

Seminar

The Data Revolution in Materials Characterization at Atomic and Nanoscopic Scales



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Tuesday May 21, 2024



11.00am – 12:00pm



Lecture Theatre S9
16 Rainforest Walk (Bldg 25)
Monash Clayton Campus

**Jian-Min Zuo**

Abstract

The recent developments in electron optics and fast detectors have revolutionized the way materials are characterized at atomic and nm scale. Rather than relying primarily on electron images collected inside transmission electron microscopes (TEMs), increasingly, these instruments are designed more like diffractometers for the collection of massive diffraction datasets, taking advantage of the large electron elastic scattering cross-section and the electron focusing property, down to hundreds of picometers. By data-mining diffraction datasets, the materials microstructure can be characterized in a quantitative way, and yet at unprecedented resolution and details. This approach also provides a path to integrate data science with material science for tackling some of outstanding materials challenges. This talk will first review the progress toward to quantitative electron diffraction, and how the combination of electron nanodiffraction with fast electron detectors has made a powerful metrology/characterization tool for the coming decades. Application examples include energy materials, semiconductor devices and high entropy alloys.

Biography

Jian-Min Zuo is the Ivan Racheff Professor of Materials Science and Engineering at the University of Illinois, Urbana-Champaign. He received his Ph.D. in Physics from Arizona State University (ASU) in 1989. His research program focuses on the atomistic structure of nanostructured materials, ultrafast electron diffraction, and studies of interfacial structure and bonding. He is a leader in developing coherent electron nanodiffraction and electron diffractive imaging techniques. He is a fellow of American Physical Society and Microscopy Society of America, a recipient of Ernst Ruska Prize of the German Society for Electron Microscopy and Gjonnes Award from International Union of Crystallography. He is the author, with late Prof. John CH Spence of ASU, of the 2017 book, *Advanced Transmission Electron Microscopy: Imaging and Diffraction in Nanoscience*, published by Springer.

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