

MM 30: Invited talk Butz

Time: Wednesday 18:15–18:45

Location: H43

Invited Talk

MM 30.1 Wed 18:15 H43

Advanced *in situ* Electron Microscopy for targeted Battery Development — ●BENJAMIN BUTZ — Micro- and Nanoanalytics Group (LMN) & Micro- and Nanoanalytics Facility (MNaF), University of Siegen, Siegen, Germany — Department of Materials Science and Engineering, Stanford University, Stanford, USA

To master the global challenges in energy storage, e.g., for e-mobility, mobile and medical devices, power tools and decentralized energy supply, novel battery concepts with enhanced energy density, long-term stability and safety at reduced price are needed. Therefore, novel technological strategies as well as capable electron-microscopic techniques along the length-scales down to the atomic regime are required to handle materials based on highly reactive species such as the alkali el-

ements. The microstructural characterization of cell parts, interfaces and starting materials commonly fails because the native state of those reactive materials is hardly preserved during sample preparation under ambient conditions or even in the high vacuum of common microscopes. The first part of this contribution will introduce cryo-EM techniques, well known from the life sciences, in conjunction with elaborated inert-gas transfer routines, which allow for detailed SEM and TEM investigation for a deep understanding of structure formation, degradation and failure. The second part will outline advanced *in situ* electrochemical and environmental TEM studies allowing for the detailed analyses of charge/discharge and corrosion/passivation processes of individual battery nanostructures and at interfaces. (This research was partially funded by the DFG under grant no. BU 2875/2-1.)