Performance of vanadium-doped lifepo4/c used as a cathode for a lithium ion battery

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Abstrak

Vanadium-doped LiFePO4/C used as a cathode for a lithium ion battery has been successfully synthesized. In this work, LiFePO4 was synthesized from LiOH, NH4H2PO4, and FeSO4.7H2O at a stoichiometric amount. Vanadium was added in the form of H4NO3V at concentration variations and 3 wt.% carbon black. The characterization includes thermal analysis, X-ray diffraction, electron microscopy, and electrical impedance spectroscopy. The thermal analysis results showed that the LiFePO4 formation temperature is 653.8–700.0°C. The X-ray diffraction results showed an olivine structure with an orthorhombic space group, whereas the electron microscopy results showed that LiFePO4/C has a round shape with an agglomerated microstructure. Electrical impedance test results showed values of 158 ? and 59 ? for the as-synthesized LiFePO4/C and the 5 wt.% vanadium-doped LiFePO4/C, respectively. Cyclic performance test results at 1 C showed capacities of 24.0 mAh/g and 31.2 mAh/g for the as-synthesized LiFePO4/C and the 5 wt.% vanadium-doped LiFePO4/C, respectively. Charge and discharge test results showed charge and discharge capacities of 27.6 mAh/g and 40.2 mAh/g for the as-synthesized LiFePO4/C and the 5 wt.% vanadium-doped LiFePO4, respectively. This result is promising in terms of increasing the performance of a lithium ion battery.