

Synthesis of mesoporous Graphene-silica composite and its application in Li-S battery

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Li-ion battery is considered as one of the most prospective energy storage technologies. However, current state of Li ion battery fails to meet the demands in powering advanced electric vehicle because of their relatively low energy and power densities. As a next generation high-performance Li batteries, Li-S battery has been drawn to many people's attention because of its high theoretical capacity (1675 mA·h/g) of elemental sulfur. However, Li-S battery systems suffer from the insulating nature of elemental sulfur and Li₂S, the low retention of sulfur in cathode due to the lithium polysulfide dissolution. In order to avoid these problems, we synthesized mesoporous graphene-SiO₂ (m-GS) composite. A SBA-15-like ordered mesoporous silica structure was introduced onto the surface of functionalized graphene via ternary cooperative assembly among triblock copolymer, silica precursor, and graphene. We expect that the well-defined mesoporous silica structure exhibits high polysulfide retention and allows for fast reaction kinetics of sulfur, the graphene alleviates the insulating nature of silica and sulfur and the synthesis of m-GS is conducted under mild conditions.