Entropy profiles of battery cells: measuring and modelling them

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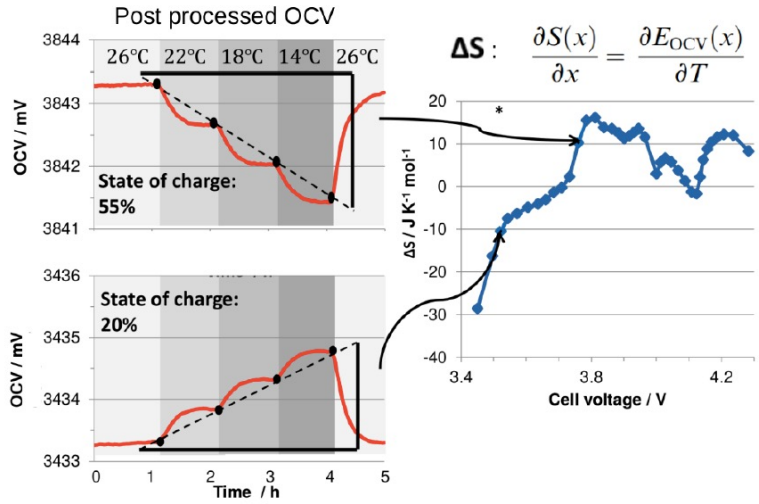
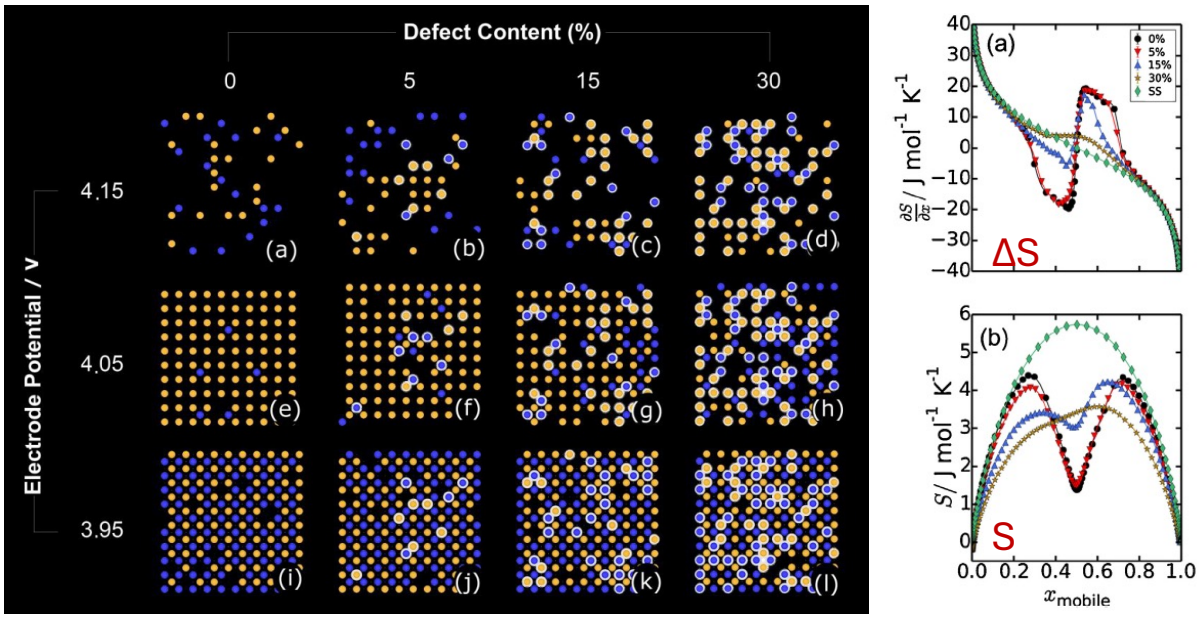
The voltage responses of battery cells on temperature modulations reveal the entropy change due to (de-)intercalation processes. Effects like gradual changes of mixing entropy or sharp order-disorder transitions create material-characteristic features. Those features provide deeper insights into (sometimes path-dependent) patterns formed in battery active materials during charge and discharge. This talk will demonstrate the measurement principle, typical features found in commercial Li-ion batteries, and some less-known phenomena in the context of Na intercalation in hard carbon. The discussion will include lattice-gas and mean-field thermodynamic modelling of enthalpy and entropy features, and to which extent those can explain the experimental observations.



Entropy profiles: measurement approach



Order-disorder transitions in a spinel electrode with increasing amounts of defects: Monte-Carlo simulation of Entropy