Contribution ID: **859** Type: **Invited talk**

Understanding the real-time structural evolution of battery materials during function

Friday 30 August 2024 14:20 (20 minutes)

A large fraction of world-wide research focuses on making better battery materials, hence better batteries to meet the demands of current and emerging applications. This talk will focus on understanding the impact of a materials'atomic scale structure and its evolution on battery performance.

A large proportion of the function of batteries arises from the electrodes, and these are in turn mediated by the atomic-scale perturbations during an electrochemical process (e.g., battery use). We use a combination of techniques, ex situ, in situ and operando to understand how atomic scale evolution impacts performance. In particular, the operando work results in an atomic level "video"of device function which can be directly correlated to performance parameters such as energy density, lifetime (or degradation), rate capability and safety. Examples using operando neutron and synchrotron powder X-ray diffraction to probe lithium- and sodium-ion battery materials and ex situ solid-state NMR to probe lithium-sulfur battery materials will be presented. In particular, our work on pushing the boundaries of such experiments will be described, e.g., operando neutron diffraction studies of batteries at different temperatures. The intention is to build up the most complete structural picture of a battery, to determine how crystallography and electrochemistry are related.

I plan to submit also conference proceedings

Yes

Primary author: SHARMA, Neeraj (UNSW)

Presenter: SHARMA, Neeraj (UNSW)

Session Classification: Mikrosymposium 5/2: Operando Investigations

Track Classification: 5. Diffraction and scattering for operando investigations