

CCST Seminar:

- › Thursday, May 28, 2009
- › 3:00 P.M.
- › 366 Colburn Laboratory

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“Applications of Aberration-Corrected Electron Microscopy for Materials Science Applications”

Transmission electron microscopy has been a vital characterization technique for materials scientists for the past 50 years. Continual advances in stability and coherence of the electron source and lenses led to increasing resolution and successful atomic resolution of atom locations for most oxides in low-order zone axis orientations. The optical limitation of the electron microscope is the large, unavoidable third order spherical aberration for an electromagnetic lens which is circularly symmetric and forms a real image of a real object. Typically the resolution of an electron microscope is on the order of 100 times larger than the wavelength of the electron. For many years a number of attempts were made to get around the resolution limit of spherical aberration. About 10 years ago, multi-pole aberration-correctors for both fixed-beam and scanning instruments were developed that demonstrated improvements in point resolution. Rapid advances have occurred and multi-pole aberration-correctors for STEMs and TEMs are now commercially available from all the major instrument manufacturers.

The principles of multi-pole aberration-correctors will be discussed along with some of the recent advances in material characterization enabled by this new technology. Higher image resolution, less delocalization, improved chemical sensitivity and depth information is now accessible via TEM. Applications of aberration-corrected STEM to the characterization of a number of heterogeneous catalyst systems will provide some examples of the exciting new capabilities of transmission electron microscopy.