Title:
Nanoscale scanning probe diffraction microscopy at the Hard X-ray Nanoprobe beamline

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The recent completion of the Hard X-ray Nanoprobe Beamline at the Advanced Photon Source as part of the Center for Nanoscale Materials provides a dedicated facility for nanomaterials characterization utilizing hard x-ray microscopy at a landmark ~40nm spatial resolution. The unique capabilities of hard X-ray microscopy techniques such as large penetration depths, experimental sensitivity to elemental composition, crystallographic phase, and strain when applied at this length scale offer unique opportunities for many fields of science. Current research will be presented based on the use of nanoscale diffraction microscopy at the Hard X-ray Nanoprobe Beamline (HXN) as a probe of local structural physics of materials. This is associated with three key areas: 1) unique material behavior of nanoscale objects, 2) nanoscale phase phenomena of active materials, and 3) frontier imaging of nanoscale disorder via coherent Bragg diffraction.