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Phase Transition of $LiMn_{0.85}Cr_{0.15}PO_4$ Cathode Material by In-Situ Time-Resolved XANES

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Lithium metal phosphate olivine ($LiMPO_4$; M= Fe, Mn, Co, Ni) have a great deal of attention as one of the promising cathode material for lithium ion batteries. To date, a considerable number of studies have enhanced the electrochemical behavior of $LiFePO_4$ from being barely electrochemically active to having a full capacity at high rates. Based on the success of $LiFePO_4$, an increasing number of research groups have focused their attention on $LiMnPO_4$, which exhibits an obvious advantage over $LiFePO_4$ with a redox potential of 4.1 V VS Li/Li^+. However, the $LiMnPO_4$ kinetics is unusually sluggish due to its intrinsically low ionic and electronic conductivity. Many techniques, including to carbon coating, nano-sized using and aliovalent doping have been done to improve rate capability of this material. The doping of $LiFePO_4$ with Cr^{3+} has been investigated in several previous studies which show an enhancement in conductivity and rate performance. However, the Cr-associated mechanism during charge/discharge is not yet revealed. Here, we report phase transition investigation of $LiMn_{0.85}Cr_{0.15}PO_4$ cathode material by in-situ time-resolved XANES.

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