Electrochemical Performance of Lithium Iron Phosphate Doped with Tungsten

HANU ARAVA, ANDREW TRENCHARD, GAN LIANG, HUI FANG, Sam Houston State University — Due to its high thermal stability, low cost and high theoretical charge capacity, LiFePO$_4$ has emerged as one of the most promising cathode materials for large-scale lithium ion batteries. In this work, we systematically investigated the effect on structure and electrochemical properties brought by W doping on Fe site of LiFePO$_4$. LiFe$_{1-x}$W$_x$PO$_4$ (x = 0, 0.01, 0.02, 0.03) samples with and without carbon coating were prepared by using solid-state reaction. The phase and structure of as prepared powders were characterized by X-ray diffraction and scanning electron microscope. Cycling charge and discharge measurement at various C-rates and cyclic voltammetry were employed to reveal the electrochemical properties. Results showed that carbon coating dramatically improved the capacity at fast C-rate. 2 at.% W doping was observed to have the highest charge capacity with 143 mAh/g at 0.1C and a 109 mAh/g for 1C.