Porous Core-Shell SnO₂ fibers/rGO Composite and Its Lithium Storage Performance

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In this work, a porous core-shell composite composed of reduced graphene oxide (rGO)-wrapped SnO₂ fibers (SnO₂ fibers/rGO composite) was fabricated through electrospinning assisted by pyrolysis. The special core-shell structure showed that porous SnO₂ fibers as the “core” were completely protected by multilayer rGO as the “shell.” Lithiation of SnO₂ occurred through Li diffusion through the rGO wrapped into the SnO₂ fibers, and natural void space facilitated SnO₂ expansion upon lithiation. This unique structure effectively prevented the aggregation and pulverization of SnO₂ fibers during lithiation and delithiation. The SnO₂ fibers/rGO composite electrode presented a super-high discharge capacity of 2,141 mAh g⁻¹ at a current density of 0.4 A g⁻¹, 1,858 mAh g⁻¹ at 0.8 A g⁻¹, 1,520 mAh g⁻¹ at 1.6 A g⁻¹, and 874 mAh g⁻¹ at 2.0 A g⁻¹ after 10 cycles. The electrode showed a discharge capacity of 658 mAh g⁻¹ at a current density of 4 A g⁻¹ after 1,000 cycles.

Keywords: porous, core-shell, tin oxide fibers, rGO, Li storage performance

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