

## **Present and Near-future Scientific Capabilities of the Hard X-ray Nanoprobe (HXN) at NSLS-II**

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The Hard X-ray Nanoprobe (HXN) at the NSLS-II, constructed to achieve the world's most ambitious goal for hard x-ray microscopy, is now ready for general user experiments. The designed scanning microscopy techniques include x-ray fluorescence, x-ray diffraction, x-ray absorption, x-ray scattering, phase-contrast imaging, spectroscopy, tomography and ptychography. Currently, x-ray fluorescence, phase-contrast imaging via differential phase contrast (DPC) and spectroscopy techniques are commissioned and ready for general user experiments. X-ray imaging with a sub-20 nm resolution is routinely achieved for general user experiments. The next set of microscopy tools including nanodiffraction, fluorescence tomography, and ptychography is under development and will be offered to general users over the next year. In parallel, significant efforts are directed to perform these techniques in-situ sample environments. Presentation will summarize the current and near-future science capabilities available for experiments, an unambiguous sign for the beneficial impact of such nanoprobe and spectroscopy beamlines. Application examples from environmental and geosciences, material and energy research, and cultural heritage will be presented to substantiate this point.