Study on Electrochemical Performance of $\text{LiMg}_{0.06}\text{Mn}_{1.94}\text{O}_4$ Synthesized by Solid-State Combustion Method

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doi: 10.20964/2018.02.19

Received: 18 August 2017 / Accepted: 3 November 2017 / Published: 28 December 2017

Spinel $\text{LiMg}_{0.06}\text{Mn}_{1.94}\text{O}_4$ cathode materials for lithium-ion batteries were prepared by a solid-state combustion method at 500°C in different time (1, 3, 6 and 9h). The structure and morphologies of $\text{LiMg}_{0.06}\text{Mn}_{1.94}\text{O}_4$ samples were characterized by scanning X-ray diffraction (XRD) and electron microscopy (SEM), respectively. It turned out that all samples show a single phase LiMn_2O_4 spinel structure with a good crystallinity. The electrochemical performances of the samples were investigated by charge-discharge cycling test and cyclic voltammetry. By means of charge-discharge cycling test, $\text{LiMg}_{0.06}\text{Mn}_{1.94}\text{O}_4$ synthesized at burning reaction time 6h had a better electrochemical performance, which presents a capacity retention rate of 81.25% after 500th cycles at 1C (1C=148 mAh/g) with initial discharge capacity of 101.9 mAh/g. Simultaneously, $\text{LiMg}_{0.06}\text{Mn}_{1.94}\text{O}_4$ prepared at 6h exhibits the lowest apparent activation energy than other samples, which indicated that Li^+ with a higher diffusion rate in the lattice, and show a better electrochemical performance.

Keywords: Solid-state combustion synthesis, Mg-doped, Spinel LiMn_2O_4 , Lithium-ion batteries (LIBs), Cathode materials

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