Graphene encapsulated Si nanoparticles for an anode of Li-ion battery

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Graphene coating is receiving great attention to overcome the significant challenges associated with large volume changes and poor conductivity of silicon nanoparticles as anodes for lithium-ion batteries. In this work, the C-coated Si/reduced Crumpled Graphene Oxide (denoted as C-Si/rCGO) nanocomposite was successfully synthesized and employed as a high-performance anode material with high capacity, cycling stability, and excellent rate capacity. The C-Si/rCGO nanocomposite was assembled via spray-drying process and simple solution mixing method. This simple and versatile self-assembly method is therefore directly relevant to the future design and large scale development of practical graphene-based electrode materials for various energy-storage devices. Here, the Crumpled Graphene Oxide (denoted as CGO) is a well-defined ductile framework that alleviates the morphology and volume expansion of the Si and also is a kind of carbon matrix which could enhance the electrical conductivity of the structure.