

## High Resolution Chemical Mapping of Energy-Related Materials: Development of Soft X-Ray Ptychography at SSRL

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Ptychography is an emerging high resolution coherent imaging technique which enables a significant increase in resolution compared to other X-ray imaging techniques such as scanning transmission X-ray microscopy (STXM). Development of this capability is underway at SSRL to establish sub-5 nm resolution ptychography with near-edge X-ray absorption fine structure (NEXAFS) imaging. This is being achieved via an upgrade of the current soft X-ray STXM chamber on beamline 13-1, involving the installation of an area detector and an interferometer system for high precision sample motor control. The undulator source on beamline 13-1 provides the spatially and temporally coherent X-ray beam required for ptychographic imaging in the energy range 500 – 1200 eV. The resolution achievable and energy range accessible using this technique at SSRL beamline 13-1 presents exciting opportunities to address scientific challenges associated with many energy-related systems such as the poisoning of fluid catalytic cracking catalysts for fuel production and the degradation of metal oxide cathodes used for energy storage. The development of this ptychography capability and opportunity for in situ measurements will be described, along with its application to the study of energy-related materials.