chemisch
physikalische
gesellschaft

Gegründet im Jahre 1869 von H. Hlasiwetz, J. Loschmidt, J. Petzval und J. Stefan

EINLADUNG

zum
virtuellen Vortrag von

Dr. Anatoliy Senyshyn

Heinz Maier-Leibnitz-Zentrum (MLZ), Technische Universität München, Garching, Germany

Neutron-based techniques in battery research

Dienstag, 21.06.2022, um 17:30 Uhr

Zoom-Meeting beitreten:
https://univienna.zoom.us/j/66878183273?pwd=bllmYUVxVWVPdnNkOTFxSFBWWm00UT09
Meeting-ID: 668 7818 3273
Kenncode: 974523

Abstract
The operation of electrochemical energy storage systems based on Li-ion technology is supplemented by the active transport of electrons and lithium ions exchanged between the positive and negative electrode materials during cycling. Besides materials properties, such an exchange is facilitated by cell parameters like electrode dimensions and geometry, current density, temperature, pressure, reaction rate etc. It is worth to be mentioned that such parameters are neither uniformly distributed nor static in general and, therefore, serve as a stabilizing factor of heterogeneous state in Li-ion batteries typically reflected in lithium concentrations distributed in the electrodes. Besides this a permanent demand for improved energy/power densities, safety and lifetime results in the increasing engineered complexity of Li-ion batteries on different scale levels. Such complexity requires the application of non-destructive probes for characterization of batteries.
It is intrinsic to Li-ion batteries to be electrically isolated systems, so that quantification of the uniformity of their properties (chemical, current, charge and/or temperature) is often non-trivial. Taking the cell apart and harvesting of the materials for further ex situ/post mortem characterisations is a popular task, which, however, might not necessarily reflect the initial/original state. There are just few methodologies capable to probe the cell homogeneity under real operating conditions, i.e. in operando, and only a limited number of reports on real cells. In such context neutron scattering provide a number of excellent probes in battery research (especially when combined with electrochemistry), either in ex situ or in operando modes. In the current contribution an overview of selected neutron scattering tools (diffraction and small-angle scattering, imaging, reflectometry, neutron and positron spectroscopy, depth profiling etc) will be presented in brief and complemented by the real examples of studies either on real-life Li-ion batteries or specially adapted electrochemical cells for neutron scattering.

CHEMISCH-PHYSIKALISCHE GESELLSCHAFT
c/o Universität Wien, Fakultät für Physik, 1090 Wien, Strudlhofgasse 4/Boltzmanngasse 5, Austria
Generalsekretär: Christl Langstadlinger
Tel.: +43-(0)1-4277/51108 - Mobil: 0664-60277 51108 - E-Mail: christl.langstadlinger@univie.ac.at
ZVR-Zahl: 513907440 - http://www.cpg.univie.ac.at
Konto: Bank Austria - IBAN: AT22 1100 0086 4440 8000 - BIC: BKAUATWW