Fakultät 1
Institut für Physik

Brandenburgische
Technische Universität
Cottbus - Senftenberg

Einladung zum
Physikalischen Kolloquium

Termin: **Dienstag, 17. Oktober 2023**
Zeit: **17.15 Uhr**
Ort: **Hauptgebäude (HG), Raum HG 0.18**

"Operando Study of Local Chemistry and the Induced Magnetic Transitions in Batteries using Lab-Scale X-ray Emission/Absorption Spectroscopy"

Faisal M. Alamgir
School of Materials Science and Engineering
Georgia Institute of Technology

Abstract

Tracking the change in electronic and local structure is crucial to investigate and improve the stability and performance of rechargeable batteries. Doing so under *operando* conditions is challenging but, if done correctly and complementarily with *ex-situ* studies, can reveal the intimate connections between local point-group structure/symmetry, the oxidation states of the constituent elements and their spin states. We will discuss the advances in instrumentation that allows for lab-scale high-energy-resolution x-ray emission spectroscopy (XES) and x-ray absorption spectroscopy (XAS), which has previously been relegated to high flux over broad bandwidth sources such as synchrotrons. We used our in-house XES and XAS to study not just the internal reactions within batteries during charge and discharge, but also the intrinsic property changes (e.g. magnetic) induced in the active materials by these reactions. The cases that will be examined are lithium iron phosphates (LFP), lithium nickel manganese cobalt oxide of various stoichiometries (NMC 111 and NMC 811), and lithium cobalt oxide (LCO). As NMC and LCO are structural siblings, we will specifically look at the connections and subtle differences between them as they undergo electrochemically induced chemical and physical changes.

Alle Interessenten sind sehr herzlich eingeladen!
gez. Prof. Seibold