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Copper and carbon co-encapsulated tin dioxide nanocrystals for high performance lithium ion batteries

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Abstract

Copper and carbon co-encapsulated tin dioxide nanocrystals with a diameter of about 8-10 nm are synthesized through a simple solution system and following calcination in N_2 atmospheres. Ascorbic acid acts as a reducing agent to facilitate rapid precipitation of polycrystalline and control the microscopic morphology of the products. The ultra-small SnO_2 grains with co-encapsulated copper and carbon shells can effectively increase the stability of the active materials. The copper and carbon coatings also help to increase the conductivity of the electrode materials. When used as anode materials of lithium-ion batteries, the composite exhibits good electrochemical performance with a high specific capacity of 670.3 mAh g^{-1} after 50 cycles at a current density of 0.2 A g^{-1}. When the current density reaches 0.4 A g^{-1}, the reversible capacity is approximately 452 mAh g^{-1} after 200 cycles. The results show that the composite material with high conductivity is a good choice for lithium ion battery anode materials.

Keywords: Lithium ion battery; SnO_2 composites; Co-encapsulated; High conductivity; Electrochemical performance

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