

Effects of the thickness and density of cathodes on electrochemical performance of lithium secondary batteries

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In lots of previous papers, new electrode active materials with higher capacity, voltage, and safety for lithium secondary batteries have been reported. However, when they report new active materials with electrochemical performance, detail electrode information such as thickness or density is often not mentioned in those papers. According to previous experimental results, both thickness and density should be considered as important as the electrode composition, because the former sometimes affect the electrochemical performance more seriously than the latter. Therefore, more specific analysis on effects of electrode thickness and density is required.

In this study, we prepared LiCoO₂ cathodes with different thicknesses and electrode densities, and then their electrochemical performance was evaluated. The composition of the cathode was maintained as active material (LiCoO₂, KD-10, Umicore, Korea), electronic conductor (Super-P, TIMCAL, Switzerland) and polymeric binder (PVdF, KF-1300, Kureha, Japan) by 90:5:5 (wt%), and the electrode thickness was controlled to 20, 35, 50 μ m. In addition, the electrode density was also changed to 1.5, 2.0, 2.5g/cm³. The 2032 coin half cells were used to evaluate capacity, coulomb efficiency, discharge rate-capability, and electrochemical impedance spectroscopy. In order to analyze pore structure inside electrodes, each electrode was tested with a mercury porosimeter

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