



# INSTITUTE OF SMART STRUCTURES & SYSTEMS

## PROGRAM OF ANNUAL GENERAL BODY MEETING (AGM)

September 29, 2018 || Golden Jubilee Seminar Hall, || ECE Dept. || Indian Institute of Science, Bangalore

3.30 PM: Welcome

3.35 PM: 2<sup>nd</sup> Prof. A Selvarajan Memorial Lecture: COMPOUND SEMICONDUCTORS: THE NEXT BUS? Prof SB Krupanidhi, IISc Bangalore

4.15 PM: ISSS Special Lecture: Engineering of Micro-Nano structured surfaces over larger area Dr. Nagahanumaiah, Director, CMTI, Bangalore

5.00 PM: Business Session of AGM



## Details of Talks

### 2<sup>nd</sup> Prof A Selvarajan Memorial Lecture: COMPOUND SEMICONDUCTORS : THE NEXT BUS?

**Prof S.B. Krupanidhi**, Materials Research Centre, Indian Institute of Science, Bangalore-560094, [sbk@iisc.ac.in](mailto:sbk@iisc.ac.in)

**Abstract:** The advent of semiconductors has changed the course of mankind and led to many technological revolutions. Rapid technological innovation is driving growth in the semiconductor industry. From the initial days Silicon has been considered as the work-horse in the semiconductor industry due to its unique properties. Later other material systems such as oxides, group III-V, II-VI based compound semiconductors has gained much attention due to their superior properties in terms of electron mobility, direct bandgap nature and tunability and opened doors to new devices which paved way to the current technologies. In spite of all the technological revolution going around, we are still currently facing problems in areas such as energy & environment, defence sector & homeland security, excessive technology dependence, economy and overall well-being. Hence there is a need of hour to work on these problems and already a plethora of research activity is going on in the field of energy generation & storage, gas sensing, light emission and detection, flexible electronics, next generation memory & electronic devices etc.

In this talk I would like to emphasize on the kind of research OUR COUNTRY needs to focus on.

**Biography:** Following his Ph. D. from Delhi University in Solid State Physics in 1981, Prof. Krupanidhi held a post doctoral positions at Queen's University, Canada till 1984. He then worked as Principal Scientist at Motorola in Albuquerque till 1988 prior to joining the Pennsylvania State University as a Professor. Since 1995 he has been a member of the faculty at MRC, IISc.

He has received several awards including two Engineering Invention Awards at Motorola, USA (1986). MRSI Medal, India, (1997), VASVIK Medal, (2004), MRS Superconductivity-Materials Science Award, (2004), Prof. CNR Rao Lecture Prize, MRSI, (2010), Tatachem Chair Professor, Indian Institute of Science, (2006) and Rustom Choksi Medal for research excellence, (2006). He was awarded J.C. Bose Fellowship in 2008. He is a Fellow of INSA, INAE and NASI.

### ISSS Special Lecture: Engineering of Micro-Nano structured surfaces over larger area

**Dr. Nagahanumaiah**, Director, Central Manufacturing Technology Institute (CMTI), Tumkur Road, Bangalore – 560022, Email: [director.cmti@nic.in](mailto:director.cmti@nic.in)

**Abstract:** In micro-nano systems engineering, multiscale surface modification that essentially involve creating different topologies controls the interactions occur at surfaces and interfaces. Applications of these functional surfaces designed with controlled pattern geometries are continuously growing, ranging from repellent windshields of automobiles, food packaging, and healthcare to energy harvesting. For instance, by controlling hydrophobic properties over the surfaces by creating patterns could resist the bacterial growth and solar entrapment by internal reflection is being achieved by engineering of textured solar cells. The first part of this lecture covers a brief introduction to the fundamental principles of surface properties that are being altered by surface patterning at micro-nano scale. It then discusses in detail on engineering of antibacterial surfaces to controlling bacterial adhesion and colonization, and micro surgical tools.

There have been multiple processes developed based on electro-mechanical-chemical-optical principles, however, manufacturing of these engineered topographies over larger area is still a challenge, For example, lithography based processes need a mask, they are ineffective for patterning non-planar surfaces and for three dimensional features. Replica molding uses softer material and it needs an already patterned mold that restricts its use to laboratory experiments. On the other hand, focused ion beam machining is relatively versatile, but highly expensive and is a slow process that makes it unsuitable for bulk integration. Keeping this in view, the need and the progress made towards integration of mechanical driven hybrid process chains, development of ultra-precision machine tools and its subsystems particularly in India, will be discussed.

**Biography:** Dr. Nagahanumaiah is Director at Central Manufacturing Technology Institute (CMTI), Bangalore and Former Chief Scientist of CSIR-Central Mechanical Engineering Research Institute, Durgapur . He completed his Ph.D. from Indian Institute of Technology Bombay, Post graduation in Tool Engineering from Indo-Danish Tool Room, Bangalore, and Engineering degree from Bangalore University. He had 20 years research experience at CSIR-CMERI, 3 years teaching and 2 years as mold designer in industrial tool rooms.

His current areas of research include micro-nano systems engineering including modular micro machines development, micro-nano scale manufacturing processes and biomedical applications of micro-nano patterned surfaces. In the past, he has worked on dies and molds, injection molding and rapid tooling areas. He has established a research group "Micro Systems Technology" at CSIR-CMERI in 2006. His group successfully developed four micro machines: micro-EDM, laser processing, nano-scratching and Reconfigurable micro factory. He was the Nodal Officer for the CSIR 11th FYP task force on Modular and Reconfigurable Micro manufacturing Systems. He continued as a Nodal officer for the CSIR's task force on Robotics and Micro Machines during 12th FYP period.

He is a Professor of Academy of Scientific and Innovative Research (AcSIR), New Delhi and Honorary Professor of Indian Institute of Engineering Science and Technology (IIST) Shibpur. He has published 85 research papers in refereed journals and conferences. He is a recipient of 'BOYSCAST Fellowship' and 'Raman Fellowship'. He has guided 18 M.Tech students and currently eight PhD scholars are working with him. He is one of the recipients of 'We Think for India' award from Prime Minister of India for the Indian manufacturing policy draft prepared in 2003. He is a Member, of International Institution for Micromanufacturing (I2M2), USA and International Association of Engineers, UK.