



Center for Nanoscale  
Chemical-Electrical-Mechanical  
Manufacturing Systems

## Atomic Structure of Nanotubes and Nano-Clusters

Atomic structure is critical to the properties of nanomaterials. An outstanding example is carbon nanotubes, which can be semiconductive or metallic depending on the tube chiral vector. Understanding the atomic structure and their dependence on growth conditions is critical to controlling the properties of nanotubes. In other nanostructures, such as nanodots or particles, surface plays an important role for photoluminescence, catalytic activities and energy storage, but we know little about their surface structure. We use nanoarea electron diffraction (NED) for structure determination of individual nanostructures. In this technique, a nanometer-sized, coherent, parallel electron beam is used to record electron diffraction patterns. This talk will report what we have learned from electron diffraction about the atomic structures of nanomaterials. The talk is divided into two parts. The first part will cover the structure of single and multi-wall carbon nanotubes and what we learned about their growth. The second part will focus on metallic nanoparticles and their surface structure. The materials covered here are highly relevant to students and researchers interested in the application of nanotubes and nanoparticles. The talk should also be interesting to these interested in atomic structure and characterization.



Wednesday, December 6, 2006  
4:00 pm  
B02 Coordinated Science Lab

**Jian-Min (Jim) Zuo**  
Materials Science and Engineering  
F. Seitz Materials Research Laboratory  
University of Illinois at Urbana-Champaign

*Jian-Min Zuo received his Ph.D. in Physics from Arizona State University in 1989. He then took a three-year postdoctoral fellowship at the National Science Foundation center for high resolution electron microscopy and the Physics department at ASU. During this time he co-authored a book on electron microdiffraction with John Spence. Prior to joining the faculty of UIUC, he was a research scientist in Physics at ASU and a visiting scientist to a number of universities and institutes in Germany, Japan, China and Norway. His honor includes the JSPS (Japan Society for the Promotion of Science) postdoctoral fellowship and the CC Wang fellowship of China. Zuo is the recipient of the 2001 Burton Award of the Microscopy Society of America and NSF career award in 2005. His current position is associate professor in the department of materials science and engineering, UIUC.*