# Structural Characterization of Battery Component Materials

Fábian Margit[1]
[1]*HUN-REN Centre for Energy Research, Budapest Neutron Centre, 1121 Budapest, Konkoly Thege st 29-33, Hungary*

The optimization of lithium-based and, increasingly, sodium-based battery components relies heavily on research aimed at understanding their structural properties. Our work in this field leverages neutron-based measurement techniques, which provide unique insights into material structure that are difficult to obtain by other methods.

We present the structural characterization of various battery component materials using neutron techniques available at the Budapest Neutron Centre. International literature highlights neutron diffraction, small-angle neutron scattering, and neutron imaging as key techniques for battery research, all of which are available at our institute.

Structural characterization of battery component materials is demonstrated through neutron diffraction studies, including datasets acquired using an in-situ electrochemical cell installed directly in the neutron beamline. These experiments enable the investigation of structural changes under realistic operating conditions. Examples ($NaFePO_4$, $NaCoO_2$, $LiCoO_2$, $LiMnO_2$) of these measurements are presented.

Our objective, which we also offer to our partners, is to provide a detailed understanding of the structure of functional battery components, experimentally validate their performance, and identify the phases that form during charge and discharge processes under in situ conditions.

Focus areas: component optimization, *in situ* testing, analysis of phase evolution during charge and discharge cycling, and investigation of structure-performance relationships in battery materials.

Short bio:

Fábián Margit received her PhD in Theoretical and Physical chemistry, within the materials science program at Eötvös Loránd University of Budapest. Her research activity is focused on the development and structural study of amorphous borosilicate, chalcogenides, bioactive glass systems, and solid-state oxide electrolytes. She has extensive experience in the field of microstructural characterization (neutron and X-ray technique (&synchrotron)) and computer modelling of atomic structure. She is also an instrument scientist at the PSD neutron diffractometer and leads the laboratory for preparation of glassy materials and another one, with several analytical testing capacity. Detailed List of Publications: https://m2.mtmt.hu/gui2/?type=authors&mode=browse&sel=10013934