Nanoscale Science Seminar

1D nanomaterials and nanodevices

Co-sponsored by
Department of Physics
School of Molecular Sciences
The LeRoy Eyring Center for Solid State Science

Guest Speaker: Dr. Qing Chen
Affiliation: Key Laboratory for Physics and Chemistry of Nanodevices, Department of Electronics, Peking University, Beijing, P. R. China
Seminar Date: Monday, April 4th, 2016
Time: 4:00 – 5:00 pm; Refreshments: 3:45 pm
Location: GWC 487
Host: Dr. Jimmy Liu

Abstract

1D nanomaterials (e.g., nanotubes and nanowires) have broad applications, especially for developing various nanodevices. Understanding the structure-property relationship is key to the design and performance improvement of novel nanodevices. Electron microscopy techniques provide powerful methods for structure and morphology characterization. However, the nanomaterials being characterized by TEM and SEM are normally not the same individual component in a nanodevice. Nanomaterials fabricated under the same condition and even in the same batch do not necessarily have the same structural characteristics (e.g., diameter, surface condition, the doping level and the crystal orientation) which result in different properties. In this seminar, I will introduce our newly developed in-situ platform based on SEM and several key nanomanipulation methods to correlate the atomic-level structure of nanowires or nanotubes to their properties such as mechanical, electronic, optoelectronic and piezoelectric properties. Structure dependent properties of carbon nanotubes (CNTs), for example, strain-induced bandgap change as a function of chirality, and the resonant frequency and the quality factor of CNT resonators as a function of strain, will be elaborated. The phase-, structure- and orientation-dependent properties (fracture strength and Young’s modulus, electronic properties, piezoelectric and piezoresistive effects, and the electrochemical lithiation) of InAs nanowires will be discussed. The recent progress in our laboratory on developing CNT FETs will be discussed as well.

Biography

Dr. Qing Chen currently is Professor at Peking University in China and serves as Associate Director of Key Laboratory for the Physics and Chemistry of Nanodevices, Ministry of Education in China and Director of the Institute of Physical Electronics, Department of Electronics of Peking University. She was educated and trained at Peking University, University of Science and Technology Beijing, Cambridge University, Institute of Metal Materials in Japan and Arizona State University before joining Peking University in 2001. She has authored and co-authored more than 160 SCI papers in peer-reviewed journals with a citation by others for over 6300 times. Her current research interests include CNT related nanodevices, inorganic semiconducting nanowires and 2D nanomaterials, and the study of structure-property relationships of nanomaterials and nanodevices via in situ electron microscopy and other techniques. She has received State Natural Science Award Second Class (2010), and has won Ourstanding Youth Fund from National Natural Science Foundation of China (2009).