

INDIAN ASSOCIATION FOR THE CULTIVATION OF SCIENCE

2A&B, Raja S.C. Mullick Road, Jadavpur, Kolkata-700032, India

Seminar Notice

Speaker: Prof. Saibal Mitra, Department of Physics, Astronomy and Materials Science, Missouri State University, Springfield, MO 65897, USA

Title: From Nanomaterials to Devices: The Journey of One Materials Physicist

Date, Time & Venue: Monday, 25th June, 2018 at 11.00 am at C.V. Raman Hall

Abstract: In the first half of the talk, I will introduce thin film deposition techniques - both physical and chemical vapor deposition. As an example of CVD, I will introduce a novel technique called initiated chemical vapor deposition (iCVD). It is a versatile, solvent-less process which can be used to deposit a variety of polymeric films. The technique involves the introduction of controlled amounts of monomer and initiator gasses into the reaction chamber and activating them over a hot-filament. Since the filament temperatures are low and the substrates are held at temperatures less than 50 °C, it is possible to coat polymer films on a variety of substrates that include biological material. In addition, conformal coatings of nanostructures have also been achieved. These properties make this deposition technique so attractive. In the second half of my talk I will present an overview of the development of micro- and nano-battery systems and electrochromic materials. The motivation for fabricating nanoscale devices and power systems stem from the fact that these devices are expected to be efficient and can be made task-specific. The fabricated nanobattery is a three-layer device. The top layer is made of LiCoO_2 while the bottom layer is aluminum coated with graphite and/or molybdenum oxide. These form the cathode and anode of the battery, respectively. The separator is the laser-machined Kapton layer with an array of $n \times n$ holes. Micro- or nano-scale holes machined into it using a femtosecond laser. These holes were then filled with Li-based electrolyte. This Kapton layer provides integrity to the battery and also acts as the separator electrically isolating the anode and the cathode.

Biography Sketch of Prof. Saibal Mitra

Dr. Saibal Mitra is a professor of Physics, Astronomy and Materials Science at Missouri State University (MSU) located in Springfield, Missouri, USA. Prior to joining MSU in 2008, Dr. Mitra was a faculty at the University of Tulsa (1996 - 2007). He obtained his undergraduate degree in Physics (Hons.) from University of Kolkata (Presidency College) and his Ph.D. in Solid State Physics from Iowa State University. After graduation he was a post-doctoral research associate at Massachusetts Institute of Technology in Cambridge, Massachusetts and Institute of Energy Conversion at Newark, Delaware. Dr. Mitra's research interests include nanoscale materials and devices, materials for photovoltaic devices, thin film growth and characterization.

All are cordially invited to attend the seminar