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Phase and structural evolution of positive electrodes in lithium- and sodium-ion batteries

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Lithium-ion batteries have revolutionized our lives and they, in conjunction with alternative battery chemistries such as sodium-ion batteries, are going to shape our lives in the near-future. Electrodes account for a significant proportion of battery function, where atomic-scale perturbations or changes in the crystal structure during an electrochemical process permit the reversible insertion/extraction of charge carriers. Therefore, determining the interplay between crystallography and electrochemistry is essential to understand and rationalize in order to deliver better materials and batteries.
A large fraction of our work investigates the structure-electrochemistry relationship in-situ or operando using both neutron and synchrotron X-ray diffraction. In other words, exploring electrode structure evolution while a battery is operating. This presentation will showcase operando and in situ neutron powder diffraction studies on commercial lithium-ion batteries and operando and in situ X-ray powder diffraction studies on ambient temperature rechargeable sodium-ion batteries. With the information from these experiments one can directly relate electrochemical properties such as capacity, battery lifetime, applied rates and differences in charge/discharge to the content and distribution of sodium in the electrode crystal structures or the lattice parameter evolution.

Speakers Gender

Male

Travel Funding

No

Level of Expertise

Experienced Researcher

Do yo wish to take part in the poster slam

No

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