Improvement electrochemical performance of Li$_{1.5}$Ni$_{0.25}$Mn$_{0.75}$O$_{2.5}$ with Li$_2$TiO$_3$ coating

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Layered cathode Li$_{1.5}$Ni$_{0.25}$Mn$_{0.75}$O$_{2.5}$ was synthesized and coated by Li$_2$TiO$_3$ with varying amounts. The pristine and coated Li$_{1.5}$Ni$_{0.25}$Mn$_{0.75}$O$_{2.5}$ powders were characterized by XRD, indicating the materials remained the layered structure before and after coating. The coated Li$_2$TiO$_3$ has been detected by scanning electron microscopy (SEM), transmission electron microscopy (TEM) and energy dispersive X-Ray spectroscopy (DEX). The electrochemical performance, especially the rate performance of Li$_{1.5}$Ni$_{0.25}$Mn$_{0.75}$O$_{2.5}$ electrode, are improved effectively after Li$_2$TiO$_3$ coating. Electrochemical impedance spectroscopy (EIS) results show that the charge transfer resistance ($R_{ct}$) of Li$_{1.5}$Ni$_{0.25}$Mn$_{0.75}$O$_{2.5}$ electrode decreases after coating, which is due to the existence of Li$_2$TiO$_3$ with high lithium ion diffusion coefficient and suppression of the solid electrolyte interfacial (SEI) layer development and is responsible for the excellent rate capability and cyclic performance.

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