Radially Assembled porous reduced Graphene oxide Spherical Architectures for Lithium-Sulfur Batteries

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The reconstruct of two-dimensional carbon nanomaterials with high specific surface area into hierarchical architectures precisely controlling internal open porosity and orientation, external morphology, composition, and interaction is expected to provide promising hosts for sulfur cathodes. Herein, we demonstrate deposited well distributed nanoSulfur and partially formed rod-like nanosulfur particles onto the open-porous micropherical reduced graphene oxide (rGO) architectures for improved rate and stable long cycle stability of lithium-sulfur batteries (LSB). The open-porous structure and an overall microspherical morphology, as well as uniform distribution and high loading of nS were feasible through the spray-frozen assembly and ozonation treatment in the experiment. The resulting rGO/nS hybrid provides a specific capacity and first-cycle Coulombic efficiency of 1269.1mAhg^{-1} and 98.5%, respectively. A 4C capacity of 510.3 mAhg^{-1} and capacity decay of 0.08% per cycle over 500 cycles (70.9% of the initial capacity over 300cycles) also support the synergistic effect of the nS strongly interacting with the open-porous rGO microspheres.