INDIAN ACADEMY OF SCIENCES

(A professional autonomous body of the
Department of Science and Technology, Govt. of India)

92nd ANNUAL MEETING

ABSTRACTS OF LECTURES

13–14 NOVEMBER 2026

Host/Venue: National Centre for Earth Science Studies (NCESS), Akkulam, Thiruvananthapuram

13 November 2026, Friday

Session 1A

Presidential Address

09:40–10:20 hrs



Raghavan Varadarajan

IISc, Bengaluru

Prof. Raghavan Varadarajan is the President of the Indian Academy of Sciences (2025–2027) and Professor in the Molecular Biophysics Unit at the Indian Institute of Science (IISc), Bengaluru. His research spans from protein stability, folding and design, and extends to the development of viral immunogens (notably for influenza and SARS-CoV-2). His laboratory at IISc uses biophysical and structural approaches to engineer thermostable vaccine candidates and to probe fundamental questions of protein biophysics. His honours include the Shanti Swarup Bhatnagar Prize in Biological Sciences and the 2024 Tata Transformation Prize. He has also held key leadership roles at the Academy over the past decade.

Understanding and modulating gene function through mutational scanning

Understanding how alterations in gene sequence modulate function is a fundamental problem in biology. This has many potential applications, including designing therapeutics and vaccines. Advances in low-cost oligonucleotide and gene synthesis, coupled with next-generation sequencing, now allow individual laboratories to rapidly probe the effects of thousands of mutations in cell culture. We have used this methodology to guide protein structure prediction, map functional residues, including regions targeted by monoclonal and polyclonal antibodies, design temperature-activated molecular switches and vaccines, and to understand how gene sequence determines the structure, stability, and function of the encoded product.

13 November 2026, Friday

Session 1B – Lectures by Fellows/Associates

Chairperson – Daya Shankar Pandey, BHU Varanasi

11:15–11:35 hrs



Vandana Bhalla

GNDU, Amritsar

Dr Vandana Bhalla received her PhD in Organic Chemistry from Guru Nanak Dev University, Amritsar, in 1998 under the supervision of Prof. Harjit Singh. She was a JSPS postdoctoral fellow at Tohoku University, Sendai, Japan, during 2002–2004 and a JST researcher in the Aida Nanospace project with Prof. Takuzo Aida of the University of Tokyo, Japan. At present, she is working as a Professor at the Department of Chemistry, Guru Nanak Dev University, Amritsar, India. She has published more than 215 research papers in international journals and has delivered around 75 lectures. She has been a Fellow of the Indian Academy of Sciences, Bengaluru, since January 1, 2025, and has been awarded the AV Rama Rao prize for Women in Chemical Sciences for the year 2025, awarded by Chemical Research Society of India.

Understanding the Regulation of Self-Assembly of Donor-Acceptor Systems in Mixed Aqueous Media

Our research work aims at development of donor-acceptor building blocks which undergo self-assembly in aqueous media to generate ‘lighted’ assemblies in aqueous media. These assemblies having appropriate binding sites for interactions with specific analytes undergo guest-induced morphology transformation and exhibit interesting photophysical properties. Very recently, we have developed supramolecular assemblies having chiral handle and investigated the achiral/chiral guest-induced chirality transformations in aqueous media. Furthermore, we have also developed metal-based as well as metal-free supramolecular catalytic ensembles for carrying out various organic transformations. In the presentation, different aspects of development of these ‘lighted’ materials and their molecular recognition and catalytic applications will be discussed.

13 November 2026, Friday

Session 1B – Lectures by Fellows/Associates

Chairperson – Daya Shankar Pandey, BHU Varanasi

11:35–11:55 hrs



Maya Shankar Singh

BHU, Varanasi

Prof. Maya Shankar Singh is a distinguished organic chemist with over four decades of experience in teaching and research. He obtained his PhD from Banaras Hindu University in 1986 under the guidance of the late Prof. K. N. Mehrotra. He has served at Vikram University, Gorakhpur University, and BHU, where he was Senior Professor of Organic Chemistry until 2025. He is currently a CSIR-Emeritus Scientist at BHU and Adjunct Faculty at IIT Jammu and NIT Manipur. He has over 220 publications and authored five textbooks in organic chemistry. His honours include the T. R. Seshadri Memorial Lecture Award, J. C. Bose National Fellowship, and C. N. R. Rao Chair Professorship. He is a Fellow of FNA, FASc (2020), and FNASc.

Organic Chemistry towards Health and Society: Chemical Psychology of Heterocycles

The reactivity of b-ketodithioester (a sulfur analogue of b-ketoester) and b-ketothioamides has been exploited for the construction of numerous useful bioactive scaffolds with substituent and skeletal diversity. The polyfunctional simple dithioester/thioamide molecule bearing several nucleophilic/electrophilic reactive sites furnished the desired synthetic scaffolds in a highly selective manner upon treatment with different reagents under varying conditions. The salient features of these domino strategies are methodical simplicity, structural diversity, short reaction times, sustainability, and formation of multiple C–C and C–heteroatom bonds in a single operation, making these novel protocols highly useful in diversity-oriented synthesis (DOS). The details of the recent accomplishments towards this endeavour will be presented during the talk.

13 November 2026, Friday

Session 1B – Lectures by Fellows/Associates

Chairperson – Daya Shankar Pandey, BHU Varanasi

11:55–12:15 hrs



D Srinivasa Reddy
IICT, Hyderabad

Prof. Srinivasa Reddy has over 26 years of research experience in synthesis of natural products, medicinal chemistry, and drug discovery. He obtained his PhD from the University of Hyderabad in 2000 and did postdoctoral research at the University of Chicago and the University of Kansas, USA. He has served in senior leadership positions in CSIR, including Director of CSIR-IICT, Hyderabad, and CSIR-IIIM, Jammu, and Director (Additional Charge) of CSIR-CDRI, Lucknow, and CSIR-AMPRI, Bhopal. He also has over seven years of pharmaceutical industry experience with Dr. Reddy's Laboratories and TATA Advinus. A molecule discovered by his team, Licogliflozin, is currently in human Phase II clinical trials. He has authored around 160 publications and is an inventor on approximately 40 patents. His honours include the Shanti Swarup Bhatnagar Prize, J. C. Bose National Fellowship, and NASI–Reliance Industries Platinum Jubilee Award. He is a Fellow of INSA, IASc (2021), and NASI.

Efforts in Drug Discovery through Natural Products and Silicon-Incorporation Approach

Our research group focuses on total synthesis of biologically active compounds and medicinal chemistry with an ultimate aim of discovering drugs. We have accomplished the synthesis of more than 50 natural products, which include cell-adhesion inhibitors, anti-bacterial, anti-malarial, anti-inflammatory, anti-cancer agents, and CNS agents sex pheromones and insect repellents. In addition, significant progress has been made using a concept called 'Silicon-incorporation approach'. In particular, this approach is best suited from CNS disorders. A very few companies and academic groups are working on this theme.

13 November 2026, Friday

Session 1B – Lectures by Fellows/Associates

Chairperson – Daya Shankar Pandey, BHU Varanasi

12:15–12:35 hrs



Praveen Kumar Vemula
inSTEM, Bengaluru

Prof. Praveen Kumar Vemula, Dean (Research), obtained a PhD in Organic Chemistry (IISc), and subsequently did postdoctoral research at the City University of New York and Harvard Medical School. He started his independent lab at BRIC-inStem in 2013. His bioengineering lab at BRIC-inStem develops innovative biomaterials and chemical biology approaches to address unmet clinical needs. His lab has adopted innovative conceptual approaches that bridge chemistry and biology to develop clinically translatable technologies. He has published more than 100 research papers and holds more than 50 pending/granted patents. Based on the technologies developed in his lab, he co-founded 8 start-up companies, through which around 25 products were launched into the market. He is a Fellow of IASc (2026).

Developing Technologies for Protecting Farmers from Pesticide-Induced Toxicity and Lethality

Our lab is focusing on clinical translational research through biomaterials and chemical biology programs. By using chemical design tools, we have been developing therapeutic and prophylactic biomaterials for medical applications. A wide range of technologies developed in the lab were used for multiple medical applications, including the treatment of inflammatory bowel diseases and arthritis, and the prevention of rejection episodes in organ transplants. Additionally, prophylactic technologies were developed to prevent pesticide-induced toxicity and lethality. This talk focuses on the development of anti-pesticide technologies to protect farmers from pesticide-induced toxicity and lethality.

13 November 2026, Friday

1C-Special Session on Blue Economy and Advances in Deep Ocean Research

Chairperson – V K Gaur, CSIR Fourth Paradigm Institute, Bengaluru

13:30–13:50 hrs



M Ravichandran

IIT Madras

Dr Ravichandran is a Visiting Faculty member at the School of Interdisciplinary Studies, IIT Madras, Chennai. He has served as Secretary to the Government of India in the Ministry of Earth Sciences (MoES) from October 2021 to May 2026. He holds a PhD in Physics, and his career has spanned several MoES institutions in varied roles. His areas of interest include Atmospheric Physics, Ocean Dynamics, Ocean Observing Systems, Ocean Modelling, and Polar Sciences. He has published over 200 papers in refereed journals and has more than 10,000 citations on Google Scholar. Under his leadership as Secretary, MoES implemented national mission-mode programmes, such as the Deep Ocean Mission, PRITHVI, and Mission Mausam. Dr Ravichandran is a Fellow of the National Academy of Sciences, India (NASI), the Indian National Academy of Engineering (INAE), the Indian Academy of Sciences (IASc), and the Indian Meteorological Society.

Oceans as Opportunities, Seas of Challenges: Building a Resilient Blue Economy for India

A resilient blue economy drives sustainable ocean-based prosperity while safeguarding communities, infrastructure, and ecosystems from climate change and marine hazards. The ocean offers oceans of opportunities, yet also seas of challenges. The talk explores India's living and non-living ocean resources, including fisheries, seaweed, marine biotechnology, renewable energy, seabed minerals, and desalinated water. It emphasizes comprehensive ocean mapping, marine spatial planning, enabling infrastructure, innovation, international collaboration and human resource development to harness ocean potential sustainably and advance the vision of Viksit Bharat.

13 November 2026, Friday

1C-Special Session on Blue Economy and Advances in Deep Ocean Research

Chairperson – V K Gaur, CSIR Fourth Paradigm Institute, Bengaluru



13:50–14:10 hrs

T Srinivasa Kumar
MoES, New Delhi

Dr Srinivasa Kumar Tummala is the Secretary, MoES, Govt. of India. He brings extensive research experience and senior techno-managerial leadership from premier scientific organisations, including the Indian National Centre for Ocean Information Services (INCOIS), the Intergovernmental Oceanographic Commission (IOC) of UNESCO, and the Indian Space Research Organisation (ISRO). Throughout his career, he led the scientific design and implementation of major multi-institutional, high societal-impact projects including the Indian Tsunami Early Warning System. He represented India on several high-level intergovernmental scientific bodies, including as Chair of the Ocean Decade Tsunami Programme Science Committee, Vice Chair of the IOC-UNESCO and Vice Chair of the IOC-WMO Joint Collaborative Board, amongst many others. Dr Tummala holds a PhD in Marine Science with extensive expertise in satellite oceanography, remote sensing, geospatial technologies, disaster risk reduction, and coastal management. Author of over 100 international peer-reviewed scientific publications, he was conferred with several prestigious awards including the National Geosciences Award and the Indian National Geospatial Award for pioneering contributions to tsunami early warning systems and disaster management applications.

Indian Ocean Tsunami Warning and Mitigation System - Towards Tsunami Resilience

I shall discuss the evolution of the Indian Ocean Tsunami Warning and Mitigation System (IOTWMS), established under UNESCO-IOC after the devastating 2004 tsunami and now a coordinated framework of 27 Member States. Operating through three Tsunami Service Providers (Australia, India and Indonesia), regional seismic and sea-level networks, and the four pillars of risk knowledge, detection and forecasting, warning dissemination, and preparedness and response, the system has strengthened end-to-end warning capabilities through SOPs, IOWave exercises and the Tsunami Ready Recognition Programme, which now covers 130 communities. Challenges remain in forecasting non-seismic tsunamis, reducing near-field uncertainties and strengthening last-mile communication, which emerging technologies such as GNSS, SMART cables and probabilistic forecasting can help address. Aligned with the UN Ocean Decade Tsunami Programme and Early Warnings for All, our findings point towards people-centred, impact-informed tsunami risk reduction and resilient communities across the Indian Ocean.

13 November 2026, Friday

1C- Special Session on Blue Economy and Advances in Deep Ocean Research

Chairperson – V K Gaur, CSIR Fourth Paradigm Institute, Bengaluru

14:10–14:30 hrs



K S Krishna

Chinaogirila, Krishna Dt., Andhra Pradesh

Prof. Kolluru Sree Krishna is a leading Indian marine geophysicist with over 43 years of research experience spanning plate tectonics, lithospheric dynamics, and ocean sciences. He formerly served as Chief Scientist at CSIR-National Institute of Oceanography (Goa), Professor and Head at the University of Hyderabad, and Dean of Sciences at GITAM University. His pioneering investigations into the tectonic evolution of the Indian Ocean, specifically the Ninetyeast Ridge and the Laxmi Basin, provided the scientific bedrock. The findings of the Laxmi Basin have become a critical scientific basis for India's Continental Shelf Programme. A recipient of the prestigious SS Bhatnagar Prize (2001), National Geosciences Award (2010), and National Excellence Award (2017). Prof. Krishna is a J.C. Bose National Fellow and an elected Fellow of INSA, IASc (2002), and NASI. He has published over 130 research papers and participated in more than 30 oceanographic expeditions.

The Laxmi Basin Paradox: An Investigation of Invisible Truth

The Laxmi Basin, along India's central-western continental margin, was long debated as either oceanic or continental crust. Integrated geophysical studies by CSIR-NIO and ONGC-KDMIPE established that it comprises hyper-extended continental crust, with magnetic anomalies resulting from Réunion plume-related magmatic intrusions rather than seafloor spreading. Published in Tectonics (AGU), the findings provided a scientific basis for India's Continental Shelf Programme. Subsequent IODP Expedition 355 and seismic studies confirmed that the basin represents an aborted rift system, establishing the extension of Indian continental crust across the Laxmi Basin to the Laxmi Ridge.

13 November 2026, Friday

1C-Special Session on Blue Economy and Advances in Deep Ocean Research

Chairperson – V K Gaur, CSIR Fourth Paradigm Institute, Bengaluru

14:30–14:45 hrs



D Shankar
NIO, Goa

Prof. Shankar did his PhD in oceanography at Goa University while employed as a physical oceanographer at CSIR-National Institute of Oceanography in Goa. His PhD followed a B.Tech. in Aerospace Engg from IIT-Madras and a master's degree in Atmospheric Sciences from IISc. Common to the three fields is the dynamics of fluids. He has been a Fellow of IASc since 2011. Over the past decade, his research focus has been on the circulation of the seas around India and its implications for our monsoonal climate and fisheries. Collaboration with biology colleagues of CSIR-NIO for over 15 years has challenged his earlier view of quantification and the guarantee of a perceptual model leading to a conceptual model.

The Gap between Perceptual and Conceptual Models: Measuring all that Matters in the Marine Ecosystem

The talk aims to bring out the contrast between how the biomass of phytoplankton and zooplankton was measured before the 1990s and the changes made in phytoplankton biomass estimates following the launch of satellites with ocean-colour sensors. It will also discuss how moorings equipped with acoustic Doppler current profilers or ADCPs were used to estimate zooplankton biomass. It is expected that what the satellite did to phytoplankton, similarly moorings would do the same to zooplankton. What these modern tools provide is a numerical constraint on the first (phytoplankton) and second (zooplankton) trophic levels. Focus, however, is not on how these measurements are made, or on how they have or can transform oceanography, fisheries, and biogeochemistry. Instead, interest is in the implications of the results on how the field is approached. The focus on numbers and quantitative measures breaks down when an unmeasurable variable that cannot be ignored is encountered. This is a generic problem that transcends the limited field of marine ecosystems or earth sciences.

13 November 2026, Friday

Session 1D – Lectures by Fellows/Associates

Chairperson – E D Jemmis, IISc, Bengaluru



16:20–16:40 hrs

Nirmalya Ghosh

IISER Kolkata

Prof. Nirmalya Ghosh is a physicist with specialization in optical physics and photonics. He is currently Professor in the Department of Physical Sciences and Centre of Excellence in Space Sciences India (CESSI), IISER Kolkata. At IISER Kolkata, he developed and runs bio-optics & Nano-photonics (bioNap) research laboratory. The research of the group is focused in areas of plasmonics and nanophotonics, spin orbit interaction of light and quantum weak measurements. He is the recipient of the G. G. Stokes Award in Optical Polarization given by SPIE for his contributions in the domain of optical polarization and related phenomena. He is a Fellow of OPTICA (formerly Optical Society of America), Fellow of Indian Academy of Sciences (FASc) since year 2022, Fellow of National Academy of Sciences, India (FNASc.) and Distinguished Fellow of International Engineering and Technology Institute (IETI).

Spin Orbit Interaction and Weak Measurements in Plasmonic Metamaterials: A Classical-Quantum Handshake

Spin–orbit interaction (SOI), which deals with the coupling between a quantum particle's spin degree of freedom and its orbital degree of freedom, is a quantum mechanical phenomenon observed in various fields of physics ranging from atomic to condensed matter physics. Since a classical light beam can also carry both spin angular momentum (associated with circular/elliptical polarization) and orbital angular momentum (associated with the helical phase front of a light beam), coupling between these two degrees of freedom in various light–matter interactions has led to analogous optical SOI phenomena. The talk will cover some of the recently observed intriguing SOI effects of classical light beams, namely the photonic spin Hall effect, spin-momentum locking, and spin-split dispersion in plasmonic metamaterials, etc. In addition, how the extraordinary quantum mechanical concept of weak measurement and weak value amplification (WVA) can be realized within the realm of classical optics using different degrees of freedom of light will be illustrated, and its implementation for the amplification of weak optical effects will be discussed.

13 November 2026, Friday

Session 1D – Lectures by Fellows/Associates

Chairperson – E D Jemmis, IISc, Bengaluru

16:40–17:00 hrs



Sattwick Haldar

IIT Tirupati

Dr Sattwick Haldar, Asst. Prof. of Chemistry and Materials Science Engineering Dept. at IIT Tirupati and Associate of the Indian Academy of Sciences, is a pioneering scientist in organic and organosulfur battery research in India. He is a Life Member of the Battery Research Society (BRS) of India, the Ministry of New and Renewable Energy (MNRE) R&D Forum for Grid Scale Energy Storage, and the Royal Society of Chemistry (UK). His honours include the Marie Curie and DST-INSPIRE awards. Before joining IIT Tirupati, he was a prestigious Faraday Institution Fellow in the LiSTAR programme at Imperial College London, UK, in Prof. Magdalena Titirici's group, a postdoctoral scientist in Prof. Stefan Kaskel's group at TU Dresden, Germany, and completed his PhD at IISER Pune, India. He has three US patents along with 1,900+ citations. He is an Associate of IASc since 2025.

Li–Organopolysulfide Batteries: Opening New Avenues in Battery Chemistry

The talk introduces Li-Organopolysulfide batteries, a sustainable, lightweight alternative to conventional lithium-ion batteries, with potential applications in electric vehicles and aviation. By chemically integrating sulfur into a redox-active organic polymer, the approach overcomes sulfur's poor conductivity and dissolution, enabling faster charging, enhanced stability and improved battery performance without heavy, inactive carbon hosts. Experimental and theoretical investigations demonstrate superior performance over conventional lithium–sulfur batteries. The concept is also being extended to aluminium-, zinc- and magnesium-based systems, paving the way for sustainable, scalable metal–organopolychalcogenide batteries.

13 November 2026, Friday

Session 1E – Special Lecture

Chairperson –Raghavan Varadarajan, President, IASc

18:30–19:30 hrs



U K Anandavardhanan

IIT Bombay

Prof. Anandavardhanan is an Indian mathematician specialising in automorphic forms and representation theory. He was awarded the Shanti Swarup Bhatnagar Prize for Science and Technology, the highest science award in India, for the year 2020 in the mathematical science category. He is affiliated with the Indian Institute of Technology, Bombay. After completing undergraduate studies at the University of Calicut, he joined the University of Hyderabad for higher studies. He secured an M.Sc. in Mathematics in 1998 and a PhD in 2003. He was with the Tata Institute of Fundamental Research from February 2003 to July 2005 and spent the spring of 2004 at the University of Iowa. He is a Fellow of IASc since 2024. He has been a faculty member at IIT Bombay since July 2005. He is the recipient of the prestigious Shanti Swarup Bhatnagar Prize award, and has also been conferred several awards, including Asian Scientist 100, Asian Scientist (2021), Young Scientist Platinum Jubilee Award (NASI) 2009, and INSA Medal for Young Scientist (2008).

Legendre Polynomials in Number Theory

The French mathematician Adrien-Marie Legendre introduced Polynomials nearly 250 years ago. They come up in almost all areas of mathematics (and in other sciences and engineering too). The talk will present an overview of some basic properties of these polynomials and illustrate a few ways in which they appear in algebra and number theory. The talk will be self-contained and no prerequisites are assumed.

14 November 2026, Saturday

Session 2A – Lectures by Fellows/Associates

Chairperson – Sanoli Gun, IMSc, Chennai



09:00–09:20 hrs

Jaydeb Sarkar

ISI, Bengaluru

Dr Jaydeb Sarkar did his PhD at IISc in 2006, and after that, he spent around five years as a visiting assistant professor at Texas A&M University and the University of Texas, San Antonio. At present, he is at ISI Bangalore as an Assistant Professor. His research areas are functional analysis, complex analysis, and operator theory in both one and several variables. He is a Fellow of IASc since 2024.

Linear and Complex Analysis with Applications

We recall classical interpolation problems that connect linear algebra and complex analysis. We then extend these ideas to infinite-dimensional spaces, such as Hardy Hilbert spaces. This framework has many applications, and we highlight a few. Finally, we briefly discuss these problems in several-variable settings.

14 November 2026, Saturday

Session 2A – Lectures by Fellows/Associates

Chairperson – Sanoli Gun, IMSc, Chennai

09:20–09:40 hrs



C Ramya

IMSc, Chennai

Dr Ramya is currently a faculty member in the Theoretical Computer Science Group at the Institute of Mathematical Sciences (IMSc), Chennai. Prior to this, she was an Assistant Professor at the Chennai Mathematical Institute and was a postdoctoral fellow at TIFR, Mumbai. She earned her PhD from the Indian Institute of Technology, Madras, and her research focuses on computational complexity, which aims to understand the inherent limitations of computing and the intrinsic hardness of certain computational problems. She is interested in computational problems with an algebraic or combinatorial flavor. She was selected as a Associate of IASc in 2025.

Multiple Facets of Computational Complexity

In the quest to solve real-world problems, obtaining algorithms that are efficient in terms of computational resources such as time, space, randomness, and communication is vital. In Complexity Theory, we are primarily interested in understanding the inherent difficulty of a computational task and in classifying problems as 'easy' or 'hard' irrespective of the state-of-the-art machines on which they are solved. Several algebraic computations are of practical importance, viz., computing the matrix product, discrete Fourier transform, determinant of a matrix, etc. In this talk, we will be primarily interested in the algorithmic as well as complexity-theoretic viewpoint of algebraic computation.

14 November 2026, Saturday

Session 2A – Lectures by Fellows/Associates

Chairperson – Sanoli Gun, IMSc, Chennai

09:40–10:00 hrs



Deepankar Choudhury

IIT Bombay

Prof. Deepankar Choudhury, Prof. T. Kant Chair Professor (HAG) and former Head of Civil Engineering at IIT Bombay, is an internationally renowned expert in geotechnical earthquake engineering, soil dynamics, and computational geomechanics. A gold medallist, he topped Jadavpur University in BE (1997) and IISc Bangalore in ME (2000), where he also completed his PhD in 2002 with the Best PhD Thesis Award from IGS. He joined IIT Bombay in 2003 and became a Professor in 2012. A Fellow of FASc (2024), FNAE, FNASc, and F.ASCE (USA), he has received prestigious distinctions including the JC Bose National Fellowship, Alexander von Humboldt Fellowship, and JSPS Fellowship. He has guided 37 PhDs and published over 320 technical papers. His pioneering pseudo-dynamic method for earthquake-resistant design of geostructures has been incorporated into a new design code IS:19117 (2025). Currently the Editor-in-Chief of the Indian Geotechnical Journal.

Geotechnical Earthquake Engineering for Sustainable Foundations of Mega-Infrastructures: Transformative Research into Practice

This presentation highlights over two decades of fundamental and applied research in geotechnical earthquake engineering and sustainable foundation design, primarily at IIT Bombay. It showcases the pioneering pseudo-dynamic method for realistic seismic earth pressure estimation, enabling safer design of retaining structures, foundations, and other geostructures. The research also advances site-specific seismic hazard assessment, microzonation, pile and combined piled-raft foundations (CPRF), soil–structure interaction, and liquefaction analysis. Its contributions include the incorporation of CPRF design provisions into the new design code IS:19117 (2025), and the development of integrated, performance-based approaches for resilient mega infrastructure, including high-rise buildings, bridges, and nuclear facilities in seismic regions.

14 November 2026, Saturday

Session 2A – Lectures by Fellows/Associates

Chairperson – Sanoli Gun, IMSc, Chennai

10:00–10:20 hrs



Bhuvaneswari Gurumoorthy

Mahindra University, Hyderabad

Prof. Bhuvaneswari Gurumoorthy has been in academia since graduating with a PhD in 1992. After a brief stint at the electric utility company ComEd in Chicago from 1994 to 1997, she worked as a Professor of Electrical Engineering at IIT Delhi from 1997 to 2021. Currently, she is with Mahindra University, Hyderabad. Her areas of specialization are Power Electronics, Electrical Machines, Drives, and their applications like power supply, power quality, HVDC, electric drives, electric vehicles, battery charging, and renewable energy. Prof. Bhuvaneswari is the only Indian woman engineer to be elected as an International Member of the National Academy of Engineering, USA. She is an elected Fellow of IEEE, IET-UK, Institution of Engineers-India, Indian National Academy of Engineering, and IETE-India. She is the recipient of the IEEE Wanda Reder Pioneer in Power Award in 2018. She is currently the Editor of the Transactions of the INAE and EIC of the *Sadhana* journal. She is a Fellow of IASc since 2025.

Power Electronics: A Technology Enabling Sustainability

To combat the global warming and climate change menace, a three-pronged approach is being suggested by technologists around the globe: (i) Energy usage in the form of electricity primarily generated from renewables; (ii) Energy conservation measures in industrial processes; (iii) Using electricity for transportation needs. For all these approaches, Power Electronic Technology (PET) is the enabler. This talk will define key features of PET and various developments in power electronics that have contributed to sustainability in the recent past followed by a brief on the domain of PET.

14 November 2026, Saturday

Session 2A – Lectures by Fellows/Associates

Chairperson – Sanoli Gun, IMSc, Chennai

10:20–10:40 hrs



Swathy Manohar

IIT Bombay

Dr Swathy Manohar is an Assistant Professor in the Department of Civil Engineering at IIT Bombay. She completed her Bachelor's in Civil Engineering from TKM College of Engineering, her M.Tech. from IIT Roorkee, and her PhD from IIT Madras, and worked as a visiting professor at ETH Zurich, Switzerland, for a brief period. Her research focuses on the characterization, durability, and conservation of construction materials, with a special emphasis on heritage stone and masonry structures. She leads the Heritage Conservation Laboratory at IIT Bombay, working on degradation mechanisms, sustainable repair materials, and preservation strategies for historic built heritage. Dr Manohar has received several recognitions, including the IIT Bombay Young Faculty Award, IIT Bombay Early Research Achiever Award, and the Confederation of Indian Industries (CII) Award on Waste to Worth Technologies. She is an Associate of IASc and INSA, and has received the Young Engineer Award from INAE (2026). She was selected as a Associate of IASc in 2025.

Bridging Eras: Reviving Historical Construction Practices and Scientific Approaches for Heritage Conservation

India possesses one of world's richest built heritage. However, centuries of weathering, environmental exposure, and ageing lead to their gradual deterioration, making their conservation a complex scientific challenge. Drawing on research and case studies from Indian heritage structures, the session will illustrate how material characterisation helps identify the causes of deterioration and guides the selection of compatible repair strategies and conservation approaches. By bridging historical construction practices with scientific investigation, the talk will showcase how interdisciplinary research contributes to understanding and preserving our built heritage, showing the major contributions in this field.

14 November 2026, Saturday

Session 2B – Lectures by Fellows/Associates

Chairperson – S K Apte, University of Mumbai

11:00–11:20 hrs



Ranjini Bandyopadhyay

RRI, Bengaluru

Dr Ranjini Bandyopadhyay is Senior Professor and Chair of Soft Matter at the Raman Research Institute, Bengaluru. She received her PhD from the Indian Institute of Science, winning the Martin Foster Gold Medal for the best thesis, and completed postdoctoral training at UCLA and Johns Hopkins University. Her research spans experimental soft condensed matter physics, with expertise in rheology, dielectric spectroscopy, colloidal suspensions, and soft glasses. She has actively mentored students and early-career researchers, served in editorial and advisory roles across six journals, and has been an invited speaker at international forums including the G7 Science and Technology Ministers' Meeting. Elected to the Fellowship of IASc in 2025.

Elasticity-Mediated Morphogenesis in Interfacial Colloidal Assemblies

The talk would focus on the self-assembly of colloidal microgel particles at a quasi-two-dimensional air-water interface of a drying droplet. Using bright-field microscopy, we demonstrate that increasing particle elasticity drives interfacial organization from repulsion-stabilized crystallization to attraction-dominated gelation, via diverse metastable structures including clusters, voids and anisotropic aggregates. Molecular dynamics simulations, using an effective potential that captures the interplay between hydrophobic, capillary, steric and dipolar interactions, reproduce the overall phenomenology of the observed colloidal morphogenesis. Our findings establish particle elasticity as a key parameter governing non-equilibrium structural organization of colloids at an interface.

14 November 2026, Saturday

Session 2B – Lectures by Fellows/Associates

Chairperson – S K Apte, University of Mumbai

11:20–11:40 hrs



Akshay Singh

IISc, Bengaluru

Dr Akshay Singh is an Assistant Professor in the Department of Physics at the Indian Institute of Science (IISc), Bengaluru, and an Associate of the Indian Academy of Sciences, Bengaluru. He received his undergraduate degree in Engineering Physics (2010) from the Indian Institute of Technology, Delhi. He pursued his PhD in Physics (2016) from the University of Texas at Austin, followed by postdoctoral research in Materials Science at the Massachusetts Institute of Technology, Cambridge. He was an Infosys Young Investigator (2022–2023), and a PECFAR fellow (DST-DFG). He has set up a cutting-edge optical spectroscopy and materials science lab (OUSUMS lab) at IISc. His research explores the synergy between measuring novel physical phenomena and fundamental properties of materials and synthesizing new materials. His research is applicable to new high-performance electronics, optical materials, as well as next-generation quantum technologies. He was selected as a Associate of IASc in 2023.

2D Materials for Novel Physics and Emerging Quantum Technologies

Two-dimensional (2D) materials are next-generation materials relevant for optoelectronics, electronics, spintronics, and quantum technologies. The talk addresses why 2D materials are fascinating for both fundamental physics and for creating useful defects. His group's work on uncovering a new energy regime for electron-matter interactions, leading to the creation of defects in monolayer MoS_2 will be discussed. This fundamental understanding to create an ultra-dilute density of defects for hosting single-photon emitters (SPEs) that are critical for quantum technologies. We understand the physical origin of these SPEs and demonstrate the spatially deterministic positioning of these emitters.

14 November 2026, Saturday

Session 2B – Lectures by Fellows/Associates

Chairperson – S K Apte, University of Mumbai

11:40–12:00 hrs



Rashna Bhandari

CDFD, Hyderabad

Dr Rashna Bhandari is a biochemist and cell biologist, and heads the Laboratory of Cell Signalling at the BRIC-Centre for DNA Fingerprinting and Diagnostics (CDFD), Hyderabad, funded by the Department of Biotechnology. Rashna studied human biology at the All India Institute of Medical Sciences, New Delhi, and graduated with a master's and PhD in Biological Sciences from the Indian Institute of Science, Bangalore. She was trained as a postdoctoral researcher at Rockefeller University, New York, University of California at Berkeley, and Johns Hopkins School of Medicine at Baltimore, before taking up her current position as a Group Leader at CDFD, Hyderabad in 2008. Rashna's research focuses on the biochemical, cellular and physiological functions of two phosphate-rich biomolecules – inositol phosphates and inorganic polyphosphate. She is also involved in the characterization of rare genetic disorders. Elected to the Fellowship of IASc in 2025.

Protein Pyrophosphorylation by Inositol Pyrophosphates – A Unique Post-Translational Modification

Protein pyrophosphorylation is an emerging post-translational modification, in which an additional phosphate group is transferred to pre-phosphorylated serine residues by inositol pyrophosphates by Mg^{2+}-dependent, enzyme-independent mechanism. Occurring primarily in intrinsically disordered, acidic regions of proteins, this modification regulates diverse cellular processes, including rRNA synthesis, vesicle transport, protein stability, and DNA repair. Recent studies have begun to elucidate its biological significance and molecular mechanisms, offering insights into this underexplored regulatory process. Our understanding of the molecular details of this phosphotransfer process from inositol pyrophosphates to generate pyrophosphoserine is still nascent. Our current knowledge of the importance of protein pyrophosphorylation, and recent advances in understanding the mechanism of this important yet under-appreciated post-translational modification will be discussed.

14 November 2026, Saturday

Session 2B – Lectures by Fellows/Associates

Chairperson : S K Apte, University of Mumbai

12:00–12:20 hrs



Anurag Agrawal

Ashoka University, Sonepat

Prof. Anurag Agrawal is Dean, BioSciences and Health Research, Trivedi School of Biosciences, Ashoka University, and former Director of CSIR-Institute of Genomics and Integrative Biology. A graduate of AIIMS, Delhi, he completed specialist medical training and a PhD in Physiology. His research focuses on respiratory biology and the integration of emerging technologies into health and healthcare. He has chaired several prominent national and international advisory groups, including WHO's Technical Advisory Group on SARS-CoV-2 Viral Evolution and the Lancet–Financial Times Commission on Digital Health Futures. A recipient of the Shanti Swarup Bhatnagar Prize, JC Bose Fellowship and other honours, he is a Fellow of the National Science Academies and Vice President of the Indian National Science Academy, overseeing its policy vertical. Elected to the Fellowship of IASc in 2019.

Norm, Normal, Normative: Evaluating Lower Lung Function in Indians

Indians have the lowest vital capacity on spirometry of any nation globally. Vital capacity was named as such because of strong correlations with mortality. Low vital capacity predicts higher risk of diabetes, premature cardiac events, strokes, COPD, and death. By global standards, impaired lung function would be the norm for Indians. Statistical definitions of normal, based on the norm, do not serve the purpose of normative standards that are tied to health outcomes. The talk will discuss whether the low lung function of Indians is normal and what the appropriate standards should be.

14 November 2026, Saturday

Session 2B – Lectures by Fellows/Associates

Chairperson – S K Apte, University of Mumbai

12:20–12:40 hrs



Anant Jain

CHINTA, Kolkata

Dr Anant Jain is an Assistant Professor at the Centre for High Impact Neuroscience and Translational Applications (CHINTA), TCG CREST, Kolkata. His research asks how brain turns experience into memory. He studies the circuit, cellular, and molecular mechanisms of hippocampal synaptic plasticity that underlie spatial learning. Dr Jain received his PhD with Catherine Woolley at Northwestern University where he explored the neurophysiological effects of estrogens and trained in computational neuroscience with Erik De Schutter at Okinawa Institute of Science and Technology. During his postdoctoral work with Ryohei Yasuda at the Max Planck Florida Institute for Neuroscience, he identified the instructive signals behind behavioural timescale synaptic plasticity that is important for spatial learning. His lab now combines advanced imaging, electrophysiology, and behavior to connect molecular events to memory. He was selected as a Associate of IASc in 2025.

Plasticity Mechanisms Underlying Spatial Memories

Hippocampal place cells, once formed, remain stable in a given environment for days, suggesting that activity-dependent synaptic plasticity underlies their induction during spatial learning. Behavioral timescale synaptic plasticity (BTSP), in which a seconds-long plateau potentials integrates with coincident CA1 inputs, has emerged as a key mechanism for CA1 place cell formation. Our previous work identified a distinct molecular signature of BTSP: delayed dendritic spread of CaMKII activation, driven by calcium release from endoplasmic reticulum. The talk will dwell on how plateau potentials may be generated in a context-specific manner, focusing on norepinephrine (NE) dynamics during goal-directed spatial learning on a linear track. NE shows a bidirectional response: it increases phasically at the reward location during early trials but decreases at the same location once the animal has learned the reward contingency. Complementary slice experiments show that NE facilitates BTSP induction by enhancing cellular excitability. Together, these studies link specific molecular and neuromodulatory signals to the synaptic plasticity that support spatial learning during behaviour.

14 November 2026, Saturday

2C – Special Session on Public Health

Chairperson: Saumitra Das, IISc, Bengaluru

14:10–14:35 hrs



E Sreekumar

RGCB, Thiruvananthapuram

Dr Sreekumar is a Senior Scientist at the Molecular Virology Laboratory, BRIC-Rajiv Gandhi Centre for Biotechnology, Thiruvananthapuram, and a former Director of the Institute of Advanced Virology, Kerala. He holds an MVSc in Immunology from IVRI and a PhD in Biotechnology from RGCB. He has 22 years of research experience, and his expertise spans emerging viruses, particularly dengue, chikungunya, rabies, and Nipah, host–virus interactions, and antiviral development. As Director of IAV, he played a pivotal role in establishing 14 BSL-2 research laboratories, initiating research and academic programmes, and molecular diagnostic services, elevating the institute to national prominence. He has served on key national and international advisory bodies, including WHO's Diagnostic and Technical Advisory Group (DTAG) and State expert committees on COVID-19 and Rabies. He is a recipient of the Fulbright-Nehru Academic and Professional Excellence Fellowship and has served as Visiting Faculty at Johns Hopkins University, USA.

From Endemic Rabies to Emerging Nipah in Kerala: E2E Preparedness through Translational Virology

Implementation of virology research with goal-oriented approaches and short-term translational focus has become imperative for the country, which is witnessing increased emergence and re-emergence of viral infections. Rabies, a classic disease causing vaccine-preventable deaths, continues as a major One-health concern. Endemic diseases like dengue and other mosquito-borne infections have no available treatment or effective vaccines. Emergence of newer and fatal infections such as Nipah presents new demands on infectious disease research. While the challenges posed by these disease categories remain distinct, there is a common pressing need for concerted research efforts and stress on developing end-to-end (E2E) solutions indigenously. For tangible outcomes, fragmented research activities focusing on theoretically-perceived problems should give way to mission-mode efforts on clinical priorities with clear translation potential. The talk explores a bed-to-bench-to-bed (B2B2B) approach to address clinical priorities, accelerate translational outcomes and bridge the gap between research and patient care.

14 November 2026, Saturday

2C – Special Session on Public Health

Convenor: Saumitra Das, IISc, Bengaluru

14:35–15:00 hrs



T S Anish

Kerala University of Health Sciences, Thrissur

Dr Anish is a public health expert, infectious disease epidemiologist, and associate professor at the School of Public Health, Kerala University of Health Sciences. A prominent authority in pandemic science, "One Health," and high-threat viral pathogens like Nipah. He served as the founding nodal officer for the Kerala One Health Centre for Nipah Research and Resilience and as convenor of the State COVID-19 Expert Group. With over 100 peer-reviewed publications in high-impact journals, Dr Anish is widely recognized for his work in disease forecasting and public health emergency management. He has contributed extensively as an expert consultant to the Kerala State Disaster Management Authority, the ICMR, and international bodies such as the WHO, the Singapore National Centre for Infectious Diseases, and the National University of Singapore. An accomplished orator, he actively bridges the gap between complex science and public policy through effective science communication.

Threats and Resilience Interfaces for Zoonotic Outbreaks: The Kerala Experience

Kerala's unique socio-ecological landscape and global connectivity create a complex interface for infectious disease emergence. The State navigates a multifactorial burden: high-consequence pathogens like Nipah, seasonal Leptospirosis, un-eliminated conventional threats such as dog-mediated Rabies, and climate-driven vector shifts. Social vulnerabilities compound these risks, affecting indigenous communities facing Kyasanur Forest Disease and Leishmaniasis, and domestic migrants exposed to Malaria and filariasis. To build resilience, Kerala has institutionalized proactive, decentralized strategies. Key milestones include the Kerala Public Health Act (2023), the health system initiated One Health Programme, and advanced diagnostic infrastructure like the Institute of Advanced Virology (IAV). Additionally, the Kerala Antimicrobial Resistance Strategic Action Plan offers a global model for combating AMR. Utilizing Nipah containment as a prototype, Kerala demonstrates how rapid, scalable responses can be achieved. Ultimately grassroots local governance provides a sustainable roadmap for mitigating emerging zoonotic threats.

14 November 2026, Saturday

2C – Special Session on Public Health

Convenor: Saumitra Das, IISc, Bengaluru

15:00–15:25 hrs



Pragya Dhruv Yadav

National Institute of Virology, Pune

Dr Pragya Dhruv Yadav served as Director-in-Charge at the ICMR-National Institute for One Health, Nagpur and currently Scientist ‘F’ & In-Charge of the Maximum Containment Facility (BSL-4) at ICMR-National Institute of Virology, Pune. She earned her PhD in Biotechnology from Savitribai Phule Pune University and has over two decades of experience in high-consequence pathogens and biocontainment science. Her research focuses on Risk Group 3 and 4 viruses, leading outbreak investigations for Nipah, Zika, mpox, and CCHF. Crucially, she isolated the SARS-CoV-2 strain used to develop COVAXIN™ and spearheaded its preclinical animal studies and involved in clinical trial and effectiveness study. Recognised among Stanford/Elsevier’s Top 2% Scientists with over 360 publications and 13,500 citations, she is a recipient of the Rashtriya Vigyan Puraskar (Vigyan Yuva–SSB Award), an elected Fellow of NAMS, NAAS, IVS, INSA and IAMM, and serves as an international expert on multiple WHO technical advisory groups WHO expert for TAG-VE, TAG-COVAC, and WHO-CORC. Under the National One Health Mission, she oversees integrated human-animal-environmental surveillance and nodal for zonal NiV construction activity.

Enhancing Outbreak and Syndromic Surveillance through a One Health Approach

The talk will deliberate on insights from the recent efforts to improve outbreak and syndromic surveillance in India using a One Health approach. Through the National One Health Mission (NOHM), the team has been working to bring together syndromic, wastewater, and metagenomic surveillance, supported by a network of 23 BSL-3 labs and NOHM partners. Through the acute febrile illness sentinel network, our event-based surveillance pilots, and spillover studies around wetlands and slaughter houses, it is witnessed that how much stronger India's outbreak readiness becomes when human, animal, and environmental data actually talk to each other. The collaboration in action through the National Joint Outbreak Response Team, which brings together NCDC, ICMR, Animal Husbandry, ICAR, Wildlife, Ministry of Jal Shakti, Ministry of Environment, Forest and Climate Change and all the NOHM stakeholders is also noted. Their combined efforts have been put to the test in national mock drills and real-world responses to outbreaks like Nipah, H5N1, and CCHF viruses.

14 November 2026, Saturday

2C – Special Session on Public Health

Convenor: Saumitra Das, IISc, Bengaluru

15:25–15:50 hrs



Sudhanshu Vrati

RCB, Faridabad

Dr Sudhanshu Vrati is working at the Regional Centre for Biotechnology (RCB), first as its Executive Director (2016–2023) and currently as a JC Bose National Fellow of the Anusandhan National Research Foundation (ANRF), and the Emeritus Scientist of the Indian Council of Medical Research (ICMR). Dr Vrati's research has focused on understanding RNA virus replication and designing anti-virals and vaccine candidates against Japanese encephalitis (JE) and rotaviral diarrhea. Dr Vrati is a fellow of the Indian National Science Academy (INSA), the National Academy of Sciences, India (NASI), and the Indian Academy of Science (IASc). He has received several awards including the prestigious National Bioscience Award and the Tata Innovation Fellowship from the Department of Biotechnology, Govt. of India.

Chikungunya Virus: a Major Emerging and Re-emerging Virus

Chikungunya virus (CHIKV), a mosquito-borne alphavirus transmitted by Aedes mosquitoes, has emerged as a major global public-health threat. First identified in Tanzania in 1952, CHIKV now affects 119 countries, causing more than one million infections annually. Although fever and rash usually resolve within days, persistent and debilitating joint pain can cause long-term morbidity. Despite its expanding burden, effective antiviral therapies remain unavailable, and vaccine access is limited. This talk will review the epidemiology, molecular biology, and clinical impact of CHIKV, followed by our laboratory's efforts to develop countermeasures. We describe the development of an inactivated CHIKV vaccine candidate and a live-attenuated small-plaque variant carrying an E2-H232R mutation, which is highly attenuated in mouse models while retaining immunogenic potential. We also present a cell-based high-throughput screening platform using recombinant CHIKV expressing EGFP to identify inhibitors of viral replication. Screening of natural-product and drug-like compound libraries identified withaferin A, a steroidal lactone from Withania somnifera, which inhibits CHIKV replication by targeting the nsP2 protease and reducing viral RNA synthesis and infectious titers. In mice, withaferin A lowered viremia and prevented joint swelling. We further identified emetine, a repurposed alkaloid, as a potent CHIKV inhibitor that binds the nsP2 helicase, suppresses viral RNA synthesis, and protects mice even when administered 72 hours after infection. Together, these studies provide promising vaccine and antiviral candidates and illustrate how structure-guided and screening-based approaches can strengthen preparedness against re-emerging viral threats.

14 November 2026, Saturday

Session 2D – Public Lecture

Chairperson: Raghavan Varadarajan, President, IASc



16:30–17:30 hrs

K Jayakumar, IAS (Retd.)

Former Chief Secretary
Government of Keralam

Shri. Jayakumar is an administrator, poet, translator, lyricist, columnist, and artist. He joined the Indian Administrative Service (IAS) in 1978 and served in various capacities in the Government of Kerala and the Central Government. Major assignments include District Collector, Kozhikode; Director of Tourism; Director of School Education; Secretary of several Departments like Education, Culture, Tourism, Devaswom, and Water Resources; Agricultural Production Commissioner; and Home Secretary. He served as Joint Secretary in the Ministry of Culture from 2002 to 2007. He retired as the Chief Secretary of Kerala in 2012. He currently serves as the President of the Travancore Devaswom Board. Author of forty books in Malayalam and nine works in English. He has translated Tagore, Rumi, Kabeer and Kahlil Gibran into Malayalam and Gita Govindam into English. He has written lyrics for over a hundred films, besides several songs and music albums. Among the scores of awards, Central Sahitya Akademi Award for Malayalam Poetry in 2024, the Kerala Sangeet Nataka Academy Award for drama lyrics, and Kerala Sahitya Academy Award for overall contribution to Malayalam literature, merit mention. He is an artist having held nearly 20 solo exhibitions in India and abroad.

Has the Kerala Model of Development Outlived its Relevance?

Hailed for its emphasis on human resource development and social equity, Kerala model of development has succeeded in social engineering that has welfare at its core. Successive governments, regardless of their ideological differences, believed that it is the moral imperative of the state to directly provide quality and affordable education and healthcare to its citizens. Several pension schemes for the vulnerable sections became an accepted feature of governance. With the 73rd and 74th Constitutional amendments, the local bodies became more empowered than ever before. They got the power to directly deal with schools and government hospitals. The local governments too continued with the same ethos. However, after liberalisation and privatisation of the Indian economy, we have been witnessing the gradual receding of the state from several crucial sectors. This policy that is the hallmark of today's national economic policy and growth idiom has thrown several challenges to the welfare ethos of the Kerala model. Will liberalisation be able to offer the welfare cushion to the citizens as the state would? Or is the claim of welfare administration a luxury with Kerala's debt rising every year? All over Europe and elsewhere, the capitalist logic of market-led economic growth and the trickle-down effect are facing increasing threats. Will this validate the Kerala model, or will the Kerala model undergo mutation to retain its relevance? One thing is certain: the benefits to society that the Kerala model could provide are still beyond the reach of liberal economics where the state has no direct role.



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