

## Nanoscale diffraction microscopy at the CNM/APS hard x-ray Nanoprobe Beamline

The near-term commissioning of the Hard X-ray Nanoprobe Beamline at sector 26 of the Advanced Photon Source as part of the Center for Nanoscale Materials will provide a dedicated facility for hard x-ray diffraction microscopy at a landmark 30nm spatial resolution. Integrating a high-brightness synchrotron X-ray beamline with an advanced optomechanical experimental platform at an energy range of 3-30keV will make possible nanoscale diffraction studies of functional nanomaterials with a high degree of precision at a previously unavailable resolution. The unique capabilities of hard X-ray microscopy techniques such as large penetration depths, high sensitivity to elemental composition, crystallographic phase, and strain when applied at this length scale offer unique opportunities for many fields of science. As well, coherent diffraction techniques make possible the study of static and dynamic disorder and phase-sensitive imaging at a spatial resolution in principle beyond that of the probe itself. The challenges and scientific impact of extending scanning probe X-ray diffraction microscopy techniques to the nanoscale will be discussed.