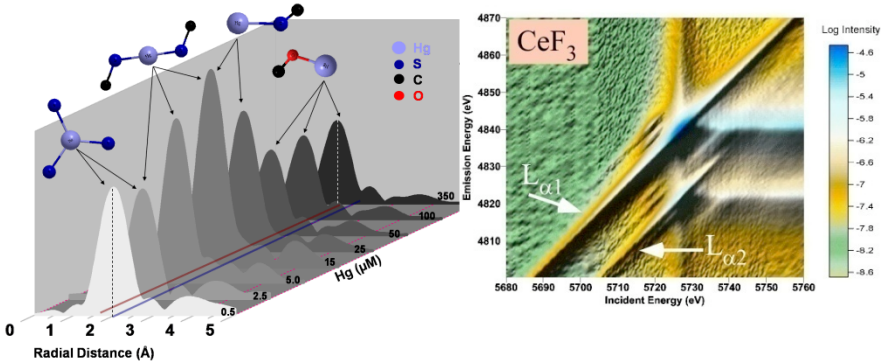
Inner Shell Spectroscopy Beamline (ISS)

ISS at NSLS-II:

- XAS of samples with very low absorber concentration
- Resonant and non-resonant X-ray Emission Spectroscopy
- XAS with resolution below the natural core-hole lifetime
- Low energy absorption edges (below 1keV) using non-resonant inelastic scattering to measure X-ray Energy Loss Spectroscopy

Examples of Science Areas & Impact:

- MATERIALS DEVELOPMENT: Technologically relevant thin films and buried layers measured by XAS with high throughput
- ENVIRONMENTAL SCIENCE: Fate and transport of contaminants studied at environmentally relevant concentrations
- BIOCHEMISTRY: Time resolved XES of Cytochrome P450 intermediates in heme mediated alkane hydroxylations to follow heme oxidation, spin state, and ligation throughout the catalytic cyle.
- ENERGY SCIENCE: Fields ranging from battery and fuel cell development to petroleum processing benefit by XELS measurements of soft x-ray edges



Left: Fourier transformed Hg L_3 EXAFS data measured for Hg adsorbed to *S. oneidensis MR-1* as a function of Hg concentration ranging from 0.5 μM (a concentration that cannot be measured on a dipole source) to 0.4 mM (a simple experiment for a dipole source). At the environmentally relevant lowest concentrations, the binding environment of the Hg is quite different from the higher concentrations.

Right: A resonant XES study of the Ce Lα emission from CeF_3. We observe a strong splitting of the pre-edge emission at ~5719 eV incident energy. This yields insight into the *f*-orbital ground states of such systems which are unavailable by other inner shell techniques.

Beamline Capabilities:

TECHNIQUE(S): X-ray Absorption Spectroscopy, X-ray Emission Spectroscopy, X-ray Energy Loss Spectroscopy

SOURCE: Multipole wiggler

FLUX IN SI(111) BANDWIDTH: 10^{14} ph/sec

ENERGY RANGE / RESOLUTION: 4.5 – 40 keV / $2x10^{-4}$ ΔE/E

SPATIAL RESOLUTION: unfocussed beam, 500 μm (preliminary focus), 30 μm (secondary focus)