Enhanced Electrochemical Performance of $\text{LiNi}_{0.8}\text{Co}_{0.1}\text{Mn}_{0.1}\text{O}_2$ Cathode Material for lithium ion batteries by WO_3 surface coating

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$\text{LiNi}_{0.8}\text{Co}_{0.1}\text{Mn}_{0.1}\text{O}_2$ cathode material was successfully modified by using a wet-chemical route to coat WO_3 . The microstructures, morphologies, crystal structures, elemental distributions and ionic valence of the prepared cathode materials were carefully analyzed by SEM, EDS, TEM, HRTEM, XRD and XPS. The results indicated that the surface of $\text{LiNi}_{0.8}\text{Co}_{0.1}\text{Mn}_{0.1}\text{O}_2$ was uniformly covered by WO_3 particles, and a small amount of W^{6+} could enter to the lattice of $\text{LiNi}_{0.8}\text{Co}_{0.1}\text{Mn}_{0.1}\text{O}_2$. The WO_3 coating could prohibit the corrosion of HF and some side reactions for the cathode material during long cycles, thus greatly improving the electrochemical performance and the structural stability of $\text{LiNi}_{0.8}\text{Co}_{0.1}\text{Mn}_{0.1}\text{O}_2$. Among the examined $\text{LiNi}_{0.8}\text{Co}_{0.1}\text{Mn}_{0.1}\text{O}_2$ cathode materials, 1.0 wt% WO_3 -coated $\text{LiNi}_{0.8}\text{Co}_{0.1}\text{Mn}_{0.1}\text{O}_2$ has the best initial discharge capacity (185.1 mAh g^{-1}) and an excellent capacity retention (93.2%) after 100 cycles at 1 C.

Keywords: Lithium-ion batteries; $\text{LiNi}_{0.8}\text{Co}_{0.1}\text{Mn}_{0.1}\text{O}_2$; WO_3 coating; electrochemical performance

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