

Diffraction studies of prismatic Li-ion cell with neutrons

Wednesday, 26 June 2019 10:40 (20 minutes)

In the last decades Li-ion batteries, occupied an important role in energy market, are widely used in powering portable devices, off-grid energy storage and e-mobility applications. In a number of publications, it was shown that a neutron powder diffraction pattern taken on cylindrical cells like 18650-type can be successfully refined using a contribution from the cell constituencies: positive and negative electrodes, current collectors and cell housing. The cylinder-type Li-ion cells are rather difficult for lab manufacturing due to rollover design which leads to numerous issues regarding reproducibility, current and electrolyte distribution etc. On the other hand, prismatic cells are much easier to manufacture in the lab. Also, from the ergonomic point of view, the prismatic cells supply improved stacking/volumetric density, when compared to cylinder ones. This leads to the increased interest of cell manufacturers to the cells in prismatic shape for both low and high current applications and inspired us to start the thorough characterization of the cells of this type using high-resolution neutron powder diffraction. In the current contribution, we present an optimized approach for the neutron diffraction measurements of prismatic cells which allows to collect data set of similar quality to cylindrical cells. This approach also allows data collection not only for *ex situ* but also upon *in situ/in operando* conditions using a specially designed setup. In the contribution, the behavior of the prismatic cells is compared to those observed for the of 18650-type cells.

Primary authors: BARAN, Volodymyr; Dr MÜHLBAUER, Martin J. (Institute for Applied Materials (IAM), Karlsruhe Institute of Technology (KIT),); SCHULZ, Michael; Mr PFANZELT, Joseph (Technical University of Munich, Research Neutron Source Heinz Maier-Leibnitz (FRM II)); SENYSHYN, Anatoliy

Presenter: BARAN, Volodymyr

Session Classification: Science group meetings 1