

# Earth and Environmental Sciences at NSLS II



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*a passion for discovery*



# **Earth and Environmental Sciences at BNL/SBU**

## ***Diverse research themes and sponsors***

- Deep earth and planets, mineral properties at extreme P/T
- Biogeochemistry
  - Contaminant bioavailability, transport and remediation
  - Plants and soils
- Climate Science
  - Weathering, Ocean chemistry/fertilization
  - Atmospheric chemistry
- Energy/Environment Interface
  - Geologic resources: CO<sub>2</sub> storage, geothermal
  - Pollution & Waste: nuclear encapsulation, coal fly ash,...
- Human Health/Environment Interface
  - Toxicology and Epidemiology; Metals in disease

Sponsors: DOE BES/BER, FE, EERE, EM; NSF; NIH; WFO

# Relevant NSLS II beamline capabilities and developments needed for EES community

- Beamline capabilities planned for NSLS II
  - High resolution imaging (100nm-10nm)
  - High resolution spectroscopy (below natural core-hole lifetime)
  - Wide energy range (2-30 keV & 150-1000eV)
  - Dilute systems (ppb range)
- Developments needed
  - Focusing optics, sample positioning,...
  - Detectors
  - Data acquisition and real-time processing
  - Environmental chambers: P/T, flow, reactive fluids
  - Sample preparation, pre-screening, transferability

# **Earth and Environmental Sciences at NSLS II**

## ***Beamlines to meet community needs***

- Project Beamlines
  - SRX: Submicron Resolution X-ray Spectroscopy
  - XPD: X-ray Powder Diffraction
  - HXN: Hard X-ray Nanoprobe
- NEXT Beamlines
  - ISS Inner Shell Spectroscopy
  - FXI Full-field X-ray Imaging from  $\mu\text{m}$  to nm
- Approved Beamline proposals
  - 4DE 4-Dimensional Studies in Extreme Environments
  - TES Tender Energy X-ray Spectroscopy
  - XFM X-ray Fluorescence Microprobe
- Proposed beamlines as part of 2011 call
  - HXT, ICT, STX
  - What's missing?