X-ray Absorption Spectroscopy for Biological, Environmental and Energy Sciences (XAS)

XAS at NSLS-II

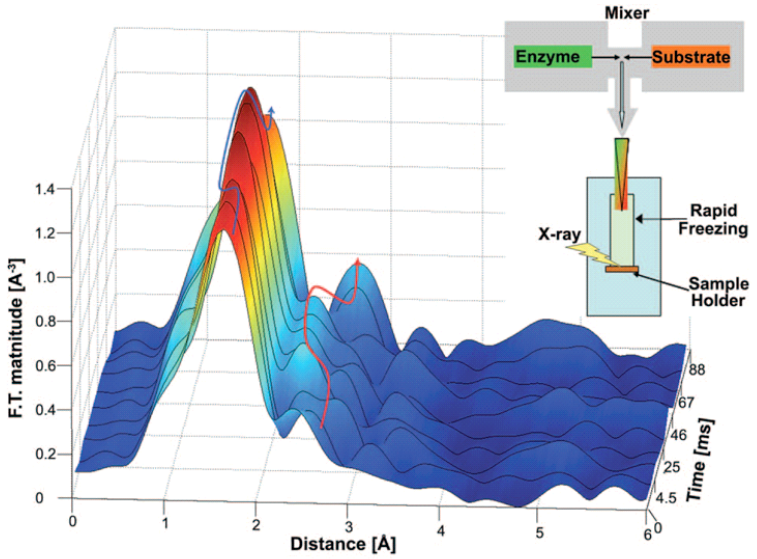
- Will enable studies of low (<100 μm) concentration samples
- #1 facility of its kind in the US; only such facility on the East Coast
- Will provide continuity of service and expanded capabilities for an extensive, highly-productive user community
- Sagittally focusing monochromator: flexible beam size & tunable flux density (~0.2x0.5 to 2x10mm, maintaining flux)
- Multiple endstations (cryogenic, *in-situ*, high-throughput) with rapid changeover

Examples of Science Areas & Impact

•BIOLOGY: Study freeze-quench intermediates in metallo-β-lactamase reactions to understand antibiotic resistance

•ENVIRONMENT: Observe Fe-TAML intermediates in the efficient catalysis of decomposition of pollutants by H_2O_2

•ENERGY: *In situ* electrochemical cell EXAFS to determine structure-property relationship of electro-active enzyme active sites for biological fuel cells



Time-resolved XAS measurements of TNF-alpha converting enzyme during enzymatic catalysis using freeze-quench technology [Solomon et al., *PNAS* **104**, 4931 (2007)]. The increased flux and improved stability at the XAS beamline at NSLS-II will enable these types of measurements on important biological, environmental and energy sciences samples only available at low concentrations.

Beamline Capabilities

TECHNIQUE(S): transmission and fluorescence mode extended x-ray absorption fine structure (EXAFS) & x-ray absorption near-edge structure (XANES)

SOURCE: 3-pole wiggler

ENERGY RANGE / RESOLUTION: 4.5–25 keV/1-4 eV (ΔE)

DETECTOR: 31-element Ge

U.S. DEPARTMENT OF ENERGY

Spokesperson: Mark Chance, Case Center for Synchrotron Biosciences

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