NUS Nanoscience & Nanotechnology Initiative (NUSNNI) – Physics Seminar

Strategies for Controlled Assembly at the Nanoscale

Speaker: **Prof Federico Rosei**
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Venue: **Blk S13, Level M, Room 11, Physics Conference Room,**
Department of Physics, Faculty of Science, NUS

Date: **10th July 2007 (Tuesday)**
Time: **3.00pm – 4.00pm**

Abstract:
The bottom–up approach is emerging as a viable alternative for low cost manufacturing of nanostructured materials. It is based on the concept of self–assembly of suitable nanostructures on a substrate.

We propose various strategies to control nanostructure assembly (both organic and inorganic) at the nanoscale. Our approaches include:
(i) surface patterning through a nanostencil (i.e. a shadow mask with nanoscale features) and deposition on naturally patterned substrates, which take advantage of long–range reconstructions
(ii) we are able to control the size and luminescence properties of semiconductor nanostructures, synthesized by reactive laser ablation.
(iii) by controlling inter-molecular interactions, we demonstrate that it is possible to create specific nanoscale patterns.
(iv) we have developed new experimental tools and comparison with simulations are presented to gain atomic scale insight into the surface processes that govern nucleation, growth and assembly.
The controlled assembly of building blocks at the nanoscale is expected to be effective for a variety of applications, ranging from nanoelectronics to chemical and biosensors, to improved biomaterials.

Profile:
Federico Rosei received a Laurea degree (1996) and a PhD (2001) in Physics from the University of Rome "La Sapienza". He worked as a Post–Doctoral Research Associate and Marie Curie Fellow at the Center for Atomic Scale Materials Physics in Aarhus (Denmark) from the end of 2000 until April 2002. He then joined the faculty at INRS- Energie, Materiaux et Telecommunications, Université du Québec as Assistant Professor in May 2002. Only two years later, he was promoted to Associate Professor, with tenure. He is recipient of a Strategic FQRNT Fellowship for New Professors from the Province of Quebec and holds the Canada Research Chair in Nanostructured Organic and Inorganic Materials.
Dr. Rosei's research interests focus on the properties of nanostructured materials, and on how to control their size, shape, composition, stability and positioning when grown on suitable substrates. He has extensive experience in fabricating, processing and characterizing inorganic, organic and biocompatible nanomaterials.
He has co–authored about 50 articles in prestigious international journals (including *Science, Physical Review Letters, J. Am. Chem. Soc., Angewandte Chemie, Nanoletters, Small, Phys. Rev. B and Applied Physics Letters*) and has given about 60 Invited, Keynote and Plenary Talks at international conferences and over 80 seminars at Universities, Government and Industrial Laboratories since 2000.

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