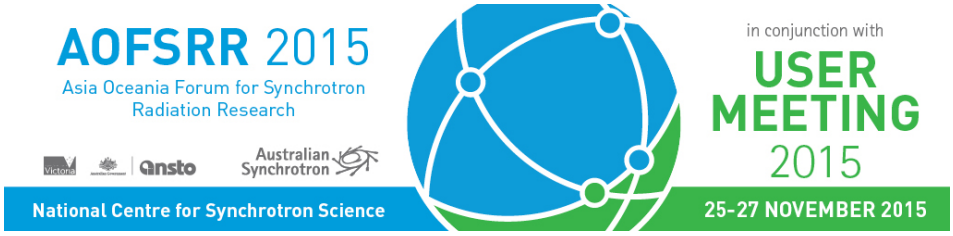

Contribution ID : **166** Type : **Poster**

Phase evolution and structural transformation of electrodes for Li- and Na-ion batteries upon cycling

Friday, 27 November 2015 13:30 (45)

Li-ion batteries (LIBs) are the primary choice of power source for portable electronic devices, including mobile phones, laptops, as well as electric vehicles. The working principle of a LIB is to store electric energy in chemical form by using charge-balancing Li ions that reversibly insert into the electrodes. On the other hand, Na-ion batteries (NIBs) are also considered one of the best alternatives to LIB technology, due to their similar electrochemistry, potentially non-toxicity, and the greater elemental abundance of sodium leading to low-cost. In both LIB and NIB, the structure and chemistry of the electrodes are closely related and determine its functional mechanism. A mechanistic understanding of the charge-carrier insertion/extraction process in electrode materials is necessary to understand the electrochemical properties that underpin battery function. In this presentation, we showcase examples of operando studies of both LIB and SIB using synchrotron X-ray powder diffraction (PD) and X-ray absorption (XAS) data, collected on PD and XAS beamlines, with sufficient information to extract detail of the insertion/extraction mechanism and to give rational improvements for the developments .

Keywords

Li-ion battery; operando X-ray diffraction; Na-ion battery

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Session Classification : Poster Session 2

Track Classification : Energy Materials