Study on Highly Compacted LiFePO₄ / C Cathode Materials for High-performance 18650 Li-ion Batteries

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The porous spherical LiFePO₄ (LFP) nanostructures were synthesized by a spray drying technology, followed by a calcination process. Effect of compacted density on the electrochemical performance of the 18650 cells, which employed as-prepared spherical LFP materials, was investigated systemically. The morphology study and physical characterization results show that the spherical LFP/C are composed of numerous particles with an average size of 300 nm, and have well-developed interconnected pore structure and a specific surface area of 12-15 m²/g. For CR2032 coin-type cell, the specific discharge capacity of the LFP/C was 162-164 mAh/g at 0.2C, and the capacity retention can reach up to 100% after 50 cycles at 1 C. For 18650 batteries, the cathode slurry viscosity of the LFP/C with LiOH as lithium source is larger than that with Li₂CO₃ as lithium source. For the sintering temperature of the LFP material is reduced to 700 °C, meanwhile the carbon content is reduced to 1.1%, the compacted density of the LFP material electrode can reach 2.47 g/cm³.

Keywords: Porous spherical LiFePO₄; 18650 Cells; Highly compacted density; Cathode slurry viscosity

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