

Karlsruhe Institute of Technology



Post Lithium Storage Cluster of Excellence

In-Depth (Surface) Analysis of Half- and Full-Cell **Potassium-Ion Batteries**

How Ethylene Bis(Alkyl Carbonates) Interfere with Electro and Surface Chemistry.

lurii Panasenko¹, Celine Röder¹, Leonie Wildersinn¹, Daniel Stottmeister³, Andreas Hofmann², Fabian Jeschull¹

¹ Karlsruhe Institute of Technology (KIT), Institute for Applied Materials - Energy Storage Systems (IAM-ESS) ² Karlsruhe Institute of Technology (KIT), Institute for Applied Materials - Materials Science and Engineering (IAM-WK) ³ Ulm University, Institute of Theoretical Chemistry



What Can We Learn From Half-Cell Test in Post-Li Batteries? Half cells in the K-ion field struggle with the reactive potassium-metal counter electrode. The resulting degradation products interfer with the cell chemistry and affect the surface chemistry of the working electrodes under investigation

Synchrotron-based Depth Profiling by **Photoelectron Spectroscopy**







- high degrees of irreversible capacity (both anode & cathode)

The electrolyte degradation at the **K-metal counter electrode** in half cells - obscures rsurface analysis results by **considerable alterations of the SEI** composition and excessively thick surface layers

Half cells results need to be critically reviewed and ideally confirmed in full cells this is especially true for post-Li cell chemistries

Funding

The authors thank the German Research Foundation (DFG) for funding (Project ID 390874152 (POLiS Cluster of Excellence, EXC 2154) and project ID 448719339 ('KIBSS')



References

[1] I. Panasenko, M. Bäuerle, F. Jeschull, SSRN 2024, DOI 10.2139/ssrn.4881960 [2] A. Hofmann, F. Müller, S. Schöner, F. Jeschull, Batter. Supercaps 2023, DOI 10.1002/batt.202300325

[3] F. Allgayer, J. Maibach, F. Jeschull, ACS Appl. Energy Mater. 2022, 5, 1136–1148 [4] F. Jeschull, J. Maibach, Electrochem. Commun. 2020, 121, 106874

Contact

Fabian Jeschull fabian.jeschull@kit.edu

Team Leader - Electrolytes and electrochemical Methods Institute for Applied Materials -Energy Storage Systems (IAM-ESS)



Visit us online!

