

Synthesis of layered $\text{LiNi}_{1/3}\text{Co}_{1/3}\text{Mn}_{1/3}\text{O}_2$ cathode materials by supercritical water method

이재욱, 이재혁¹, 이진영, 김준수, 이창하^{1,*}
한국지질자원연구원; ¹연세대학교
(leech@yonsei.ac.kr*)

Layered $\text{LiNi}_{1/3}\text{Co}_{1/3}\text{Mn}_{1/3}\text{O}_2$ and LiCoO_2 cathode materials were synthesized using a supercritical water (SCW) method with a metal salt solution in a batch reactor. These two cathode materials were successfully synthesized in 10-minute reaction without calcination. The physical properties and electrochemical performances of $\text{LiNi}_{1/3}\text{Co}_{1/3}\text{Mn}_{1/3}\text{O}_2$ were compared to those of LiCoO_2 by means of X-ray diffraction (XRD), scanning electron microscopy (SEM), induced coupling plasma spectroscopy (ICP), and charge/discharge cycling tests.

The XRD pattern of $\text{LiNi}_{1/3}\text{Co}_{1/3}\text{Mn}_{1/3}\text{O}_2$ was found to be similar to that of LiCoO_2 , showing clear splitting of the (006)/(102) and (108)/(110) peak pairs as particular characteristics of the layered structure.

The $\text{LiNi}_{1/3}\text{Co}_{1/3}\text{Mn}_{1/3}\text{O}_2$ electrode delivers a high discharge capacity of 180 mAh/g between 2.5 and 4.5 V at a current density of 0.24 mA/cm² with excellent cycleability and rate capability while the LiCoO_2 electrode delivers a discharge capacity of 149 mAh/g.