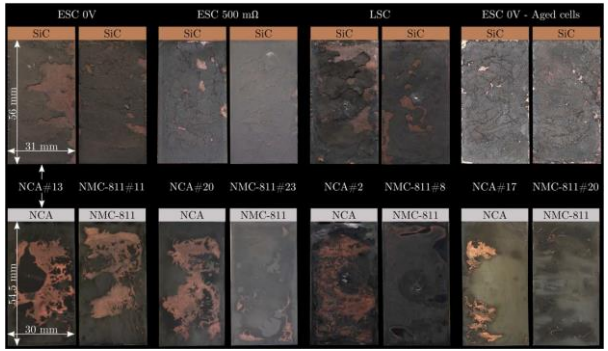
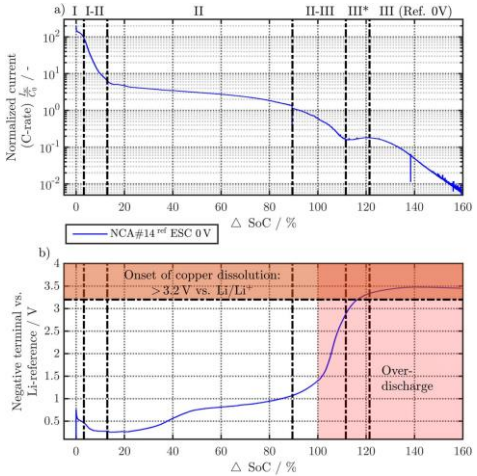
Experimental Analysis of Short-Circuit Scenarios Applied to Silicon-Graphite/Nickel-Rich Lithium-Ion Batteries



In this work, external (i.e. external condition of 0 V = R_{ext} = 0 mΩ - 500 mΩ) and local short circuits tests (i.e. penetration with ⌀ 1 mm needle) are applied to single-layered pouch-type LIBs using a quasi-isothermal calorimetric test bench. Characteristics of the cells' short-circuit behavior are analyzed from measurement data, such as discharge current flow, terminal voltage, heat generation rate, dissipated heat, and locally measured electrical potentials.

- External and local short-circuits applied to SiC/NCA and SiC/NMC-811 SLP cells
- External short-circuits with aged SLP cells incorporating reference electrodes
- Additional current plateau due to anode-limited electrode balancing
- Up to 29% dissipated heat amount during over-discharge
- Significant copper deposition on both anode and cathode with up to 20% copper dissolution from the negative current collector



J. Sturm=, S. Friedrich=, S. Genies, D. Buzon, Rahn-Koltermann G., A. Rheinfeld: Jossen A.:Experimental Analysis of Short-Circuit Scenarios Applied to Silicon-Graphite/Nickel-Rich Lithium-Ion Batteries. In: Journal of The Electrochemical Society, 2022 169 020569. DOI: 10.1149/1945-7111/ac51f3.