

The state of high-energy diffraction microscopy instrument at the Advanced Photon Source – past, present and future

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High-energy diffraction microscopy (HEDM) techniques provide three-dimensional microstructural information – e.g. grain orientation, morphology, grain-averaged strain tensor – non-destructively about materials on the micrometer scale for samples of a few millimeters in size, which can be utilized for general characterization, and model validation, verification among others. In the past two decade, a suite of high energy diffraction microscopy techniques – near field (NF), far field (FF), and very far field – and associated in situ thermo-mechanical loading capabilities have been implemented at the Advanced Photon Source (APS). In this talk, we describe the current state of the HEDM instrument, including resolution and sensitivity characterization for NF and FF-HEDM techniques. We also report on the new developments at the APS such as the high-throughput HEDM beamline and scanning HEDM technique. Finally, we present our vision of HEDM's future after the APS Upgrade and describe our ongoing efforts in preparation for the upgrade.