Using In-situ and Operando Methods to Understand Rate Capability and Thermal Stability in Lithium Ion Electrodes

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In this presentation, I will described various approach being developed and utilized at the Center for Functional Nanomaterials to characterize phase transitions and reaction mechanism in battery electrode materials using in-situ and operando methods. Specifically, I will describe recent work from the Electron Microscopy Group regarding the lithiation and sodiation of idealized NiO nanosheets, with a specific focus on reaction pathways occurring in this system. I will also show how in-situ EM approaches can provide insight into the thermal stability of NCA and MNC cathodes, and how EM is complementary to bulk probes such as XRD and XAS.