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The role of oxygen vacancies and defects on Lithium intercalation capacity of composite vanadium-titanium oxide thin films M.B. SAHANA, C. SUDAKAR, C. THAPA, G. LAWES, K.R. PADMANABHAN, R. NAIK, Dept. of Physics and Astronomy, Wayne State University, Detroit, MI 48201 USA., G. AUNER, Dept Electrical and Computer Engineering, Wayne State University, Detroit, MI 48202 USA, V.M. NAIK, Dept of Natural Sciences, University of Michigan-Dearborn, Michigan 48128 — Composite films of vanadium-titanium oxides have been recognized as promising cathode materials for lithium ion batteries. While there is a consensus agreement that the cycling stability of the mixed V/Ti-oxide system is improved compared to V_2O_5 thin films, there are different findings on the Li+ intercalation capacity of V_2O_5 with the addition of TiO_2. To understand the difference we have carried out a systematic semi quantitative investigations on the defect and oxygen vacancy concentration as determined using Raman and UV-visible spectroscopy and transmission electron microscopy of V_2O_5 and 5%Ti doped V_2O_5 films prepared by spin coating using two precursors: a metalorganic and a organic sol gel precursor. We observe that a critical concentration of defects and oxygen vacancies is important to have high capacity. With 5% Ti doping the capacity in films prepared using solgel precursor increases, but the capacity decreases in films prepared with the metalorganic precursor. We attribute this to the different concentrations of oxygen vacancy defects in the two samples.

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