

A Facile Hydrothermal Synthesis of Ultrasmall Sn Nanoparticles in Carbon Matrices as Anode for Lithium Ion Battery

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Ultrasmall sub-5nm nanoparticles in carbon matrices are synthesized by a facile hydrothermal route. The morphology and structure of the prepared samples were characterized by transmission electron microscopy (TEM) and X-ray diffraction (XRD). The electrochemical performances were evaluated by galvanostatic cycling and cyclic voltammetry. It is found that among the three nanocomposites Sn/C-3 with Sn nanoparticles content of 20.9wt% shows the best rate performance and the highest discharge capacity. At the current density of 200 mA g⁻¹, it shows a high discharge capacity of 851.8 mAh g⁻¹. Even when the current density is increased to 5000 mA g⁻¹, a high discharge capacity of 168.1 mAh g⁻¹ can still be obtained. This result indicates a potential suitability of fabricating Sn/C electrode with high electrochemical performance.

Keywords: ultrasmall Sn; carbon; hydrothermal synthesis; lithium-ion battery

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