PAP Seminar Announcement


By

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Date: 9 July 2012, Monday
Time: 11.00am to 1.00pm
Venue: MAS Executive classroom 1 (MAS-03-06)
Host: Asst. Prof. Fan Hongjin

Abstract
The demand of novel functional materials has become the major challenge scientists face to answer crucial contemporary issues such as alternative energy sources, novel sensors for a safer and cleaner environment and for better health. For instance, one of the promising alternatives for the transition of energy resource from its fossil fuel-based beginning to a clean and renewable technology relies on the widespread implementation of solar-related energy systems, however the high cost of energy production and low-energy of currently used material combinations pose an intrinsic limitation. In this context, revolutionary materials development is required to achieve the necessary dramatic increases in power generation and conversion efficiency. The necessity of materials development which is not limited to materials that can achieve their theoretical limits, but makes it possible to raise theoretical limits by changing the fundamental underlying physics and chemistry is crucial. Low cost purpose-built, functional materials with optimized geometry, orientation, and aspect ratio combined with inexpensive large scale manufacturing methods will play a decisive role in the success of materials for renewable energy. However, fabricating and manufacturing large area of such functional materials is a daunting challenge. Novel smarter and cheaper fabrication techniques and, just as important, better fundamental knowledge and comprehensive understanding of materials and their syntheses as well as their properties using nanoscale phenomena such as quantum confinements to create multifunctional structures and devices is the key to success. R&D exploiting Nanoscience and Nanotechnology has the greatest potential to reach such challenging goals. Such ideas will be demonstrated by the thermodynamic modeling, low-cost aqueous design and fabrication of highly oriented crystalline arrays of metal oxide quantum dots and rods-based structures and devices with controlled orientation, size and shape onto various substrates designed at nano-, meso-, and micro-scale by aqueous chemical growth at low-temperature. In addition, the in-depth characterization of their electronic structure and quantum confinement performed at synchrotron radiation facilities and their applications for solar hydrogen generation, photovoltaics, magnetic and gas sensor devices will be presented.

Short Biography
Born in 1968, he obtained a MSc. in Physical Chemistry in 1991 and a PhD. in Inorganic Chemistry in November 1995 from the Université Pierre et Marie Curie, Paris, France for his research work on the Interfacial & thermodynamic growth control of metal oxide nanoparticles in aqueous solutions. Thereafter, he joined Uppsala University, Sweden as a postdoctoral researcher for the Swedish Materials Consortium on Clusters and Ultrafine Particles to extend his concepts and develop purpose-built metal oxide nanomaterials as well as to characterize their electronic structure by x-ray spectroscopies at synchrotron radiation facilities. He has been invited as a visiting scientist at: the University of Texas at Austin; the UNESCO Centre for Macromolecules & Materials, Stellenbosch University, And iThemba LABS, South Africa; the Glenn T. Seaborg Center, Chemical Sciences Division, at Lawrence Berkeley National Laboratory; Texas Materials Institute; The Ecole Polytechnique Fédérale de Lausanne, Switzerland; the University of Queensland, Australia, and Nanyang Technological University, Singapore. He has been an independent scientist at the National Institute for Materials Science, Tsukuba, Japan for 8 years.

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