Facile Fabrication and Low-cost Coating of $\text{LiNi}_{0.8}\text{Co}_{0.15}\text{Al}_{0.05}\text{O}_2$ with Enhanced Electrochemical Performance as Cathode Materials for Lithium-ion Batteries

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The electrochemical performance of $\text{LiNi}_{0.8}\text{Co}_{0.15}\text{Al}_{0.05}\text{O}_2$ (NCA) was improved by coating with lithium boron oxide (LBO) via an effective, simple and low-cost method, where H_3BO_3 reacts with residual $\text{Li}_2\text{CO}_3/\text{LiOH}$ on the surface of NCA to form LBO. LBO-coated NCA (LBO-NCA) had a better cycling stability and rate capability than bare NCA. After 50 cycles at 1C rate, 95.1% of the discharge capacity of LBO-NCA was retained, corresponding to 155 mAh g^{-1} , whereas bare NCA showed a discharge capacity retention of only 84.5%. In addition, LBO-NCA showed a discharge specific capacity of 153 mAh g^{-1} and 140 mAh g^{-1} at 2C and 5C, respectively, compared with bare NCA, which showed 145 mAh g^{-1} and 128 mAh g^{-1} . The improvement in the rate capability of LBO-NCA is mainly attributed to the LBO coating layer greatly decreasing the charge-transfer resistance.

Keywords: H_3BO_3 ; coating; facile; low cost; $\text{LiNi}_{0.8}\text{Co}_{0.15}\text{Al}_{0.05}\text{O}_2$

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