

APS WK#12: Multi-scale X-ray Fluorescence Microscopy Imaging Using Multiple APS Beamlines

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Biological, chemical, geological, archeological, cultural heritage, and material science samples come with sizes ranging from nanometers to centimeters. The APS facility of Argonne National Laboratory offers a variety of x-ray fluorescence microscopy (XFM) instruments that offer different capabilities including high spatial resolution, flexible sample environment, sensitivity and additional imaging modality. However, most of the instruments have limited resolution range and may have other limitations. In many cases, proper sample preparation, selection of micro- and nanoscopic features, and efficient use of beam time for large-scale samples, such as tissue sections, cathode or catalysis material, and soil aggregates require wider range and options than a single beamline may be able to offer. Fortunately, sequential measurement at beamlines such as 8-BM, 20-ID, 13-ID, 2-ID-D/E, 9-ID-B, and 26-ID with increasing resolution and with sample modification allows for integrated sample measurement, more comprehensive identification of micro features within large samples, and highly improves efficiency of measurements at beamlines with high spatial resolution but slow data collection rate.

This workshop will demonstrate ongoing progress in multi-scale XFM research, including data collection, sample handling and guided modification, as well as developments in sample holders design and visualization software, which all together will significantly improve user experience with multi-beamline imaging. The workshop will familiarize the broader user community with available XFM options at APS and provide ideas for efficient data collection strategy on current APS as well as for upgraded APS beamlines.