Contribution ID: **93** Type: **Talk (20 min + 5 min discussion)**

Diffraction Computed Tomography for Non-Destructive Analysis of Li-Ion Batteries

Thursday 5 December 2024 15:00 (25 minutes)

This contribution discusses the application of Diffraction Computed Tomography (DCT), including both X-ray and neutron probes, as a powerful method for non-destructive structural analysis in materials science. DCT uses a pencil-beam scanning technique to yield the reconstructed images of internal structure and chemical gradients of materials, extending the traditional imaging approaches. A notable application of DCT is in the study of commercial lithium-ion batteries, where it has been used to resolve inhomogeneities in lithium distribution and structural evolution during cycling. We apply DCT to various commercial battery types, specifically focusing on cylindrical cells with different diameters, featuring diverse chemistries such as NCA, NMC, and graphite anodes. By employing high-resolution DCT, we map lithiation distributions and investigate electrode degradation mechanisms, providing key insights in battery performance and aging. The efficiency of the method, state-of-the-art resolution capabilities, and technique's extension to neutrons are discussed.

[1] V. Kochetov et al, Powder diffraction computed tomography: a combined synchrotron and neutron study, J Phys Condens Matter 33 (10), 2021.
[2] D. Petz et al, Lithium distribution and transfer in high-power 18650-type Li-ion cells at multiple length scales, Energy Storage Mater 41, 2021.

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