BFB11

Characterization of structural and electrochemical properties of $LiMn_2O_4$ coated with $LiNi1-XCo_XO_2$ (X = 0.2 and 1) using Solution-based Chemical Process

$LiNi1-XCo_XO_2$ (X = 0.2 and 1)이 표면 코팅된 $LiMn_2O_4$의 전기화학적 특성 및 구조적 특성에 관한 연구

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The surface coating of $LiMn_2O_4$ using a gel precursor of $LiNi_{1-x}Co_xO_2$ (X = 0.2 and 1) from a chemical process was attempted in order to enhance the cycle stability of $LiMn_2O_4$ at elevated temperature. When the surface of $LiMn_2O_4$ was coated with $LiCoO_2$ coating solution, the surface of $LiMn_2O_4$ was covered with fine particles. From XRD, EDAX, and TEM analyses, it was clarified that the fine particle on its surface was $LiCoO_2$. $LiCoO_2$-coated $LiMn_2O_4$ showed an excellent cycle stability at 65℃ compared to pure $LiMn_2O_4$. While pure $LiMn_2O_4$ retained 70 % of the initial capacity after 100 cycles at the rate of 120 mAh/g at 65℃, $LiCoO_2$-coated $LiMn_2O_4$ retained approximately 92 % of the initial capacity. The improvement of cycle stability at 65℃ is attributed to the reduction of Mn dissolution resulting from the suppression of the electrolyte decomposition induced by the catalytic activity of $LiMn_2O_4$. In the case of $LiNi_{0.8}Co_{0.2}O_2$-coated $LiMn_2O_4$, its high temperature cycle performance was also as excellent as that of $LiCoO_2$-coated $LiMn_2O_4$. Consequently, It is proposed that the surface encapsulation of $LiMn_2O_4$ with fine $LiNi_{1-x}Co_xO_2$ (X = 0.2 and 1) particles improve its cycling stability at high temperature.