Solid-state Synthesis of High-Capacity $\text{LiNi}_{0.8}\text{Co}_{0.1}\text{Mn}_{0.1}\text{O}_2$ Cathode by Transition Metal Oxides

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doi: 10.20964/2016.12.19

Received: 30 August 2016 / Accepted: 21 September 2016 / Published: 10 November 2016

$\text{LiNi}_{0.8}\text{Co}_{0.1}\text{Mn}_{0.1}\text{O}_2$ cathode materials were synthesized using transition metal oxides in different synthesis conditions by solid-state reaction. Physical and electrochemical characterizations were made on the as-prepared $\text{LiNi}_{0.8}\text{Co}_{0.1}\text{Mn}_{0.1}\text{O}_2$ by X-ray diffraction, scanning electron microscope and charge-discharge test. All the examined samples have a good layered structure with $R\bar{3}m$ space group. $\text{LiNi}_{0.8}\text{Co}_{0.1}\text{Mn}_{0.1}\text{O}_2$ samples prepared with different lithium sources in different synthesis conditions exhibit different charge-discharge performances. The sample synthesized via the process of heating lithium nitrate and transition metal oxides at 400 °C for 8 h, followed by sintering at 800 °C for 24 h under O_2 atmosphere, exhibits a highest capacity of 210.5 mAh g⁻¹ and capacity retention of 95.4% in 20 cycles at 0.2 C.

Keywords: Solid-state synthesis; transition metal oxides; synthesis conditions; lithium source

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