Improvement of High-Voltage Electrochemical Performance of Surface Modified $\text{LiNi}_{0.6}\text{Co}_{0.2}\text{Mn}_{0.2}\text{O}_2$ Cathode by La_2O_3 Coating

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Layered transition-metal oxides $\text{LiNi}_{0.6}\text{Co}_{0.2}\text{Mn}_{0.2}\text{O}_2$ (NCM 622) due to their poor stability when worked at high operating voltage have limited their applications in industry. In this study, La_2O_3 is coated on NCM 622 positive electrodes via a facile solvothermal method. The scanning electron microscopy (SEM) and EDS test results show that La_2O_3 nano-particles are successfully coated on the surface of NCM 622 samples. The favorable Li-ion conductivity of the La_2O_3 -modified NCM 622 sample lead to obvious improvement in its electrochemical performances. In particular, the coated sample exhibits a capacity retention over 80% at 1 C after 100 cycles at a high cut-off voltage of 4.5 V, while that of the bare electrode is less than 60%. The alternating current impedance and cyclic voltammetry (CV) tests show that the La_2O_3 coating can effectively restrain the electrode polarization and reduce the Li-ion charge transfer resistance of cathode materials.

Keywords: $\text{LiNi}_{0.6}\text{Co}_{0.2}\text{Mn}_{0.2}\text{O}_2$; Cathode; Coating; High cut-off voltage

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