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Abstract for an Invited Paper
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Advance X-ray Characterization of Battery Degradation Mechanisms

JOHANNA WEKER, SLAC National Accelerator Lab

Synchrotron-based X-rays are a powerful characterization tool that can probe across many relevant length scales (from atomistic to millimeter) with different techniques that are sensitive to distinct features such as microstructure, chemistry, and morphology. Because of the high flux available and penetrating power of high energy X-rays, batteries can be probed under realistic conditions, which enables us to understand and overcome failure mechanisms of the generation battery materials. I will discuss our multimodal approach combining information from high resolution transmission X-ray microscopy, X-ray diffraction, and X-ray absorption spectroscopy to study a range of different battery chemistries. Specifically, I will present recent work on using X-ray microscopy to study nanoporous architectures for alloying anode to accommodate their large volume changes. I will also show X-ray diffraction mapping to characterize Li metal plating on the graphite anode from fast charging and compare it to the local state of charge of the cathode.