Exploring the Application of Hexagonal SnS₂ Nanoplates Covered with a 3D Graphene Network for Lithium Sulfur Batteries

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With its high specific capacity, the lithium sulfur battery is seen by many as the battery of the future. However, the Li–S battery still faces a host of problems, mainly connected to its poor cycling performance due to the “shuttle effect”. As they show strong chemical absorption and are reaction sites to polysulfide species, sulfiphilic hosts are used in cathode material. For this paper, tin sulfide (SnS₂) nanoplates were incorporated with a 3D graphene network using a simple hydrothermal method and a reduction process. After the infiltration of sulfur, the S/rGO-SnS₂ exhibited a high initial discharge capacity of 1150.1 mAh g⁻¹ and excellent stability after 100 cycles (844.6 mAh g⁻¹). The superior stability and reversibility is due to the synergy between the high-active sulfiphilic SnS₂ and high-conductivity 3D graphene network. This result shows a potential approach to the application of Li–S batteries.

Keywords: lithium sulfur batteries, SnS₂, graphene, sulfiphilic host

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