Preparation of Micron-Sized Flower-Shaped SnO₂ Particles and Its Application as Anode Materials for Lithium Ion Batteries (LIBs)

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For the first time, flower-shaped micron-sized tin dioxide (SnO₂) particles were prepared via an air calcination process using dibutyltin diacetate as the unique starting material. In this work, a proper amount of dibutyltin diacetate was calcined in air for 2 h under three calcination temperatures (300°C, 500°C and 700°C), generating three samples (sample a, b and c, respectively.). It was indicated by the XRD and XPS analysis that SnO₂ with a relatively higher crystallinity was the main substance of above three prepared samples. Very interestingly, as displayed by the SEM images, spherical micron-sized particles, flower-shaped micron-sized particles and layered square rock-shaped particles were respectively observed in sample a, b and c. Most importantly, the initial discharge capacity (DC) of sample b at 100 mA g⁻¹ was as high as 1067 mAh g⁻¹, and even after 20 cycles, the DC value of sample b was maintained to be 325 mAh g⁻¹, a value slightly lower than the theoretical specific capacity of graphite (372 mAh g⁻¹). Showing the fact that the direct calcination of dibutyltin diacetate was a feasible way to produce flower-shaped micron-sized SnO₂ particles, and drawing a conclusion that the calcination temperature and calcination time were all the important factors influencing the electrochemical performances of the resultant samples, were the main contributions of this preliminary work, which was very beneficial to the development of SnO₂-based anode materials of lithium ions batteries (LIBs) due to the very simple preparation procedure and lower preparation cost as well.

Keywords: dibutyltin diacetate; calcination; flower-shaped micron-sized SnO₂ particles; anode materials; lithium ion batteries (LIBs).

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