Research Areas

- Electronic, Magnetic & Photonic Materials
- Electron Microscopy
- Nanomaterials & Nanotechnology

Research Interests

Our research focuses on atomic-level analytical electron microscopy and spectroscopy. To reach essential science for materials development, we have to keep pursuing to find the key factors to control material properties. Most of these factors, which have not been well understood, are “subtle features” inside the materials. For example, optical and electronic properties from doped nanocrystals are mainly governed by the position and chemical state of dopants, and only full understanding of those individual dopant atoms can lead us to achieve desired properties from the materials. The challenge to unveil the origin of many material properties is primarily associated with the lack of understanding of the subtle features such as interfaces, defects, doping, and strains. Scanning transmission electron microscopy (STEM) is no doubt one of the techniques to visualize the subtle feature with enough precision and resolution. We are conducting extensive sub-Å-resolution microscopy and spectroscopy studies to understand these subtle features, establish fundamental knowledge of them, and get desired material properties.

- Atomic-level characterization of materials using analytical scanning transmission electron microscopy (STEM)
- Quantitative analysis of defects, interfaces, dopants, strain and magnetic and electric field in low-dimensional materials
- Electron energy-loss spectroscopy (EELS), Energy dispersive spectroscopy (EDS), and STEM annular dark-field (ADF) imaging
- Electron holography
- Electron and X-ray crystallography
Awards

Eric Samuel Scholarship, The Microscopy Society of America, 2014
Moam Scholarship, 1996-1999

Selected Publications


