

National Institute of Technology Karnataka, Surathkal

Short Course Sponsored by GIAN (MHRD)

On

Organic Semiconductors for Microelectronics & Display Applications

May 30 – June 3, 2016

Overview

This Short Course will provide an insight into the exciting new field of Organics Electronics. Starting with an introduction to the physics of organic semiconductors, it will include their applications in thin-film transistors (TFTs), memory devices and organic light-emitting diodes (OLEDs) for lighting and display applications.

In the first part of the module band theory of solids (inorganic and organics) will guide the way to the energy band diagram of metal-semiconductor (MS) contacts as a fundamental constituent of electronic devices. By means of the metal-oxide-semiconductor (MOS) capacitor, concepts such as accumulation and depletion of charge carriers in organic semiconductors will be discussed and contrasted to their inorganic counterparts. This leads over to the structure and operating principle of field-effect transistors (FETs), their device architectures, considerations on switching speeds and scaling. As part of their applications, the role of organic TFTs in (unipolar and complementary) logic circuits, displays, and memories will be introduced. The module will then look at general properties and requirements of memories such as writing/reading speeds, retention time, endurance, and scalability/integration. Different memory concepts (e.g. capacitive, resistive, floating-gate) will be introduced.

In the second part of the module the field of optical displays will be introduced, covering the technologies currently in use and those expected to feature in the next generation of display technologies with emphasis on OLED-based displays. The module will offer a short introduction the different kinds of optical displays available, and will briefly discuss the current driving forces governing market trends. The lectures will discuss the way in which the human eye operates and how it affects the way in which we perceive optical displays. The course will then move on to cover all of the physical and technical properties associated with understanding and characterizing optical displays, such as luminous power, luminous efficiencies and understanding the 1931 CIE colour space standard etc. Various manufacturing technologies will also be highlighted.

Module	Organic Semiconductors for Microelectronics & Display Applications : May30–June 3, 2016 Number of participants for the course will be limited to fifty.
You Should Attend If...	▪ you are a UG or PG/PhD student in any Engineering College or in the Department of Physics or Materials Science or Electronics or Chemistry in a University / College ▪ you are faculty member teaching in an Engineering College or in Post Graduate Department of Physics / Materials Science / Electronics / Chemistry of a University/College. ▪ you are Scientist/Engineer in a Government R&D Lab or in a Industry.
Fees	The participation fees for taking the course is as follows: Participants from abroad : US \$500 Industry/ Research Organizations: `Rs.20000 Academic Institutions: Rs.5000 The above fee includes instructional materials, computer facilities for assignments and internet facility on campus. The participants will be provided with accommodation on payment basis.

The Faculty



Dr. Thomas D. Anthopoulos is a Professor of Experimental Physics in the Department of Physics and The Centre for Plastic Electronics, Imperial College, London. He received his B.Eng., and Ph.D., from Staffordshire University in UK. He then moved to University of St. Andrews where he worked on organic light-emitting diodes. In 2003 he joined Philips Research Laboratories in The Netherlands to work on organic semiconductors for use in opto/electronic devices and integrated circuits. In 2005 he was awarded an EPSRC Advanced Fellowship and in 2007 a RCUK Fellowship both hosted in the Department of Physics, Imperial College London. His current research interest is focused on the physics of novel organics, inorganics and hybrid materials and devices. Ongoing research projects include:

Novel inorganic transparent semiconductors; High-mobility organic semiconductors & devices; Nanoscale opto/electronic devices & systems; Transparent photo-transistors for invisible electronics; Charge carrier transport in semiconductors & devices; Novel nano-lithography methods for plastic nano-electronics; Novel device concepts for energy harvesting & generation



Dr. G. Umesh is a Professor in the Department of Physics, National Institute of Technology Karnataka (NITK), Surathkal, Mangaluru. His research interests are in the areas of Electromagnetics and Photonics.

Course Co-ordinator

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