32 MID YEAR MEETING OF THE INDIAN ACADEMY OF SCIENCES A CISCO WEBEX EVENT | 4, 11, 18, 25 JUNE & 2, 3 JULY

JULY 2021 Abstract e-Book 09:30 - 13:05 h

Inaugural Lectures by Fellows/ Associates



SARIT S AGASTI JNCASR, Bangalore

ASSOCIATE 2020 *Chemistry* 3 July 2021 09:30 -09:50 h



Imaging Life with Dynamic Molecular Interactions

In this talk, the speaker will describe the group's recent success of programming molecular assemblies in the living system based on a synthetic host-guest system featuring Cucurbit[7]uril (CB[7]). They demonstrated that highly selective and ultrastable hostguest interaction in CB[7] provides a non-covalent mechanism for assembling imaging agentsin cells and tissues. They have shown that CB[7]-ADA interaction fulfills the demands of specificity and stability that is required for bioorthogonal assembly in the living cell. They demonstrated this by labeling and imaging the distribution and dynamics of microtubule in HeLa cells. They used the dynamic nature of the supramolecular interaction to develop a new technique for super-resolution imaging with ~20 nm resolution. This technique, which they call SPIN (Supramolecular Probe-based Interaction mediated Nanoscopy), exploits repetitive and transient binding of the fluorescently labeled guest to complementary CB[7] host to obtain stochastic switching between fluorescence ON- and OFF-states. By connecting CB[7] guest to targeting ligands, they have demonstrated that this autonomous blinking enables two-dimensional (2D) and 3D superresolution imaging of biomolecules in cells.

Inaugural Lectures by Fellows/ Associates



SEEMA SHARMA IISER-Pune

FELLOW 2021 *Physics* 3 July 2021 09:55-10:15 h



Quest for Dark Matter at the LHC — The Supersymmetric Paradigm

The Large Hadron Collider (LHC) concluded Run-2 operations at end of 2018 delivering proton-proton collisions at a centre-of-mass energy of 13 TeV. The CMS and ATLAS collaborations have been analyzing the data corresponding to ~140/fb integrated luminosity collected by each experiment – it is the largest dataset ever collected by collider based experiments at the highest energy available ! The speaker will give a gist of the tools and techniques used for identifying signatures of the long sought Dark Matter, at the CMS experiment. She will briefly discuss the recent Supersymmetry (SUSY) results using the full Run-2 dataset, and plans for detector upgrades in near future.

Inaugural Lectures by Fellows/ Associates



SONU GANDHI NIAB-Hyderabad

ASSOCIATE 2020 Engineering 3 July 2021 10:20-10:40 h



Point of Care Diagnostics: Electrochemical sensors as a Platform for Rapid Detection of Diseases

Biosensors provide highly sensitive assay for rapid detection of any disease and its implementation in a simple, easy-to-use, inexpensive, point-of-care (POC) disposable cassette that carries out all the unit operations from sample introduction to detection. A novel, ultrasensitive electrochemical immunosensor was developed for simple, rapid determination of various biomarkers. Under optimum conditions, the proposed sensors displayed wide linear detection range (1 fM to 1 μ M) with a low detection limit in standard. Furthermore, the developed uPARimmunosensor showed good reproducibility, repeatability, and storage stability (75% of initial activity upto 4 weeks). Currently, the speaker's group is focusing on to fabrication of the manufactured electrode in to point-of-care diagnosis. Their system is particularly suitable for resource-poor settings, where centralized laboratory facilities, funds, and trained personnel are in short supply, and for use in doctors' offices, clinics, and at home.

Inaugural Lectures by Fellows/ Associates



SHOBHANA NARASIMHAN JNCASR, Bengaluru

FELLOW 2021 PHYSICS 3 July 2021 10:45-11:05 h



In Silico Design of Novel Nanomaterials

With advances in computational methodologies as well as computer hardware, it is now possible to obtain accurate solutions to the quantum many body problem using the techniques of density functional theory.

Such calculations are now often quicker and cheaper than carrying out actual laboratory experiments, and can be used to make realistic predictions, as well as to rapidly screen a large number of systems so as to identify the most promising materials for a desired technological application. The speaker will present a brief overview of the concepts behind this area of research, and present some examples of successful predictions made in her research group.

Inaugural Lectures by Fellows/ Associates



UMAKANTA SUBUDHI IMMT, Bhubaneshwar

ASSOCIATE 2019 General Biology

3 July 2021 11:30-11:50 h

Self-Assembled Branched DNA Nanostructure as Cancer Therapeutics





Inaugural Lectures by Fellows/ Associates



THOMAS J PUCADYIL IISER, Pune

FELLOW 2021 General Biology 3 July 2021 11:55-12:15 h



Membrane Fission: Insights From Reconstituting Organelle Form and Chemistry

The lipid bilayer is highly resilient to rupture and explains why it was selected over the course of evolution to serve a barrier function. Yet fission, or the splitting of a membrane compartment, is a central theme in biology that manifests during cell division, organelle biogenesis and vesicular transport. Fission involves the local application of forces to bend and constrict or thin down a membrane tube. Since bending requires the bilayer to deviate from its preferred planar configuration, fission is energetically unfavorable. Using reconstitution approaches that involve biochemical screens, we have discovered novel proteins that catalyze fission and have elucidated their mechanism and cellular functions. This talk will describe these recent developments.

Inaugural Lectures by Fellows/ Associates



KUNAL CHAKRABORTY INCOIS, Hyderabad

ASSOCIATE 2020 Earth and Planetary Sciences

3 July 2021 12:20-12:40 h



Monitoring and Forecasting the Biogeochemical State of the Indian Ocean

The Indian Ocean is an ideal laboratory to understand physicalbiological coupled processes across water column using the models which integrate ocean simulation, observation, and analysis. Ocean models have a unique ability to integrate our empirical and theoretical understanding of the marine environment and the role ocean physics plays in marine environmental health and ecosystem functioning in the coastal ocean and adjacent deepsea.

A high-resolution, coupled ocean-ecosystem modeling system, known as Biogeochemical State of the Indian Ocean (BIO), has been developed to study the evolution of the biogeochemical state of the Indian Ocean at both short and long time scales. The modeling framework involves an online coupling of the Regional Ocean Modeling System (ROMS) physics/dynamics integrated with an ecosystem model. This high-resolution BIO modelling system has not only overcome the operational difficulties in generating Potential Fishing Zone (PFZ) advisories due to the non-availability of remote sensing data but also graduated PFZ advisories into PFZ forecasts.

Inaugural Lectures by Fellows/ Associates



M. SABU MBGIPS, Calicut

FELLOW 2020 Plant Sciences 3 July 2021 12:45-13:05 h



Wild Ginger and Banana Families of India: An Overview

The talk is a comprehensive presentation on the taxonomy, uses, IUCN status of wild gingers and banana in India. The gingers include the members of the family Zingiberaceae, which consist of about 21 genera and about 200 species in India. Of these, one genus and 35% of the taxa are endemic to India. The Calicut University Botanical Garden holds the largest collection of gingers in India. Banana family or Musaceae form the second largest family of the order Zingiberales in India. A live germplasm of Indian Musaceae is established in the Calicut University Botanical Garden and Malabar Botanical Garden. Recently 14 new species have been discovered from India. The speaker and group could rediscover five species after a lapse of 57 to 121 years. This present work includes all wild bananas from India, endemism, IUCN status, ecology etc.