Thermal Stability of Nanoparticle-Coated $LiCoO_2$ in Li-Ion Cells

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Despite the fact that Li secondary batteries are the most promising power sources for mobile electronics, many accidents arising from the thermal instability of the $LiCoO_2$ cathode material have been reported.

In particular, one of the unsolved problems that can occur during operation, the abrupt overcharge to the voltage-supply limit, 12 V, due to a defect or a malfunction in the protective devices of the cell has not been prevented. Moreover, numerous battery accidents with an accompanying fire and explosion have been reported in the press [1,2]. The main cause of the disastrous failure is that $LiCoO_2$ cathode undergoes a violent exothermic reaction with the electrolyte during overcharge resulting in short-circuits in the cell.

Here, we present a breakthrough improvement in the safety hazard of Li secondary batteries via nanoparticle coating. This nanoparticle coating completely solves the safety problems associated with Li secondary batteries. Moreover, this innovative technique improves the electrochemical performance of the cell over those fabricated using the conventional metal-oxide (sol-gel) coating method.

References

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2. U.S. Consumer Product Safety Commission (http://www.cpsc.gov/cpscpub).

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