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Reduced Graphene oxide -coated 3D interconnected SiO_2 Nanoparticles with Enhanced Lithium Storage Performance

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3D interconnected SiO_2 nanoparticles coated by reduced graphene oxide (rGO) (SiO_2@rGO) were fabricated easily by online hydrolysis and subsequent condensation of the precursor tetraethylorthosilicate (TEOS) in the dispersed graphene oxide (GO) sol, followed by the reduction of GO using hydrazine hydrate. The as-obtained 3D interconnected SiO_2 nanoparticles coated by rGO composites as anode material for lithium ion rechargeable batteries (LIBs) delivers a reversible discharge capacity of 490.7 mAh g^{-1} at a current density of 100 mA g^{-1} after 60 cycles with the coulombic efficiency of nearly 98%. Compared to the bare nano-SiO_2, the enhanced lithium storage performance could be attributed to its unique 3D interconnected network space structure to accommodate the volume variation during cycled lithiation/delithiation process.

Keywords: SiO_2; Sol-gel method; Anode materials; Lithium ion batteries.

FULL TEXT