Spectro-microscopy and Nano-tomography with Transmission X-ray Microscopy

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Hard X-ray transmission X-ray microscopy (TXM) is an ideal tool for in situ and operando studies of functional materials and materials synthesis routes. The high energy X-rays provides relatively relaxed restrictions on in situ environments enabling high resolution 2D microscopy and tomography (3D microscopy) across a large range of pressures and temperatures and in varying gas or liquid environments. The full field geometry of TXM allows imaging at the sub-second time scale, allowing relevant dynamics to be captured during; for example, battery cycling, catalysis reactions, electrochemical synthesis, and corrosion. Moreover, by tuning the incident X-ray energy to specific absorption edges, TXM can capture elemental and chemical (spectro-microscopy) changes at 30 nm resolution within a few minutes (Figure 1). Here we will present our latest in situ and operando X-ray microscopy results.

![Figure 1. Spectro-microscopy of LiCoO2 battery electrode during deep discharge.](image)