X-RAY ABSORPTION STUDY OF LITHIUM INTERCALATION IN MICRO AND NANOCRYSTALINE METAL OXIDES

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RESULTS

Metal oxides are sturdy contender as positive electrodes in high energy density applications in Lithium ion batteries due to their high insertion capacity of Lithium, the ability to sustain high rates of (de)intercalation, high gravimetric energy density, high volumetric energy density, low cost, etc. The understanding of redox behavior of these elements in electrochemical cells is of great interest in both fundamental and applied point of view.

The intercalation of Li into micro- nano crystalline anatase TiO_2 and V_2O_5 by chemical (using n-butyllithium) as well as electrochemical method has been studied by X-ray absorption spectroscopy. The oxidation state and local environment of metal (Ti and V) are monitored through the extended X-ray absorption fine structure (EXAFS) while changes in electronic structure are assessed through analysis of the X-ray absorption near-edge structure (XANES). Anatase TiO2 is a typical lithium insertion compound, shown strong particle size-dependent electrochemistry and insertion capacity. The insitu XAS study confirmed the signature of different phase transformation during Lithium ion intercalation in V_2O_5 crystallites electrochemically.