Short Communication

Synthesis and Electrochemical Properties of Er^{3+} Doped $\text{Li}[\text{Li}_{0.2}\text{Mn}_{0.54}\text{Ni}_{0.13}\text{Co}_{0.13}]\text{O}_2$ as Cathode Materials for Lithium Ion Batteries

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$\text{Li}_{1.20}[\text{Mn}_{0.54}\text{Ni}_{0.13}\text{Co}_{0.13}]_{0.80-x}\text{Er}_x\text{O}_2$ ($x = 0, 0.01, 0.02, 0.03$) cathode materials were synthesized using a combination of co-precipitation and high-temperature sintering. XRD, SEM, and TEM analyses and galvanostatic charge-discharge tests were carried out to study the influences of Er^{3+} doping on the crystal structural, morphology and electrochemical properties of $\text{Li}_{1.20}\text{Mn}_{0.54}\text{Ni}_{0.13}\text{Co}_{0.13}\text{O}_2$. The XRD results revealed that Er^{3+} doping decreased the cation mixing degree. The galvanostatic charge-discharge test results showed that improved electrochemical properties were obtained through Er^{3+} doping. With an increasing Er^{3+} doping content, the capacity retentions were enhanced from 88.1% to 92.8% and then decreased to 90.2% after 100 cycles with $x = 0.01, 0.02$ and 0.03 , respectively, while the undoped sample delivered a capacity retention of 84.6%. In addition, the discharge capacity of $\text{Li}_{1.20}[\text{Mn}_{0.52}\text{Ni}_{0.13}\text{Co}_{0.13}\text{Er}_{0.02}]\text{O}_2$ was approximately 23.0 mAh g^{-1} larger than that of the undoped sample at a high rate of 5 C .

Keywords: $x\text{Li}_2\text{MnO}_3 \cdot (1-x)\text{LiMO}_2$; Er^{3+} doping modification; Cation mixing; Electrochemical properties.

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