Preparation and Electrochemical Performance of Spherical Mesophase Soft Carbon Materials Composite Anodes for Lithium-ion Batteries

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It is imperative to develop lithium battery anode materials with high power performance. In this paper, by improving the preparation process, a novel micro-nano composite structure spherical mesophase soft carbon material was developed as the anode material of a lithium-ion battery. The structure and surface morphology were observed by SEM and XRD. The material was assembled into a button battery and a power battery for performance testing and safety testing. The experimental results indicate that the prepared soft carbon material has excellent surface properties and a uniform shape distribution. The first coulombic efficiency of the button battery is 87.5%. The charging capacity and discharging capacity ratios at 2C/1C are 84.8% and 85.9%, respectively. The capacity retention rate after 50 cycles at 0.5C is 99.9%. The discharge capacity of the battery decreases with increasing discharge ratio. After 500 cycles at 0.5C, 93.96% of the capacity is maintained. In low-temperature testing at –20°C, the discharge rate is 98.94%, while in high-temperature testing at 60°C, the discharge rate is 99.74%. The battery does not catch fire under needle punching, extrusion or overcharging. Therefore, the new soft carbon battery has excellent working performance and can be used as a new energy storage battery.

Keywords: Lithium ion battery, Soft carbon anode, Cyclic performance, Working performance

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