

Multidimensional Operando Analysis of Li/S Batteries with Neutrons and Photons

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Lithium/sulfur (Li/S) batteries have a fivefold higher theoretical gravimetric energy density (2680 Wh/kg) than state-of-the-art lithium-ion batteries. However, the strong capacity fading with increasing cycle numbers is still a significant obstacle to broad technical utilization despite decades of research. Operando technique is suitable for gaining a mechanistic understanding of degradation processes. Especially the simultaneous combination of several independent measurements (multidimensional) while the Li/S cell is in operation allows deep insights into the degradation mechanisms and provides a further mechanistic understanding of the complex Li/S chemistry. Here scattering and imaging methods are especially suitable for Li/S batteries. Since pouch cells are highly relevant for the commercialization of this promising technology, results from a multidimensional (temperature distribution, force measurement, operando EIS, X-ray imaging, charge/discharge) analysis of a Li/S pouch cell will be presented.