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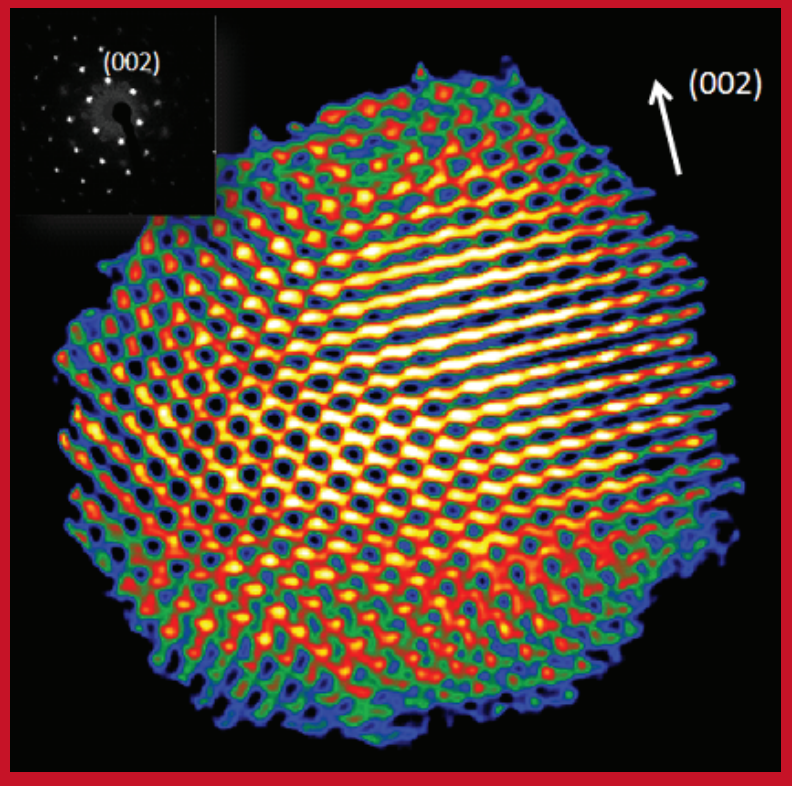
Jian-Min Zuo

Atomic Resolution Coherent Diffractive Imaging and Ultrafast Science

A major scientific challenge is determining the 3-D atomic structure of small nanostructures, including single molecules. Coherent diffractive imaging (CDI) is a promising approach. Recent progress has demonstrated coherent diffraction patterns can be recorded from individual nanostructures and phased to reconstruct their structure. However, overcoming the dose limit imposed by radiation damage is a major obstacle toward the full potential of CDI. One approach is to use ultrafast x-ray or electron pulses. In electron diffraction, amplitudes recorded in a diffraction pattern are unperturbed by lens aberrations, defocus, and other microscope resolution-limiting factors. Sub-Å signals are available beyond the information limit of direct imaging. Significant contrast improvement is obtained compared to high-resolution electron micrographs. Progress has also been made in developing time-resolved electron diffraction and imaging for the study of ultrafast dynamic processes in materials. This talk will cover these crosscutting issues and the convergence of electron and x-ray diffraction techniques toward structure determination of single molecules.



Jian-Min Zuo received his Ph.D. in physics from Arizona State University (ASU) in 1989. Prior to joining the faculty at University of Illinois at Urbana-Champaign (UIUC) he was a research scientist in physics at ASU and a visiting scientist at a number of universities and institutes in Germany, Japan, China, and Norway. Zuo is the recipient of the 2001 Burton Award of the Microscopy Society of America, U.S. National Science Foundation (NSF) career award in 2005, and Outstanding Overseas Young Scientist Collaboration Award from the NSF of China in 2007. Currently, he is a professor in the Department of Materials Science and Engineering and the Frederick Seitz Materials Research Laboratory at UIUC.

Wednesday, January 12, 2011 | 3:00 p.m.

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