Short Communication

Preparation of Ternary Cathode Materials from Spent Lithium Batteries at Low Temperature

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In order to avoid the shortcomings of long process and low recovery rate during the existing recycling of spent lithium-ion batteries. A novel process was developed for regeneration of spent $\text{LiNi}_{0.5}\text{Co}_{0.2}\text{Mn}_{0.3}\text{O}_2$ cathode in Li^+ molten salt solution at low temperature under atmospheric pressure. Based on regeneration at low temperature, the initial discharge capacity of the regenerated cathode material is $169.1 \text{ mAh} \cdot \text{g}^{-1}$, and the capacity retention rate is 89.36% after 200 cycles. The regenerated NCM523 sample changed from $165.9 \text{ mAh} \cdot \text{g}^{-1}$ at 0.1C to $137.35 \text{ mAh} \cdot \text{g}^{-1}$ at 5C and the rate capacity measured at the current density of 0.1 C is almost as the same as the original capacity. The original composition and crystal structure of NCM523 cathode are regenerated, which makes the capacity, cycle stability and rate capability reached the level of original material.

Keywords: Ternary materials; Lithium ion battery; Regeneration; Low temperature lithium addition; $\text{LiNi}_{0.5}\text{Co}_{0.2}\text{Mn}_{0.3}\text{O}_2$ cathode material

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