

A new high-voltage, high-capacity cathode material, $\text{Li}_{1.05}(\text{Ni}_{1/3}\text{Co}_{1/3}\text{Mn}_{1/3})\text{O}_2$ for Lithium-Ion Batteries

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$\text{Li}_x(\text{Ni}_{1/3}\text{Co}_{1/3}\text{Mn}_{1/3})\text{O}_2$ (where $x=1.05$) was prepared by heating a mixture of $\text{Ni}_{1/3}\text{Co}_{1/3}\text{Mn}_{1/3}(\text{OH})_2$ and $\text{LiOH}\cdot\text{H}_2\text{O}$. X-ray diffraction (XRD) patterns indicated that this compound had a pure phase of α - NaFeO_2 -type structure ($a=2.860\text{\AA}$, $c=14.230\text{\AA}$). From the X-ray photoelectron spectra (XPS) and cyclic voltammetry (CV) data, we would expect the redox reactions corresponding to both Ni(II)/Ni(IV) and Co(III)/Co(IV). At 0.1C rate (14mA/g) and in the voltage window 3.0-4.5V vs. Li (coin-type cell), initial discharge capacity of around 180mAh/g was obtained. Discharge capacity at 1C rate was 151mAh/g with good capacity retention of 144mAh/g after 50 charge-discharge cycles, which is substantially better than LiCoO_2 . When charge voltage was raised to 4.7V, its specific capacity was 205mAh/g and its capacity retention on cycling was still better than that of LiCoO_2 .

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