

T02 GD-OES depth profiling - ZSW

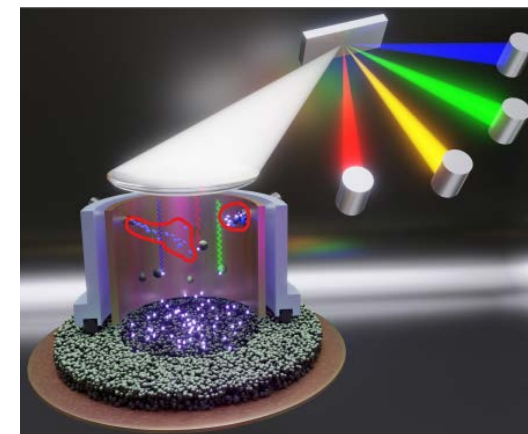


TEESMAT

Open Innovation Test Bed for Electrochemical Energy Storage Materials

How it works

- Ar sputtering of negative electrode surface to current collector
- Detection of sputtered elements by optical emission spectroscopy (incl. Li, Si, C, O, P, Cu, ...)
- Measurements at different parts of a sample due to small measuring spot (\varnothing 2.5mm)



What can be seen

- Semi-quantitative detection of SEI growth/Li plating on graphite [1] and Si/graphite anodes [2]
- Detection of Cu after over-discharge [3]
- Determination of Si content in anodes [4]

What kind of sample ?

Negative anode (graphite or Si/graphite), pristine or taken from Post-Mortem analysis of a cell, $> 1 \text{ cm}^2$

Why is it useful ? production control, durability, safety

Investigation time-scale: some weeks

Maturity level : advanced



Grant Agreement
No 814106





References:

- [1] N. Ghanbari, T. Waldmann, M. Kasper, P. Axmann, M. Wohlfahrt-Mehrens, Inhomogeneous Degradation of Graphite Anodes in Li-Ion Cells: A Postmortem Study Using Glow Discharge Optical Emission Spectroscopy (GD-OES), J. Phys. Chem. C. 120 (2016) 22225–22234. <https://doi.org/10.1021/acs.jpcc.6b07117>
- [2] M. Flügel, K. Richter, M. Wohlfahrt-Mehrens, T. Waldmann, Detection of Li Deposition on Si/Graphite Anodes from Commercial Li-Ion Cells: A Post-Mortem GD-OES Depth Profiling Study, J. Electrochem. Soc. 169 (2022) 050533. <https://doi.org/10.1149/1945-7111/ac70af>
- [3] M. Flügel, M. Kasper, C. Pfeifer, M. Wohlfahrt-Mehrens, T. Waldmann, Cu Dissolution during Over-Discharge of Li-Ion Cells to 0 V: A Post-Mortem Study, J. Electrochem. Soc. 168 (2021) 020506. <https://doi.org/10.1149/1945-7111/abdc5f>
- [4] K. Richter, T. Waldmann, M. Kasper, C. Pfeifer, M. Memm, P. Axmann, M. Wohlfahrt-Mehrens, Surface Film Formation and Dissolution in Si/C Anodes of Li-Ion Batteries: A Glow Discharge Optical Emission Spectroscopy Depth Profiling Study, J. Phys. Chem. C. 123 (2019) 18795–18803. <https://doi.org/10.1021/acs.jpcc.9b03873>

