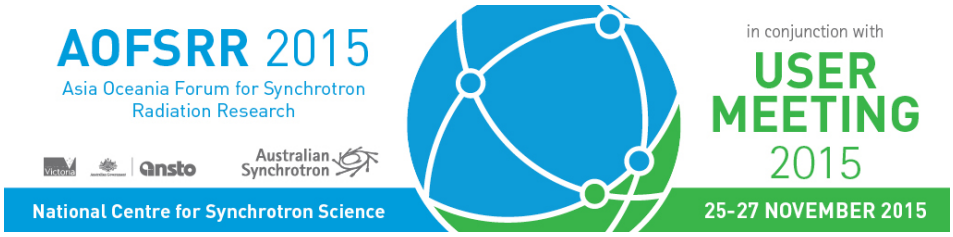

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In Operando Structure-property Studies of Advanced Nano Materials for Lithium Batteries

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Lithium ion battery has wide applications in portable electronics and is one of the most attractive power sources for next generation electric vehicles. Thus, research on new intercalation compounds, which are usually nano-scale mixed metal oxides, is extensively carried out.

In a lithium ion battery, charge transfer can be correlated with redox reactions of cations and this has been extensively investigated. Anions could play a significant role in charge transfer as well, while they are less explored. Researchers have pointed out that oxygen ions in LiCoO[sub][2][sub] and Zn doped LiMn[sub][2][sub]O[sub][4][sub] partially contribute to charge transfer during electrochemical cycling[sup][1,2][sup]. Recently, a reversible oxygen redox chemistry[sup][3][sup] was further observed in Ru doped Li[sub][2][sub]MnO[sub][3][sub]. Combined both redox activities of cations and anions opens doors for further performance optimization, while detailed structure-property mechanisms on how oxygen is involved are poorly understood.

In this presentation, a series of bismuth based nano mixed metal oxides, which could have excellent oxygen ionic mobility were used as electrodes for lithium battery applications. Detailed discharge mechanism was further investigated using a combination of in operando XRD and X-ray Absorption Near edge Structure Analysis (XANES).

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Keywords

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