BENGALURU INDIA NANO 2022 - PROGRAMME AT A GLANCE

DAY 1 | M ONDAY | 7TH MARCH, 2022

TIME	HALL - 1	HALL - 2	HALL - 3
10:00 am - 11:00 am	**INAUGURATION**		
11:15 am - 12:00 pm	**PLENARY LECTURE - I**		
12:10 pm - 12:55 pm	**PLENARY LECTURE - II**		
12:55 pm - 01:30 pm	**Interactive Poster Session @ Poster Zone**		
TIME	**HALL - 1**	**HALL - 2**	**HALL - 3**
01:30 pm - 03:00 pm	Nano in Hydrogen Economy	Nano in Medicine	Fueling Manufacturing on the Nanoscale in India by Developing Semiconductor Ecosystem.
03:10 pm - 04:40 pm	Nano in Electronics	Nano in Manufacturing	Nanotechnology in Pharma and Medicine: Current Status and Future Opportunities in India
04:50 pm - 05:35 pm	Israel Nano Ecosystem – Connecting Academic & Industry		Infineon and Fraunhofer Institutes: Nanotech Made in Germany

DAY 2 | TU ESDAY | 8TH MARCH, 2022

TIME	HALL - 1	HALL - 2	HALL - 3
10:00 am - 10:45 am	**PLENARY LECTURE - III**		
10:55 am - 11:40 am	**PLENARY LECTURE - IV**		
TIME	**HALL - 1**	**HALL - 2**	**HALL - 3**
11:50 am - 01:20 pm	Nano for the Young	Nano in Food and Agriculture	Focus on Funding
01:20 pm - 01:50 pm	**Interactive Poster Session @ Poster Zone**		
01:50 pm - 03:20 pm	Nano in Textile	Nano Photonics	NanoSparX Startup Pitching
03:30 pm - 04:15 pm	North Rhine-Westphalia: Navigating Nanotechnology for Manufacturing:	Japan-India Co-Innovation through R & D	NanoCanada
04:15 pm - 05:00 pm	Come Innovate with the Netherlands Nano Ecosystem	**Nanotech Quiz**	**Interactive Poster Session @ Poster Zone**
05:00 pm - 05:30 pm	**NANO EXCELLENCE AWARDS**		
05:30 pm - 06:00 pm	**VALEDICTORY**		

DAY 3 | WEDNESDAY | 9TH MARCH, 2022

TIME	HALL - 1
10:00 am - 11:15 am	TUTORIAL 1- **Nano Fabrication**
11:25 am - 12:40 pm	TUTORIAL 2 - **Bottom-up Synthesis**
12: 50 pm - 01:20 pm	**Lunch Break**
01:20 pm - 02:35 pm	TUTORIAL 3 - **Characterization Tools**
02:45 pm - 04:00 pm	TUTORIAL 4 - **Nano Biology**

EVENT INAUGURATION

DAY 1 | MONDAY | 7TH MARCH, 2022
10:00 am - 11:00 am l HALL 1

Dignitaries :

Shri Basavaraj S. Bommai
Hon'ble Chief Minister of Karnataka

Prof. C.N.R. Rao, F.R.S.
Honorary Chairman, VGNT, Government of Karnataka;
National Research Professor & Linus Pauling Research Professor,
Honorary President, JNCASR, Bengaluru

Dr. C.N. Ashwath Narayan
Hon'ble Minister for Electronics, IT, Bt and S&T,
Higher Education, Skill Development,
Entrepreneurship & Livelihood, Government of Karnataka

Shri Rajeev Chandrasekhar
Hon'ble Minister of State for Skill Development,
Entrepreneurship, Electronics and IT,
Government of India

Shri Rizwan Arshad
Hon'ble Member of the Legislative Assembly, Shivajinagar
Assembly Constituency

Prof. Navakanta Bhat
Chairman, VGNT, Government of Karnataka
Dean, Division of Interdisciplinary Sciences,
Professor, CeNSE, IISc, Bengaluru

Dr. E.V. Ramana Reddy, IAS
Additional Chief Secretary to Government,
Department of Electronics, IT, Bt and S&T;
Department of Commerce & Industries,
Government of Karnataka

Prof. Ajay Kumar Sood, FRS
Chairman, CEC - Bengaluru INDIA NANO 2022
Year of Science Chair Professor,
Department of Physics, IISc, Bengaluru

Shri A. B. Basavaraju, IAS
Director (Technical), Dept. of Electronics, IT, Bt and S&T,
Government of Karnataka;
Managing Director, Karnataka Science and Technology
Promotion Society (KSTePS)

Presentation of "Prof. C.N.R. Rao Bengaluru INDIA NANO Science Award"

PLENARY LECTURE – I

DAY 1 | MONDAY | 7TH MARCH, 2022
11:15 am - 12:00 pm | HALL 1

Chair:

Prof. Navakanta Bhat
Centre for Nano Science and Engineering,
Indian Institute of Science, Bangalore

Plenary Speaker:

Prof. Federico Capasso
Harvard University, USA

Presentation Title: Flat Optics: from metalenses and cameras to structured light and dark

PLENARY LECTURE – II

DAY 1 | MONDAY | 7TH MARCH, 2022
12:10 pm - 12:55 pm | HALL 1

Chair:

Prof. Ajay Kumar Sood
Department of Physics, Indian Institute of Science, Bangalore

Plenary Speaker:

Prof. Xiaodong Chen
School of Materials Science and Engineering, Nanyang Technological University, Singapore

Presentation Title: Artificial Sense Technology
Abstract: Artificial senses refer to the emulation of human's basic senses and assimilate them to functional devices and systems to help us understand and perceive the world around us. This research topic of artificial senses is transdisciplinary and lies at the confluence of materials science, bioengineering, medical sciences, electrical engineering, and computer science. Some use cases, including enhanced sensory capabilities to overcome physical human limitations, improved robotic capabilities and diagnostics with smart information processing, and prosthetics and health-monitoring devices to improve quality of life, are drawing much attention. In this talk, I will present some latest progress in artificial tactile and olfaction with the viewpoint from materials development, sensor fabrication, information processing, and system integration. Artificial senses would be a new enabling technology to construct next-generation intelligent devices and systems, paving the way for advanced soft robotic applications, rehabilitation, prosthetics, and so on.

Nano in Hydrogen Economy

DAY 1 | MONDAY | 7TH MARCH, 2022, 01:30 pm - 03:00 pm | HALL 1

Chair:

Prof. S. Sampath
Department of Inorganic and Physical Chemistry, Indian Institute of Science, Bangalore

Speakers:

Dr. Ashish Lele
CSIR-National Chemical Laboratory, Pune

Presentation Title: Green hydrogen for atmanirbhar green future

Dr. Vijayamohanan K Pillai
Indian Institute of Science Education and Research, Tirupati

Presentation Title: Electrocatalytic Applications of Two Dimensional Materials for Hydrogen Economy
Abstract: Two Dimensional Materials either as mono/multilayers films or as quantum dots prepared exclusively using Molecular Nanotechnology have attracted much attention recently due to their tunable bandgap for water splitting. Electrocatalysis, Photocatalysis and Photoelectrocatalysis with these quantum dots especially after heteroatom doping have provided high efficiency for hydrogen production in comparison with similar behavior of their bulk analogues. In this lecture, I will focus on the generic aspects of electrocatalytic behavior of such two dimensional quantum dots by taking many examples like graphene, molybdenum sulphide, Tungsten disulphide and phosphorene. The common aspects of elemental as well as transition metal dichalcogenides as two dimensional materials for transformation to quantum dots and their size tuning will be discussed along with possible utility in generating green hydrogen

Prof.Balaji R. Jagirdar
Department of Inorganic and Physical Chemistry, Indian Institute of Science, Bangalore

Presentation Title: Turn to hydrogen for our energy demands
Abstract: Hydrogen, with a high chemical energy per mass equal to 142 MJ/kg has clearly emerged as an alternative to hydrocarbon fuels.1 Storage of hydrogen in large quantities for on-board applications remains a major impediment for its widespread usage in the so-called hydrogen economy. The low density of H2 makes it difficult to store in compressed or liquefied form. One viable way to store hydrogen for on-board applications that is relatively safe is in the chemical form. Hydrogenation catalysis is perhaps the massive man-made chemical reactions in the world. Even a small improvement in the catalytic activity implies huge savings in terms of both the costs involved and the resources required. In this talk, generation of hydrogen from certain substrates using catalysts, storage of hydrogen in the form of light metal hydrides and metal sponges, and efforts towards the development of more efficient hydrogenation catalysts will be discussed.

Nano in Medicine

DAY 1 | MONDAY | 7TH MARCH, 2022, 01:30 pm - 03:00 pm | HALL 2

Chair:

Prof. Ashok M. Raichur
Department of Materials Engineering, Indian Institute of Science, Bangalore

Speakers:

Prof. Rangaramanujam Kannan
Center for Nanomedicine, Wilmer Eye Institute, John Hopkins School of Medicine, USA

Presentation Title: Translation of Neuroinflammation-Targeted Nanomedicines

Abstract: Inflammation, mediated by reactive microglia/macrophages, plays a key role in many systemic, neurological and ocular disorders. Therefore, targeted, localized, and 'appropriate reprogramming' of reactive macrophages can have a significant impact on many disorders, offering potent therapeutic strategies for unmet needs. However, targeted delivery of drugs to specific cells at remote sites of injury is a challenge. We take advantage of the selective, intrinsic, pathology-dependent, reactive microglia/macrophage uptake of dendrimers (tree-like nanoparticles, 4nm in size, with no targeting moieties) in >40 models of central nervous system (CNS), ocular, and systemic disorder models in six species (mouse to primates, and humans). Building on such selective uptake, we have designed dendrimer-drug conjugates which have shown significant promise for translation. We show that appropriate manipulation of reactive glia/macrophages can have dramatic impact on inflammation, oxidative stress, excitotoxicity, neurobehavior and cognition in many models. These results not only provide unique insights into the role of macrophages on disease and repair, but also offer opportunities for developing potent systemic therapies for unmet needs, from childhood disorders such as cerebral palsy, to disorders affecting the elderly such as COVID-19, age-related macular degeneration (AMD), and Alzheimer's Disease. The systemic therapeutic approach opens avenues for the technology to benefit patients across a broad economic spectrum. Examples of the promise of this approach and efforts towards clinical translation will be presented.

Dr. Jyotsnendu Giri
Department of Biomedical Engineering, Indian Institute of Technology, Hyderabad

Presentation Title: Translation of Nanotechnology for Mass Health Care
Abstract: Nanotechnology demonstrated their clinical potential to change the course of diagnostics, therapy and human health care. However, there are several challenges related to the clinical translation of nanotechnology such as biological challenges, large-scale manufacturing, biocompatibility and safety, government regulations, and overall cost-effectiveness in comparison to current therapies. Nanoparticle system for nanomedicine application is usually far more complex and significantly more expensive to manufacture than conventional medicines. These challenges impose significant bottleneck to translate the nanotechnology from laboratory bench to market for mass health care, irrespective of whether they are therapeutically efficacious or not. My group have been working for last several years on the development of novel nanoparticles systems for delivery of drugs, protein therapeutics, regenerative medicine, and antimicrobial coating with the objective of translational nanoparticles system for effective and affordable mass health care applications. In this talk our several patented nanotechnologies will be discussed mainly focusing on the nanostructure hybrid lipid capsule (nHLCs) for cancer theragnostic, sugar-glass-nanoparticles (SGnP) and sugar-silk fibroin-nanoparticles (sSFnP) for protein therapeutics (stabilization and delivery) and regenerative medicine, and “DuroKea” for next-generation antimicrobial nanotechnology.

Dr. Neetu Singh
Center for Biomedical, Engineering, Indian Institute of Technology, Delhi

Presentation Title: Engineering New Materials for Healthcare: A Chemist’s Perspective
Abstract: Among myriad of health issues of global populace today, the problems associated with better means of diagnosis, and repair and regeneration of organs, bones, cartilages, etc. remain a big challenge. The prospect of using nanoscience and nanotechnology as a tool to answer questions arising out of these healthcare issues are exciting and form the basis of this talk. Nanostructures, due to their similar size scale as bio-macromolecules and cellular components, provide an unprecedented opportunity to target and potentially modulate important biological processes. Some of the key nanotechnology based scientific and technological contributions from our laboratory that are impacting disease diagnostics and tissue engineering will be discussed. Briefly, examples illustrating how knowledge of chemical science & nanotechnology has enabled us to develop platform technologies for easy quantification of cell growth, migration and disease progression. The technologies developed allow detecting diseases faster and achieving complex cell organization as seen in real organs for developing in vitro 3D organoid platforms for various applications.

Fueling Manufacturing on the Nanoscale in India by Developing Semiconductor Ecosystem

DAY 1 | MONDAY | 7TH MARCH, 2022, 01:30 pm - 03:00 pm | HALL 3

Chair:

Mr. Jitendra Chaddah
Intel India, Bangalore

Speakers:

Prof. V. Ramgopal Rao
Indian Institute of Technology, Delhi

Mr. Balajee Sowrirajan
Samsung Semiconductor, India R&D Centre, Bangalore

Mr. Vikas Dabeer
Applied Materials

Mr. Subhash Chintamaneni
Micron Technology, Delhi

Success Stories:

Chair:

Mr. Shashishekar Adiga
Samsung R&D

Speakers:

Dr. Deepika Malwal
Log9 Material

Dr. Nitin Kale
NanoSniff

Dr. Kiruba Daniel
JK Nano Solutions

Mr. Siddhant Bhattacharya
Saveer Matrixnano

Mr. Mohammed Asif
Ad-Nano

Nano in Electronics

DAY 1 | MONDAY | 7TH MARCH, 2022, 03:10 pm - 04:40 pm | HALL 1

Chair:

Prof. V. Ramgopal Rao
Department of Electrical Engineering, Indian Institute of Technology, Delhi

Speakers:

Prof. Harish Bhaskaran
University of Oxford, UK
Presentation Title: The title is Engineering nanostructures at the interface between Photonics and electronics for computing.

Dr. Manan Suri
Department of Electrical Engineering, Indian Institute of Technology, Delhi

Presentation Title: Building an Intelligent Nanoelectronic World full of Memories
Abstract: We live in an era which is more memory-centric than ever. Factors that contribute to the ever increasing importance of nanoelectronic memory are – (i) Saturation of Moore's law, (ii) ease of generating enormous amounts of data and (iii) exciting new material properties. A fundamental shift in the vastly successful Von Neumann computational paradigm is needed to overcome the bottlenecks associated with data-intensive applications. This is where next generation nanoelectronic Non-Volatile Memory (NVM) technology plays a significant role. In our research at IIT-D, we have been actively working on exploiting the characteristics of emerging nanoelectronic memory devices & materials for a multitude of novel applications. In this talk, I will present a brief overview of our on-going R&D efforts related to NVM and its applications spanning across technology and use cases such as bio-inspired Neuromorphic computing.

Dr. Mayank Srivastava
Department of Electronic Systems EngineeringIndian, Institute of Science, Bangalore

Presentation Tiltle: The Future of (Nano) Electronics and Possible Roles India Can Play

Abstract: Like petroleum, electronics have become a key driver for significant economies in the world. For instance, on the commercial front, China has (recently) become the biggest exporter of electronics/semiconductor products globally. Taiwan's primary business is in Semiconductors, which is one of the critical drivers of their economy. Similarly, India's electronics import is on the verge of exceeding its oil import. At the strategic front, the technological capabilities are often driven by electronic / semiconductor technologies available in-house. In this context, India has attempted several times, in the last two decades, to catch the bus in terms of setting up a silicon CMOS foundry, which can cater to India's commercial, strategic and scientific needs. For all practical reasons, if India attempts to catch up with the west in technologies having a very high obsolescence rate, India may not be able to take the lead in the future. In this context, the question is, "How can India take the lead – at the international front - in Semiconductor R&D, leading to commercial and strategic independence"? The Speaker of this talk believes that for India to become a leader, India must jump the technology roadmap and invest pro-actively in disruptive technologies projected for the future rather than only catching up on the established technologies. This talk will be pitched with the vision and belief highlighted above while discussing five critical disruptive technologies, which can be game-changers as far as the future of electronics is concerned.

Nano in Manufacturing

DAY 1 | MONDAY | 7TH MARCH, 2022, 03:10 pm - 05:35 pm | HALL 2

Chair:

Prof. B L V Prasad
Centre for Nano and Soft Matter Sciences, Bangalore

Speakers:

Dr. Amol A. Kulkarni
CSIR - National Chemical Laboratory, Pune

Presentation Title: Continuous Manufacturing of Nanomaterials
Abstract: Continuous flow manufacturing of nanomaterials helps to achieve consistency in the material properties viz. dimensions (size or size distribution and shape), optical properties, electric properties, etc. The laboratory scale flow synthesis of nanomaterials is now a routine approach and has been demonstrated successfully for several materials. Taking laboratory scale synthesis to large scale manufacturing is a rather more challenging task when compared to scale-up for conventional organic or inorganic compounds where purity is more important and the physical forms do not matter at the reactor outlet. However, for the case of nanomaterials, the situation becomes more challenging as the energy supplied at a relatively much larger scale needs to deliver effects at nanometer length scales. Considering this aspect, it is necessary to control the reaction rates at a sub-microscopic length scales and ensure that the macroscopic effects are well understood so as to control the energy supply. In this presentation, we will present a detailed analysis of the nature of mixing and heat transfer at macroscopic condition on the synthesis of nanosilver in a cascade of continuous flow reactors. Need for early stage knowledge of the nucleation and growth dynamics is the key seen to control the growth and even encapsulation/coating of stabilizing agent on the nanomaterial thereby needing additional washing steps to make them useful for applications as antimicrobial agents, conducting inks and coatings.

Dr. Viswanath Balakrishnan
School of Engineering, Indian Institute of Technology, Mandi

Presentation Title: Challenges in manufacturing and mechanical reliability of nanoscale materials and devices

Abstract : Often, it is the large-scale manufacturing that hampers the transition of interesting nanomaterials from laboratory to industry. Scaling up the manufacturing process is also intertwined with complex issues of mechanical reliability and performance. Integration of multiple components that are needed to develop a heterogeneous system towards product development also demands newer processes and engineering skills. Lowering the cost of such system development to affordable prices with high rate nanomanufacturing is another big challenge. This talk will touch upon some of the fundamental challenges involved in nanomanufacturing and mechanical reliability of CNTs, 2D materials and phase change materials with focus on electrical, optical and supercapacitor device applications. Development of scalable processes with mechanistic understanding of vapour phase growth will be presented. In particular, issues of large area growth with uniform coverage, surface chemistry, presence of defects and thermal stresses leading to severe cracking and issues of mechanical reliability at nanoscale along with future prospects for improvements will be discussed

Dr. Nagahanumaiah
Central Manufacturing Technology Institute, Bangalore

Presentation Title: Engineering of Manufacturing Systems for Micro-Nano Fabrication - 4P (Product-Process-Production-People) Challenges

Abstract: In micro-nano systems engineering, the definition of geometric topographies and engineering of those into functional micro-nano devices that too in a batch scale is still a challenge. These need to be looked under multiple viewpoints related to product, process, production and people. This talk will highlight some of these 4P challenges in manufacturing of micro-nano devices, within the desired business attributes like innovative micro-nano systems being produced in batch scale at competitive price with improved quality. One can foresee the scaling of this technology would demand specialized equipment, precise instrumentation, and product and process standardization. In such efforts one has to address several aspects at the interface of engineering of micro-nano structured devices for various applications. Often helping technology development teams in the realization of novel designs/concepts by offering affordable support services would be demand modular and reconfigurable manufacturing systems. The efforts made by speakers team both at CMTI and CSIR-CMERI, focusing on designing and implementing manufacturing platforms underpinning the development and the batch production including packaging of micro-nano devices will be discussed.

Prof. C.S.Kumar
Micro Nano Robotics and Fabrication Facility, Department of Mechanical Engineering, Indian Institute of Technology, Kharagpur.

Presentation Title: Robotics and Automation technologies supporting Nano Scale Manufacturing

Abstract: Over the last couple of decades we are seeing considerable advances and developments in Nano science and technology. It is reaching various fields of our life and domains as in materials, electronics, healthcare etc. While interesting outcomes are being revealed often, developing products with repeated quality features needs a whole new type of technology support.
In my talk I will cover some of the mechanisms we are developing at IIT Kharagpur at the Micro Nano Robotics and Fabrication Facility to support manufacturing at such scales. A very interesting mix of robotics, manufacturing, human computer interaction (through haptics), augmented and virtual reality as well as new concepts in micro and nano manipulation is playing a key role in such a scheme of things. I will also touch upon ways the industry can connect in India to foster and develop own technologies for the future as there is considerable talent and knowledgebase in the country already.

Nanotechnology in Pharma and Medicine: Current Status and Future Opportunities in India

DAY 1 | MONDAY | 7TH MARCH, 2022, 03:10 pm - 04:40 pm | HALL 3

Chair:

Dr. Taslimarif Saiyed
Centre for Cellular and Molecular Platforms, Bangalore

Speakers:

Dr. Sujay Singh
Imgenex India Pvt. Ltd. Delhi

Dr. Praveen Kumar Vemula
Institute for Stem Cell Science and Regenerative Medicine, Bangalore.

Dr. Manzoor K
Centre for Nanoscience and Molecular Medicine, Amrita Vidyapeeta, Kerala

Case Studies Presentation

Chair:

Mr. Shashishekar Adiga
Samsung R&D

Mr. Debayan Dasgupta
Theranautilus Pvt Ltd

Mr. Naveen Hiremath
Organismic Technologies Pvt Ltd

Mr. Nitish Sathyanarayanan
Impres Health

Mr. Arun Chandru
Pandorum Technologies

Israel Nano Ecosystem – Connecting Academic & Industry

DAY 1 | MONDAY | 7TH MARCH, 2022, 04:50 pm - 05:35 pm | HALL 1

Moderator:

Mr. Joseph Avraham
Consul for Trade and Economic Affairs
Consulate General of Israel to South India

Speakers:

Ms. Alice Polacsi-Segev
Managing Director
Tel Aviv University Center for Nanoscience & Nanotechnology

Mr. Doron Myersdorf
Chief Executive Officer, StoreDot

Infineon and Fraunhofer Institutes: Nanotech Made in Germany

DAY 1 | MONDAY | 7TH MARCH, 2022, 04:50 pm - 05:35 pm | HALL 3

Moderator:

Mr. Friedrich Birgelen
Deputy Consul General, German Consulate Bangalore

Speakers:

Mr. Vinay Shenoy
Managing Director, Infineon Technologies

Mrs. Anandi Iyer
Director, Fraunhofer india office

PLENARY LECTURE - III

DAY 2 | TUESDAY | 8TH MARCH, 2022
10:00 am - 10:45 am | HALL 1

Chair:

Prof. G.U. Kulkarni
Jawaharlal Nehru Centre for Advanced Scientific Research, Bengaluru

Plenary Speaker:

Prof. Peidong Yang
College of Chemistry, University of California, Berkeley, USA
Presentation Title: Enabling nanotechnology to address grand climate challenges

PLENARY LECTURE - IV

DAY 2 | TUESDAY | 8TH MARCH, 2022
10:55 am - 11:40 am | HALL 1

Chair:

Prof. P.S. Anil Kumar
Department of Physics, Indian Institute of Science, Bangalore

Plenary Speaker:

Dr. S. Swaminathan
Centre for Nanotechnology & Advanced Biomaterials, SASTRA Deemed University, Thanjavur

Presentation Title: Skin – Designed by Nature Skin Tissue Engineering – Enabled by Nanotechnology
Abstract: Tissue engineering involves strategies to repair or replace damaged cells, tissues or organs. Various strategies have been employed using scaffolds, cells and signalling molecules. Our group has been actively involved in the regeneration of tissues such as skin, nerve, infarcted heart, blood vessel, etc using nanofibres. The scaffolds provide structural, mechanical, topographical and biological cues that are essential for the regeneration of tissue. This talk will cover our work in the development of random nanofibres for skin tissue engineering as well as 3D bioprinting.

Nano for the Young

DAY 2 | TUESDAY | 8TH MARCH, 2022, 11:50 am - 01:20 pm | HALL 1

Chair:

Prof. Ajay Kumar Sood
Department of Physics, Indian Institute of Science, Bangalore

Speakers:

Prof. Praveen Kumar Vemula
Institute for Stem Cell Science and Regenerative Medicine, Bangalore

Presentation Title: Protection of gut metabolites through Inflammation-targeting nanomaterials for the treatment of inflammatory bowel diseases
Abstract: Gut microbial metabolites have beneficial effect. However, they are seldom not stable in the GI tract, hence they are not suitable for oral therapy. Therefore, we have been developing next-generation inflammation-targeting nanoparticle that can encapsulate and stabilise metabolites, and deliver them to inflamed tissue in a targeted manner. These novel materials have enhanced therapeutic benefit in the treatment of inflammatory bowel diseases.

Prof. Ashok K Ganguli
Indian Institute of Technology, Delhi
Presentation Title: Nanotechnology in daily life
Abstract: Nanoscience and nanotechnology is an interdisciplinary area which overlaps across many disciplines starting from core sciences (Physics, Chemistry and biology) to materials science, engineering and medicine. Nano features and properties can be observed around us in living and non-living objects. There is nanoscience all around us, whether in the colour of butterflies, the ability of lizards to climb on walls and amazing technologies like antireflective coatings for solar panels, integrated circuits (IC chips), low cost biosensors for clinical and environmental applications, low cost microfluidics and agricultural nanotechnology and more recently examples of important developments against Covid -19 brought about by nanotechnology My aim here is to make students realise the presence of nanoscience and nanotechnology in everyday life.

Prof. Anindya Das
Department of Physics, Indian Institute of Science, Bangalore

Presentation Title: Magic land of Graphene for Nano Science

Abstract: The journey of Nano Science began with a famous statement, 'There's Plenty of Room at the Bottom' by Nobel Laureate Prof. Richard Feynman in 1959. His main message was that the ability to manipulate the atoms with our wish has enormous prospects with new properties, devices, and technologies. The isolation of a single layer of graphene by Prof. Geim and Prof. Novosolev in 2005 has shown that the dream of Feynman is indeed possible in reality. Notably, using the van der Waals nature of the material, one can arrange or stack one atomic layer with another one as we want. This has led to many unprecedented emerging phenomena in Nano Science. This talk will briefly discuss the evolution of Nano Science and its current status based on graphene and graphene-like two-dimensional layers and their heterostructures.

Nano in Food and Agriculture

DAY 2 | TUESDAY | 8TH MARCH, 2022, 11:50 am - 01:20 pm | HALL 2

Chair:

Dr. S Swaminathan
Centre for Nanotechnology & Advanced Biomaterials, SASTRA Deemed University, Thanjavur

Speakers:

Dr. Kavitha Sairam
FIB-SOL Life Technologies Pvt.Ltd, Chennai

Presentation Title: Light weight Nanofiber based carriers for Agriculturally important Soil microbes
Abstract: Among numerous other nanostructures for encapsulation of bioactive molecules, electrospun nanofibers have unique advantage of high surface area combined with an ease of macro-scale manipulation, as they form a non-woven mat. The dimensions of fibers generated through these techniques are in the range of 10-1000 nm, which accounts for their high surface area available for catalysis, cell adhesion, drug delivery and other functionalities. Therefore, electrospinning is an efficient system to encapsulate bio-active materials for storage and its delivery. FIB-SOL is currently developing and commercializing nanofibre-based agricultural inputs. The product is a five-gram fibre that is soluble in water and can be applied on the field using conventional or modern irrigation practices. The product addresses the demand for live bacteria that could rejuvenate the soil. It could also increase the nutrient utilization efficiency, allowing plants to assimilate nutrients in a better way.

Dr. Ramesh Raliya
Indian Farmers Fertiliser Cooperative Limited, India

Presentation Title: Nanotechnology for sustainable and precision agriculture: current state and future perspective
Abstract: The increasing food demand as a result of the rising global population has prompted the large-scale use of fertilizers. As a result of resource constraints and the low use efficiency of fertilizers, the cost to the farmer is increasing dramatically. Nanotechnology offers great potential to tailor fertilizer production with the desired chemical composition, improve the nutrient use efficiency that may reduce environmental impact, and boost plant productivity. Furthermore, controlled release and targeted delivery of nanoscale active ingredients can realize the potential of sustainable and precision agriculture. In the presentation, I will discuss nanotechnology-based approaches for smart and precision agriculture. Scientific gaps to be overcome and fundamental questions to be answered for safe and effective development and deployment of nanotechnology will be addressed.

Dr. Shekhar Agnihotri
Department of Agriculture and Environmental Sciences
National Institute of Food Technology Entrepreneurship and Management, Haryana

Presentation Title: Nanobiocatalytic Strategies in Valorization of Agro-Food Waste and Bioprocessing

Abstract: Contemporary advancements in industrial bioprocessing aim to develop eco-friendly and sustainable solutions using enzymes. 'Nanobiocatalysis', has emerged as a promising approach that remarkably improves enzymes' stability, activity and reusability under bioprocess-relevant conditions. We attempted to develop a novel tool for catalytically converting (i) sugarcane bagasse into glucose with high yield and saccharification rate and (ii) potato-peel waste into fermentation-active ingredients, via magnetically separable halloysite nanotubes (MHNTs) as an immobilization matrix, respectively. The optimization of process parameters yielded >90% activity of enzymes, cellulose and α-amylase with high enzyme loading after immobilization. Statistical optimization (Response surface methodology) of immobilization process enabled lower enzyme dosage for achieving higher catalytic yield, thereby avoiding the loss of extra load of enzyme and making the process cost-effective. Structural characterization confirmed the successful loading of both enzymes onto MHNTs without losing their biocatalytic activity. Instead, the support matrix imparted enhanced stability, thermal resistance and activity to immobilized enzymes as compared to its free form. The magnetic nature of nanobiocatalyst enabled separating them from the reaction mixture after the completion of the reaction. Its excellent catalytic activity at elevated temperatures, running continuously over longer durations and eco-friendly attributes make this novel strategy amenable for transforming agro-food waste in sustainable bioprocessing. Conclusively, this proof-of-concept may offer a unique solution to other enzyme-linked processing which are currently being underutilized.

Focus on Funding

DAY 2 | TUESDAY | 8TH MARCH, 2022, 11:50 am - 01:20 pm | HALL 3

Speakers:

Dr. Sangeeta Semwal
Nanotechnology Initiatives Division
Ministry of Electronics & Information Technology, New Delhi

Ms. Champa E
Karnataka Innovation & Technology Society,
K-tech, Department of IT, BT and S & T, Government of Karnataka

Mr. Ganesh Thyagarajan
McLaren Strategic Ventures, Bangalore

Prof. Srinivasan Raghavan
Centre for Nano Science and Engineering, IISc Bangalore

Nano in Textile

DAY 2 | TUESDAY | 8TH MARCH, 2022, 01:50 pm - 03:20 pm | HALL 1

Chair:

Prof. Ashok K Ganguli
Indian Institute of Technology, Delhi

Speakers:

Prof. John Bosco Balaguru Rayappan
Centre for Nanotechnology & Advanced Biomaterials, SASTRA Deemed University, Thanjavur

Presentation Title: Nanoengineered Cotton Fabrics as Protective Textiles
Abstract: Integration of multifunctional nanomaterials with textiles could be a significant value addition to the bright future of the growing technology "Technical Textiles". Development of surface modified cotton fabrics with multi-functional capabilities have wide range of applications across various fields including healthcare, agriculture, industrial safety, personal protection, etc. In this context, surface modification of cotton fabrics with nanostructured materials such as ZnO, NiOx, HyWO3-x, Glu-CuNPs using sol-gel, dip-pad-dry-cure, chemical bath, and sputtering techniques has been successfully accomplished for protective applications such as UV filtering, gas sensing, flame retardant, and electromagnetic filter.

Prof. Mangala Joshi
Department of Textile and Fibre Engineering
Indian Institute of Technology, Delhi

Presentation Title: Polymer Nanocomposites: Advanced Material for Functional Textiles
Abstract: Polymer nanocomposites have gained a great deal of attention because of the much superior properties i.e. increased strength and modulus, improved heat resistance, decreased gas permeability and flame retardance at very low loadings of nanofiller. With these improved set of properties, they show promising applications in developing advanced textile materials such as- nanocomposite fibers, nanofibers and nanomaterial incorporated nanocomposite coated textiles for applications in medical, defense, aerospace and other technical textile applications. This is a relatively niche topic and fewer groups across the world are working in this domain. Our research group at IIT Delhi has been actively working in this domain since last fifteen years. Some of the significant work that has been done in the area of nanocomposite fibers, coatings and nanofibers will be presented. Our focus has been to develop functional textiles by incorporating suitable nanomaterial in the polymer matrix to impart properties such as gas barrier coatings for inflatables like aerostat for defense applications, nanocomposite fibres with inherent antimicrobial properties for medical textile applications such as sutures etc. and fabric based filters for safe drinking water. Nanocomposite nanofibrous webs for drug delivery applications showed promising results in terms of sustained and controlled release of drug with time. Another area of interest was carbon nanomaterial based coatings for EMIshielding applications. The research highlights of our work in the above areas would be presented.

Mr. Ganesh Srinivasan
Resil Chemicals Pvt. Ltd, Bangalore

Presentation Title: Nanomaterials in Textile for combating COVID-19 Pandemic

Abstract: The ongoing COVID-19 outbreak has created awareness regarding the spread of infection, effective diagnosis, and its treatment. The infection is transmitted both directly i.e., from one person to another, and indirectly through contaminated surfaces like Textiles. Various antiviral agents have been explored for imparting antiviral properties to the surfaces which could, thus, reduce the transmission of the viruses. Nanoparticles have been explored for not only imparting antiviral and antibacterial properties to the textile surfaces. In this review, the application of different nanomaterials as antiviral agents has been discussed. The existing antiviral technologies have been categorized into 4 groups: polymeric nanoparticles, self-assembling nanoparticles, carbon-based nanoparticles, and inorganic nanoparticles. The application in textile includes Mask, filters, apparel and home textiles.

Nano Photonics

DAY 2 | TUESDAY | 8TH MARCH, 2022, 01:50 pm - 03:20 pm | HALL 2

Chair:

Prof. K S Narayan
Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore

Speakers:

Dr. Rajesh V. Nair
Department of Physics, Indian Institute of Technology, Ropar

Presentation Title: Modifying the emission landscape of quantum emitters using nanophotonics Structures
Abstract: In this talk, we discuss the optical properties of quantum emitters like NV centers and devise the methods which can enhance their utility in various applications ranging from tailored emission, quantum sensing, and bio-imaging. We have utilized engineered photonic structures like photonic crystals and photonic monolayers to control the spontaneous emission from the NV centers. The light transport properties of these structures are analyzed which shows the suppressed and enhanced photon density of states at the respective resonant modes. The modified emission properties of NV centers in frequency and time scale would be elaborated, which follows the Barnett Loudon sum rule. The indigenous developments of a confocal microscope to map isolate single NV centers and their emission characteristics would be discussed. I conclude the talk with a discussion on a few nanophotonics structure designs that can deterministically tune the quantum emitter emission properties.

Dr. Bijoy Krishna Das
Department of Electrical Engineering, Indian Institute of Technology, Madras

Presentation Title: Recent Progress of Silicon Photonics Research in India and Elsewhere
Abstract: Silicon photonics turned out to be an enabling technology since the onset of this millennium. In the beginning it was mainly developed for high-speed optical transceivers for Data Centers. In course of time, it has proven its potential in high performance computing and on-chip optical interconnects taking advantage of the electrical interconnect bottleneck faced by electronics IC manufacturing industries. Very recently, the area has been expanded into microwave and quantum photonics applications. In India, we at IIT Madras started silicon photonics research and technology development as early as in 2006. However, the overall picture of silicon photonics R&D in India is not at all up to the mark even today in comparison to that happening elsewhere across the world. The good news is that Silicon photonics technology has been included in the recent vision document on electronics manufacturing by the Govt. of India. In this talk, I shall try to capture the current scenario of silicon photonics research in India along with a brief note on its global outbreak.

Prof. Venu Gopal Achanta
CSIR-National Physical Laboratory, New Delhi

Presentation Title: Bound states in continuum : Physics and Applications

Abstract: High quality factor modes in metamaterials are interesting for various applications involving light-matter interaction. Bound states in continuum (BIC) in all-dielectric metamaterials are being pursued to utilize the infinite Q factors and lossless dielectric nanostructures. From basic physics point of view, it would be interesting to understand the origin of BIC, evolution of BIC modes to leaky modes. In fact, BIC is a mathematical ideality with infinity Q or zero linewidth and thus is not usable. However, the quasi-BIC modes which eventually evolve into leaky modes are usable and interesting. I will also present applications of quasi-BIC for polarization independent mode as well as orbital angular momentum states.

NanoSparX Startup Pitching

DAY 2 | TUESDAY | 8TH MARCH, 2022, 01:50 pm - 03:20 pm | HALL 3

International Center for Nanodevices Private Limited / UNanoD

Organismic Technologies Pvt Ltd

SuperQ

Hbaromega Private Limited

Densepower Pvt Ltd

Pradaan Innovation Labs

1H1 Labs Private Limited

North Rhine-Westphalia: Navigating Nanotechnology for Manufacturing:

DAY 2 | TUESDAY | 8TH MARCH, 2022, 03:30 pm - 04:15 pm | HALL 1

Keynote Speakers:

Prof. Dr. Andreas Pinkwart
Honourable Minister of Economic Affairs, Innovation,
Digitalization and Energy of the State of North Rhine-Westphalia

Dr. C.N. Ashwath Narayan
Hon'ble Minister for Electronics, IT & Bt, Science and Technology, Higher Education, Skill Development, Entrepreneurship and Livelihood. Government of Karnataka

Mr. Friedrich Birgelen
Deputy Consul General of the Federal Republic of Germany in Bengaluru

Moderator:

Ms. Ambika Banotra
Chief Representative, NRW.Global Business India

Speakers:

Mr. Felix Neugart
Chief Executive Officer, NRW.Global Business GmbH

Prof. Sanjay Mathur
Chair of Inorganic and Materials Chemistry, University of Cologne

Dr. Bernd Engelkamp
Technology Manager, NMWP.NRW Cluster

Mr. Otto Carel
Raith GmbH, Director Sales India, Middle East, Belgium and the Netherlands

Japan-India Co-Innovation through R & D

DAY 2 | TUESDAY | 8TH MARCH, 2022, 03:30 pm - 04:15 pm | HALL 2

Speakers:

Mr. Takashi SUZUKI
Director General, JETRO Bengaluru Office

Ms. Akiko SUGITA
Consul-General, the Consulate-General of Japan in Bengaluru

Mr. Kazuhiko AOKI
India Liaison Officer, Japan Science and Technology Agency

Ms.Yuna NATSUMI
Director (India-Japan Startup Hub), JETRO Bengaluru Office

NanoCanada

DAY 2 | TUESDAY | 8TH MARCH, 2022, 03:30 pm - 04:15 pm | HALL 3

Speakers:

Benoit Préfontaine
Consul General for Canada in Bengaluru

Marie D'lorio
President for NanoCanada

Come Innovate with the Netherlands Nano Ecosystem

DAY 2 | TUESDAY | 8TH MARCH, 2022, 04:15 pm - 05:00 pm | HALL 1

Speakers:

Prof. Guus Rijnders
Scientific Director, MESA, Institute for Nanotechnology, University of Twente

Mr. Dhoya Snijders
Counsellor for Innovation, Embassy of the Netherlands, New Delhi

Ms. Akanksha Sharma
Sr. Innovation Officer, Consulate General of the Netherlands, Bangalore

NANOTECH QUIZ

DAY 2 | MONDAY | 8TH MARCH, 2022
04:15 pm - 05:00 pm | HALL 2

Bengaluru India Nano first time hosting National Level Quiz on Nanotechnology – "**Nanotech Quiz**". Conducted by Quizmaster Pickbrain, Mr. Giri Balasubramanium.

NANO EXCELLENCE AWARDS

DAY 2 | MONDAY | 8TH MARCH, 2022
05:00 pm - 05:30 pm | HALL

1. Bengaluru INDIA NANO Innovation Award
2. Karnataka DST Nanoscience Fellowships
3. Best Poster Awards

VALEDICTORY

DAY 2 | MONDAY | 8TH MARCH, 2022
05:30 pm - 06:00 pm | HALL 1

Dignitaries :

Dr. C.N. Ashwath Narayan
Hon'ble Minister for Electronics, IT, Bt and S&T,
Higher Education, Skill Development,
Entrepreneurship & Livelihood, Government of Karnataka

Prof. Navakanta Bhat
Chairman, VGNT, Government of Karnataka
Dean, Division of Interdisciplinary Sciences,
Professor, CeNSE, IISc, Bengaluru

Dr. E.V. Ramana Reddy, IAS
Additional Chief Secretary to Government,
Department of Electronics, IT, Bt and S&T;
Department of Commerce & Industries,
Government of Karnataka

Prof. Ajay Kumar Sood, FRS
Chairman, CEC - Bengaluru INDIA NANO 2022
Year of Science Chair Professor,
Department of Physics, IISc, Bengaluru

Shri A. B. Basavaraju, IAS
Director (Technical), Dept. of Electronics, IT, Bt and S&T,
Government of Karnataka;
Managing Director, Karnataka Science and Technology
Promotion Society (KSTePS)

TUTORIAL 1- Nano Fabrication

DAY 3 | WEDNESDAY | 9TH MARCH, 2022, 10:00 am - 11:15 am | HALL 3

Speaker:

Prof. Sushobhan Avasthi
Centre for Nano Science & Engineering, Indian Institute of Science, Bangalore

Presentation Title: Fundamentals of micro-nanofabrication
Abstract: I will briefly discuss the fundamentals of micro and nanofabrication. Focus is nanoelectronics devices, fabricated through a top-down approach. We shall discuss why micro/nanofabrication is important and interesting. We shall discuss the history, challenges and solutions, and future trajectory. The talk should be accessible to a wide range of student, from high-school to college seniors.

TUTORIAL 2 - Bottom-up Synthesis

DAY 3 | WEDNESDAY | 9TH MARCH, 2022, 11:25 am - 12:40 pm | HALL 3

Speaker:

Dr. B L V Prasad
Centre for Nano and Soft Matter Sciences, Bengaluru

Presentation Title: Dressed to function: Surface modification strategies to prepare functional nanoparticles via bottom-up strategies
Abstract: In this talk we will give a brief introduction to the synthetic aspects of nanomaterials. Our focus mainly will be on bottom-up strategies for the preparation of nanoparticles as dispersions in a given solvent media. In this realm, one of the notable achievements is the creation of functional materials out of systems that have otherwise been thought to be noble and hence non-reactive. The transformation of the intert noble metals into functional materials not only involves their preparation at nanometer scale but also their surface functionalization with appropriate organic molecules. Such surface functionalization assumes significance not just for their stability in diverse solvent media but defines the way nanoparticles interact either with themselves or with the environment that they are present in. This talk briefly reviews the role of organic molecules as tools for controlling nanoparticle size, morphology and dispersion stability in different media.

TUTORIAL 3 - Characterization Tools

DAY 3 | WEDNESDAY | 9TH MARCH, 2022, 01:20 pm - 02:35 pm | HALL 3

Speaker:

Prof. N. Ravishankar
Materials Research Centre, Indian Institute of Science, Bangalore

Presentation Title: Nanostructure Investigations using Electron Microscopy
Abstract: The electron microscope is a powerful instrument capable of providing atomic resolution imaging, diffraction and spectroscopy from the same localised region in a thin specimen. Combined with the ability to carry out in-situ experiments of various kinds, the instrument is transformed into a laboratory in itself, capable of addressing a wide variety of interesting and important problem. In the first half of the tutorial, I will discuss some of the capabilities of the modern state-of-the-art microscope. In the second part, I will discuss some examples of applications of the microscope from our recent studies. This will include imaging to obtain picometer level atomic displacements in nanostructures, tomography to obtain mechanistic insights, energy loss spectroscopy to map oxidation states at the atomic level and some in-situ studies. These will be to illustrate the power of the modern day microscope rather than an extensive discussion of specific results.

TUTORIAL 4 - Nano Biology

DAY 3 | WEDNESDAY | 9TH MARCH, 2022, 02:45 pm - 04:00 pm | HALL 3

Speaker:

Prof. S. Swaminathan
Centre for Nanotechnology & Advanced Biomaterials, SASTRA Deemed University, Thanjavur

Presentation Title: Nanomaterials – Applications in Regenerative Medicine & Drug Delivery
Abstract: The application of nanomaterials in regenerative medicine and smart drug release systems has opened new strategies to manage and treat a variety of injuries and diseases respectively. The cells recognize and respond better to nanostructured cues and hence tailoring the geometry and chemistry of nanomaterials offer tremendous scope for therapeutic applications. Nanofibrous scaffolds have geometries that mimic the extracellular matrix closely and thereby provide the right topography for the adhesion, growth and proliferation of cells. Similarly, smart nanodelivery systems have been widely investigated for sustained, targeted and triggered release of drugs at the target cells thus reducing side-effects, doss and frequency of administration of the drugs. Our lab is actively involved in the development of a three-dimensional nanostructures for regeneration of various tissues and smart drug delivery systems. In this workshop, we will discuss the importance of properties of nanostructures for regenerative medicine & drug delivery.