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Influence of stoichiometry of V_2O_5 thin films on the electrochemical properties M.B. SAHANA, C. SUDAKAR, C. THAPA, G. LAWES, R. BAIRD, G.W. AUNER, K.R. PADMANABHAN, R. NAIK, Wayne State University, MI 48201, V.M. NAIK, University of Michigan-Dearborn, MI, 48128 — V_2O_5 has been widely used in a variety of technological applications such as solid state battery cathodes, solar cell windows, and electrochromic devices, as it allows easy intercalation/deintercalation of different ions due its open layered structure. However, the electrochemical properties of V_2O_5 critically depend on the details of its composition, and preparation methods, thus requiring optimization of several growth parameters. We present experimental results on the effect of V_2O_5 stoichiometry on electrochemical characteristics, including the intercalation capacity and Li^+ diffusion coefficient. We have prepared V_2O_5 thin film samples with different stoichiometry by spin coating with three precursors of different carbon to vanadium ratio: (i) a sol gel inorganic,(ii) a sol-gel organic , and (iii) a metalorganic precursor. The stoichiometry of $V_2O_5$is found to be very sensitive to carbon to vanadium ratio in the precursor. Films prepared from the metalorganic precursor, with a high carbon to vanadium ratio, are highly non-stoichiometric, as determined using Raman and UV-visible spectroscopy and high resolution electron microscopy and possess a higher intercalation capacity and a larger Li^+ diffusion coefficient.

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