

Abstract Submitted
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Determination of Valence State of Transition metal ions in Li(Fe, M)PO₄ (M = Cr, Ni, Ti, Cd, and V) Cathode Materials.¹ GAN LIANG, HUI FANG, Sam Houston State University, MARK CROFT, Rutgers University, LU-LU ZHANG, China Three Gorges University — A clear determination of the valence states of transition metal ions in cathode materials of lithium-ion batteries is important for understanding the improvement of electrochemical performance of cation doped LiFePO₄ cathode materials. In this work, the x-ray absorption spectroscopy (XAS) determination of valence states of transition metal ions Cr, Ni, Ti, Fe, Cd, and V in Li(Fe, M)PO₄ (with M = Cr, Ni, Ti, Cd, and V) cathode materials is presented. Our XAS results clearly indicate that in these transition metal doped cathode materials, the valence values of Cr, Ni, Ti, Fe and Cd are +3, +2, +4, +2, and +3, respectively. The valence of V in V-doped LiFePO₄, however, is between +3 and +4. The improvement of the electrochemical performance (or the increase of specific discharge capacity) due to the transition metal M for Fe doping for some transition metals M is discussed in association with the XAS results.

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