

Synthesis and characterization of Mo-doped $\text{LiNi}_{0.5}\text{Co}_{0.2}\text{Mn}_{0.3}\text{O}_2$ cathode materials prepared by a hydrothermal process

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Yunjiao Li^{a,b*}, Qianye Su^{a,b}, Qiang Han^{a,b}, Puliang Li^b, Ling Li^{a,b}, Chunrui Xu^a, Xinlong Cao^a,

Guolin Cao^a

^aSchool of Metallurgy and Environment, Central South University, Changsha 410083, PR China

^bCitic Dameng Mining Industries Limited, Nanning 530028, PR China

*Corresponding author at: School of Metallurgy and Environment, Central South University, Changsha 410083, PR China. Tel.: +86 731 88830872; fax: +86 731 88710171. yunjiao_li@csu.edu.cn

Abstract

The lithiated metal oxide precursor with $\alpha\text{-NaFeO}_2$ structure and low crystallinity prepared by a hydrothermal process is verified to be Li-Ni-Co-Mn-Mo composite oxide. The layered $\text{Li}(\text{Ni}_{0.5}\text{Co}_{0.2}\text{Mn}_{0.3})_{1-x}\text{Mo}_x\text{O}_2$ ($x=0, 0.005, 0.01$ and 0.02) cathode material with high crystallinity for lithium ion batteries (LIBs) is obtained from the lithiated metal oxide precursor by heat treatment. The results of SEM and EDS mapping characterization indicate that the molybdenum is distributed in the materials homogeneously. The effects of molybdenum on the structure, morphology and electrochemical performances of the $\text{LiNi}_{0.5}\text{Co}_{0.2}\text{Mn}_{0.3}\text{O}_2$ are extensively studied. According to the results of electrochemical characterizations, the $\text{Li}(\text{Ni}_{0.5}\text{Co}_{0.2}\text{Mn}_{0.3})_{0.99}\text{Mo}_{0.01}\text{O}_2$ sample exhibits the best discharge cycling performance with capacity retention of 97.0% after 50 cycles, and an excellent rate performance of

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