

Facility Title: Multiple Timescale, *in-Situ/Operando* X-ray Scattering and Spectroscopy (MTX)

Principle contact: Xiaoyi Zhang

X-ray Sciences and Division, Argonne National Laboratory, 630-252-0366, xyzhang@aps.anl.gov

Team members: Yang Ren (ANL), David M. Tiede (ANL), Lin X. Chen (ANL), Tao Sun (ANL), Libai Huang (Purdue), and Randall E. Winans (ANL)

Abstract:

The Multiple Timescale, *in-Situ/Operando* X-ray Diffraction and Spectroscopy (MTX) facility exploits the APS-U highly collimated, tunable hard and high energy X-ray beam characteristics to develop new time-resolved capabilities: (1) Transient microscopic X-ray scattering (XRD, PDF) and spectroscopy; and (2) Laser-assisted high-energy X-ray scattering (XRD, PDF, SAXS). The MTX is designed to provide time-resolved X-ray capabilities not available at other light sources. The science programs associated with MTX focus on multiple time- and length-scale electronic and structural characterization of complex heterogeneous samples with hierarchical structures. The MTX is directed at enabling world-leading scientific programs, ranging from fundamental understanding of solar energy conversion, catalysis, fuel cells, and electrochemical (battery) storage, to in-process probing of additive manufacturing and *in-situ* atomistic studying in combinatorial materials synthesis. We anticipate MTX will lead to landmark discoveries on fundamental knowledge in energy conversion and storage; and enable great breakthroughs in materials genome initiative and additive manufacturing technologies.