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Microstructure and Electrochemical Properties of LiNi1/3Co1/3Mn1/3-xAlxO2 Cathode Material for Lithium Ion Batteries

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Abstract : The layered structure LiNi1/3Co1/3Mn1/3-xAlxO2 (x = 0 ~ 0.04) series cathode materials were synthesized by a carbonate co-precipitation method, followed by a high temperature calcination process. The influence of Al substitution on the microstructure and electrochemical performances of the prepared materials was investigated by X-Ray diffraction (XRD), scanning electron microscopy (SEM), and galvanostatic charge/discharge test. The results show that the LiNi1/3Co1/3Mn1/3-xAlxO2 has a well-ordered hexagonal "α" -NaFeO2 structure. Although the discharge capacity of Al-doped samples decreases as x increases, LiNi1/3Co1/3Mn1/3-0.02Al0.02O2 exhibits superior capacity retention at high voltage (4.6 V). Therefore, LiNi1/3Co1/3Mn1/3-0.02Al0.02O2 is a promising material for “green” vehicles.

Keywords : lithium ion battery, carbonate co-precipitation, doping, microstructure, electrochemical properties
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