transition metal ion in the body centre. The electronic configuration of this central transition element plays a key role in the behavior of those multiferroics. For example, those with d0 configuration display ferroelectricity while those with dn (where n is non-zero) generally display magnetic behavior. The d0 configuration leads to distortion of metal-oxygen bond in these perovskites and breaking of special inversion symmetry causing a local dipole moment and ferroelectricity. Often this distortion in metal-oxygen bond is caused by lone pair of electrons of non-transitional cations in the corners of the perovskite structure. BiFeO3 (BFO) is a shining example of this kind of distortion, where the central ion Fe (III) causes magnetism but Bi (III) ions in the corner cause the polarization leading to the multiferroicity in BFO displaying both ferroelectric and anti ferromagntic ordering. The symmetry breaking manifests in different kinds of ordering. Moreover, the variable valency of the central transition metal ion with d electrons manifests in redox behavior in these materials leading to various uses. We have observed such various functions in the multiferroic BFO like ferroelectric, magnetic and high specific capacitance rendering these materials useful in green energy storage materials. Moreover, these redox behavior of these transition metal ions also leads to antimicrobial behavior in BFO.

Biography:

Dr. Sujit Kumar Bandyopadhyay is an Emeritus Fellow who served at the Meghnad Saha Institute of Technology from 2017 to 2020 and at the Institute of Engineering and Management from 2020 to 2021. He is a former Head of the Material Science Studies Division and served as Scientific Officer (H)+ and Professor at the Homi Bhabha National Institute, Variable Energy Cyclotron Centre (VECC), Department of Atomic Energy, Government of India. He retired on superannuation on 30 September 2015. Dr. Bandyopadhyay began his career in 1978 as a Scientific Officer in the Chemical Engineering Division of the Bhabha Atomic Research Centre and joined the Variable Energy Cyclotron Centre in 1982 in the same capacity. He obtained his PhD in Physics from Jadavpur University in 1998, with a thesis titled "Charged Particle Irradiation Studies on Copper Oxide Superconductors." In 2000, he worked as a Postdoctoral Fellow at the Atomic Institute of Austrian Universities, Vienna, focusing on magnetisation studies of neutron-irradiated high-temperature superconductor single crystals. He has been a Professor at the Homi Bhabha National Institute, a deemed university, since 2009. His achievements include the National Science Talent Search (NSTS) Scholarship and the National Scholarship from the Government of India in 1971, as well as the A. P. J. Abdul Kalam Award for outstanding research.



Melika Afshar,

University of Ottawa,
Canada

Title: Active Control of Ablation Threshold of Materials Using Optical Vortex Beams.

Abstract:

The performance and robustness of laser material processing is governed by the ablation threshold, defined as the minimum laser energy required to initiate material removal. Conventionally, the ablation threshold is regarded as a well-defined quantity determined solely by intrinsic material properties and laser parameters such as wavelength, pulse du ration, and repetition rate. Under fixed irradiation conditions, this threshold is assumed to be immutable, limiting control over laser–matter interaction. In this work, we challenge this long-standing assumption by demonstrating active control of ablation threshold in dielectrics, semiconductors, and metals using asymmetric optical vortex beams carrying orbital angular momentum (OAM). By shifting the phase singularity of the beam and changing its handedness, we tailor the spatial distribution of optical phase and intensity, thereby modulating multiphoton absorption during laser irradiation. This enabled us to achieve up to 60% variation in the ablation threshold under both single-pulse and multi-pulse irradiation. This approach enables dynamic control of laser–matter interactions, offering new opportunities for mitigating damage in high-energy optical systems and precision fabrication of microstructures with engineered morphologies and enhanced control.

Biography:

Melika Afshar is a started my PhD at the University of Ottawa, where I have been studying the fundamental physics of laser–material interactions. My first research project investigated laser-induced phase transformations in silicon during femtosecond laser ablation. In collaboration with other research groups, I have also worked on the fabrication of optical waveguides in fused silica and laser inscription of fiber Bragg gratings. My current research investigates how the helicity of optical vortex beams influences the laser ablation threshold of materials, providing new insights into light–matter interactions and laser processing.



Afreen Ahtesham,

Northumbria University
United Kingdom

Title: Enhanced Bioenergy Production by a Pre-Cultured Pseudomonas–Bacillus Consortium Using a PANI/rGO/g-C_3N_3 -Modified Flexible Anode in a Single-Chamber Air-Cathode Microbial Fuel Cell

Abstract:

Microbial fuel cells (MFCs) enable simultaneous bioenergy recovery and wastewater treatment, yet their output is frequently constrained by slow extracellular electron transfer at the anode. This study reports a flexible carbon felt anode modified with a polyaniline/reduced graphene oxide/graphitic carbon nitride (PANI/rGO/g-C_3N_3) nanocomposite, prepared by a simple drop-casting technique, and evaluated in a single-chamber, membrane-less, air-cathode MFC inoculated with a pre-cultured Pseudomonas–Bacillus consortium. The synthesized electrode was characterized for its physicochemical and electrochemical properties, and metagenomic analysis confirmed successful composite formation alongside enrichment of an electroactive microbial community at the anode surface. Cyclic voltammetry revealed well-defined redox behaviour, with an oxidation peak at +0.43 V and a reduction peak at −0.42 V, indicating active surface redox processes and strong biofilm electroactivity. The modified anode reached a specific capacitance of 0.318 F g^{-1}, attributed to effective bacterial attachment, while electrochemical impedance spectroscopy showed low internal resistance (Rs = 1.29 Ω, Rct = 49.72 Ω), consistent with improved interfacial electron transfer. The system delivered a maximum power density of 101.8 mW m^{-2} together with efficient pollutant removal, achieving chemical oxygen demand (COD) reduction exceeding 96%. Concurrent degradation of methyl orange was monitored by UV–Vis spectroscopy, which showed near-complete disappearance of the characteristic 464 nm absorbance peak within 72 h. These findings demonstrate that the PANI/rGO/g-C_3N_3 -modified flexible anode enhances both power generation and dye-laden wastewater treatment, supporting conductive polymer/carbon nanocomposite anodes as a practical route to higher-performance bioelectrochemical systems.

Biography:

Afreen is pursuing PhD in Chemical Sciences from Universiti Sains Malaysia and is currently a visiting researcher at Northumbria University under a Commonwealth Split-Site Scholarship. Her research focuses on polymer- and carbon-based electrode materials for microbial fuel cells, electrochemical characterization, wastewater treatment, and voltammetric biosensing, spanning conducting-polymer/carbon-nanomaterial composites and their application to bioelectrochemical energy and environmental systems.

DAY- 2

POSTER PRESENTATIONS

OCTOBER 29-30, 2026

BERLIN, GERMANY



Aleksandra Mosenoka,

Daugavpils University,
Latvia

Influence of Synthetic Gold Nanoparticles on Growth and Physiological Responses of Rucola (Eruca Sativa Mill.) Seedlings Under Salt Stress

Abstract:

Soil salinisation challenges plant production, and nanoparticles have been investigated to alleviate salt stress. In this study, we evaluated the effects of synthetic gold nanoparticles (AuNPs) on rucola (Eruca sativa Mill.) seedlings grown under NaCl stress. Six-day-old seedlings were grown hydroponically for 18 days in media containing 2 mg/L AuNPs, 50, 100 or 150 mM NaCl, or their combinations. Plant survival, growth, biomass, leaf area, elemental composition, hydrogen peroxide, chlorophyll, anthocyanins, nitrogen balance index (NBI), chlorophyll a fluorescence (OJIP test) and genomic template stability (GTS) were assessed. Treatment with 150 mM NaCl, with or without AuNPs, resulted in complete plant mortality. At 50 mM NaCl, the addition of AuNPs increased shoot and root length, fresh biomass and Ca, Mg, Mn, Fe, Zn and Cu contents compared with NaCl alone, although these values mostly remained below the control and survival was significantly reduced. At 100 mM NaCl, AuNPs increased survival compared with NaCl alone, but fresh biomass remained below the control. AuNPs alone resulted in the highest hydrogen peroxide content and lower chlorophyll and NBI values. Anthocyanin content increased under all treatments, whereas flavonoid differences were not significant. Chlorophyll a fluorescence showed changes in OJIP kinetics and photosynthetic electron transport, most pronounced under the combined AuNPs + NaCl treatment. GTS decreased significantly in all experimental groups, with the lowest GTS under 100 mM NaCl + AuNPs. Overall, AuNPs showed limited, stress-dependent effects, providing new insights into their interaction with plant responses to salinity and their potential to modulate plant stress responses.

Biography:

Aleksandra Mošenoka is a PhD student and laboratory assistant at the Genomics and Biotechnology Laboratory of Daugavpils University, Latvia. Her research focuses on plant biotechnology and the effects of nanoparticles on plant growth, development, and genome stability. She is involved in research investigating the effects of nanoparticles on plant physiology and genotoxicity, as well as the application of nanotechnology in plant science.



Blake Daiber,

Auburn University,
USA

Title: Lowering Entry Costs of Two Photon Polymerization by Creation of Visible Wavelength Processes

Abstract:

Two photon polymerization (TPP) is a form of 3D printing that allows for the creation of microstructures below the standard diffraction limit by using two-photon absorption to have polymerization only occur within the focal volume of a laser. The current standard laser wavelength for TPP processes is 780 nm to take advantage of the fact that UV curable resins and lithographic processes are in abundance. However, this standardization also restricts the ability to engage with TPP as the most commonly used lasers are expensive Ti;Sapphire that are part of even more costly machines. Here we have shown the ability to customize a TPP process for a 522 nm wavelength laser and have implemented it on a standard optical table. By modifying the chemistry of a resin formula that has been proven to work for 780 nm processes we developed a resin optimized for 522 nm. This resin was then shown to be able to produce simple structures on a variety of substrates that are commonly used within the semiconductor and optical industries. With these findings, we show that a TPP process can be created that allows microstructures to be created on simple optical tables with less expensive setups. These findings lower the entry costs of TPP by allowing labs to use preexisting optical setups and lasers.

Biography:

Blake Daiber is a completed my Bachelors in Computer Science from the University of Alabama in Huntsville in 2019. Driven by a desire to do hands on research building quantum computing components, I enrolled in the PhD program at Auburn University where I currently research how to create an integrated photonic chip that has a source of light and entanglement located on chip. I strive to be able to apply my research in the field of quantum simulation.

SUPPORTING JOURNALS

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Journal of Nutrition and Diet Management

Journal of Alternative Medicine and Therapies

Journal of Nanotechnology and Nanobiotechnology

Journal of Oral Diseases and Treatment

Journal of Skin Health and Cosmetics

Journal of Pharmacology and Drug Delivery

Journal of Mental Health and Behavioural Science

Journal of Neonatology and Pediatric Care

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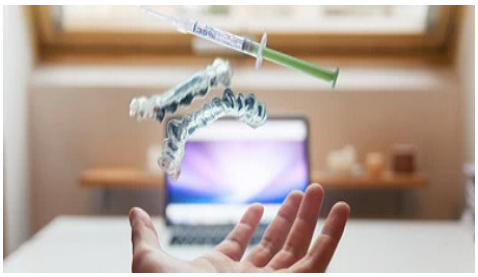
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UPCOMING CONFERENCES

NOVEMBER - CONFERENCES

WORLD CONGRESS ON
CLINICAL AND EXPERIMENTAL DERMATOLOGY
NOVEMBER 23 - 24, 2026 | BARCELONA, SPAIN

4TH INTERNATIONAL CONFERENCE ON
SURGERY AND ANESTHESIA
NOVEMBER 26-27, 2026 | BARCELONA, SPAIN

2026

5TH INTERNATIONAL CONFERENCE ON
PRIMARY HEALTH CARE
NOVEMBER 26-27, 2026 | BARCELONA, SPAIN

INTERNATIONAL CONFERENCE ON
OTOLARYNGOLOGY-ENT SURGERY
NOVEMBER 26-27, 2026 | BARCELONA, SPAIN

MARCH - CONFERENCES

4TH WORLD CONGRESS ON
PHYSICAL MEDICINE AND REHABILITATION
MARCH 18–19, 2027 | BARCELONA, SPAIN

2027

4TH INTERNATIONAL CONGRESS ON
PSYCHOLOGY & BEHAVIORAL SCIENCES
MARCH 18–19, 2027 | BARCELONA, SPAIN

4TH INTERNATIONAL CONFERENCE ON
DERMATOLOGY & SKINCARE
MARCH 18–19, 2027 | BARCELONA, SPAIN

APRIL - CONFERENCES

2ND INTERNATIONAL CONFERENCE ON
DIGITAL HEALTH INNOVATIONS AND ADVANCED NURSING PRACTICE
APRIL 22-23, 2027 | AMSTERDAM, NETHERLANDS

2027

4TH GLOBAL SUMMIT ON
NURSING AND MIDWIFERY
APRIL 22-23, 2027 | AMSTERDAM, NETHERLANDS

WORLD SUMMIT ON
CLINICAL TRIALS, AI AND HEALTHCARE TECHNOLOGIES
APRIL 22-23, 2027 | AMSTERDAM, NETHERLANDS

MAY - CONFERENCES

6TH INTERNATIONAL CONFERENCE ON
GYNECOLOGY AND OBSTETRICS
MAY 20–21, 2027 | PARIS, FRANCE

5TH INTERNATIONAL CONFERENCE ON
PEDIATRICS & NEONATOLOGY
MAY 20 - 21, 2027 | PARIS, FRANCE

GLOBAL CONGRESS ON
NEPHROLOGY AND KIDNEY HEALTH
MAY 20 - 21, 2027 | PARIS, FRANCE

2027

6TH INTERNATIONAL CONFERENCE ON
GLOBAL ENTREPRENEURSHIP SUMMIT
MAY 25–27, 2027 | TORONTO, CANADA

4TH INTERNATIONAL CONFERENCE ON
AI IN HEALTHCARE, INDUSTRY & REGULATORY AFFAIRS
MAY 25–27, 2027 | TORONTO, CANADA

JUNE - CONFERENCES

4TH EUROPEAN CONFERENCE ON
DENTISTRY AND ORAL HEALTH
JUNE 17 - 18, 2027 | BERLIN, GERMANY

2027

4TH INTERNATIONAL CONFERENCE ON
OPHTHALMOLOGY & VISION SCIENCE
JUNE 17 - 18, 2027 | BERLIN, GERMANY

AUGUST - CONFERENCES

5TH INTERNATONAL CONFERENCE ON
NEUROLOGY & NEUROLOGICAL DISORDERS
AUGUST 26–27, 2027 | BOSTON, USA

2027

2ND WORLD CONGRESS ON
AUTISM RESEARCH & INNOVATION
AUGUST 26–27, 2027 | BOSTON, USA

2ND GLOBAL CONGRESS ON
ADDICTION MEDICINE, BEHAVIORAL HEALTH & PSYCHIATRIC RESEARCH
AUGUST 26–27, 2027 | BOSTON, USA

SEPTEMBER - CONFERENCES

INTERNATONAL CONFERENCE ON

ADVANCED REHABILITATION & PHYSICAL MEDICINE

SEPTEMBER 23 - 24, 2027 | LAS VEGAS, USA

5TH INTERNATONAL CONFERENCE ON

INNOVATIONS AND ADVANCES IN CANCER RESEARCH AND TREATMENT

SEPTEMBER 23 - 24, 2027 | LAS VEGAS, USA

2ND WORLD CONGRESS ON

TRAUMA, CRITICAL CARE AND EMERGENCY MEDICINE

SEPTEMBER 23 - 24, 2027 | LAS VEGAS, USA

NOVEMBER - CONFERENCES

INTERNATIONAL CONFERENCE ON

AUTISM RESEARCH AND NEURODEVELOPMENTAL DISORDERS

NOVEMBER 11 - 12, 2027 | AMSTERDAM, NETHERLANDS

5TH INTERNATIONAL CONFERENCE ON

INFECTIOUS DISEASES & GLOBAL HEALTH

NOVEMBER 11 - 12, 2027 | AMSTERDAM, NETHERLANDS

NOTE

Upcoming Conferences

We wish to engage with you again in 2027...

4th INTERNATIONAL CONFERENCE ON OPTICS AND LASER TECHNOLOGY

OCTOBER 07-08, 2027 | BERLIN, GERMANY

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&

4th WORLD CONGRESS ON NANOTECHNOLOGY, ARTIFICIAL INTELLIGENCE AND ADVANCED ENGINEERING

OCTOBER 07-08, 2027 | BERLIN, GERMANY

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