Effect of Temperature on Li-rich Layered Cathode Material $0.5\text{Li}_2\text{MnO}_3 \cdot 0.5\text{LiNi}_{0.5}\text{Mn}_{0.5}\text{O}_2$ Prepared by a Low Temperature Solution Combustion Synthesis

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Li-rich layered cathode materials of $0.5\text{Li}_2\text{MnO}_3 \cdot 0.5\text{LiNi}_{0.5}\text{Mn}_{0.5}\text{O}_2$ were synthesized by a low temperature solution combustion synthesis method. The effects of different ignition temperatures on the phase composition and electrochemical performances of the materials were studied. The results reveal that all the materials of $0.5\text{Li}_2\text{MnO}_3 \cdot 0.5\text{LiNi}_{0.5}\text{Mn}_{0.5}\text{O}_2$ are of ordered layered structure and maintain a similar morphology with homogeneous and polyhedral particles. Electrochemical experiments indicated that the $0.5\text{Li}_2\text{MnO}_3 \cdot 0.5\text{LiNi}_{0.5}\text{Mn}_{0.5}\text{O}_2$ obtained at a ignition temperature of 500 °C showed the higher discharge capacity of 220.2 mAh·g⁻¹ at 0.1 C and the capacity retention rates of 91.1 % after 50 cycles as well as excellent rate capability than that of other samples. The capacity retention rates of the samples ignited at 400 °C, 500 °C and 600 °C are more than 90%, and the sample ignited at 400 °C shows the best electrochemical cycling stability during cycling. It is concluded that ignition temperature has an important effect on the electrochemical performances of Li-rich layered cathode materials of $0.5\text{Li}_2\text{MnO}_3 \cdot 0.5\text{LiNi}_{0.5}\text{Mn}_{0.5}\text{O}_2$.

Keywords: Li-rich layered cathode material, Lithium ion batteries, $0.5\text{Li}_2\text{MnO}_3 \cdot 0.5\text{LiNi}_{0.5}\text{Mn}_{0.5}\text{O}_2$, Low temperature solution combustion synthesis

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