Short Communication

Antimony-doped SnO₂ hollow nanospheres as negative materials for high-performance lithium-ion batteries

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SnO₂-based lithium-ion batteries suffer from capacity fades rapidly during lithiation and delithiation at high current density due to the aggregation and cracking of active materials. This work proposes a novel architecture of antimony-doped SnO₂ (ATO) hollow nanospheres using hydrothermal and hard template methods. The crystal structure, morphology, and surface elemental composition of ATO are tested by XRD, SEM TEM and XPS, respectively. Notably, the electrochemical tests results indicate that the ATO negative materials exhibit a significantly improved cycling and rate performance than that pure hollow SnO₂ nanospheres. After 100 cycles, ATO still maintains a high capacity retention of 709 mAh g⁻¹ at 0.1 A g⁻¹ and delivers 286 mAh g⁻¹ even at 5 A g⁻¹. These consequences reveal that the Sb modified SnO₂ hollow sphere electrodes have good implications for the design of high-power-density negative materials of the next-generation lithium-ion batteries.

Keywords: Lithium-ion batteries; SnO₂ hollow nanospheres; Antimony-doped; High rate performance

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