Hard X-ray beam damage study of monolayer Ni islands using SX-STM

Scientific Achievement
The SX-STM technique combines synchrotron x-rays (SX) and scanning tunneling microscopy (STM). Matter-beam interaction can be studied in situ with ultra-high spatial resolution.

Significance and Impact
Beam damage introduced by X-ray beams is a significant challenge in materials science, biology, and other fields. So far, beam damage could only be studied indirectly (e.g., changes in diffraction peaks). SX-STM allows to directly see the surface during illumination; thus, study damage in situ.

Research Details
- Submonolayer of Ni deposited onto clean Cu(111).
- Sample continuously illuminated for about 11 h.
- During irradiation tip scanned across the surface to monitor changes in shape and volume.
- Photon energy: 8.45-8.85 keV
- Flux: 3x10^{13} photons s^{-1} mm^{-2}
- X-ray illumination does not cause damage on Ni islands.
- Utilized APS/CNM beamline ID-26.