Performances of Platinum and nitrogen Dual-Doped Ordered Mesoporous Carbon as Sulfur Host for Li-S Battery

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Two types of *Resorcinol-Formaldehyde* (RF) resin based ordered mesoporous carbon materials were used as sulfur host in lithium sulfur battery system. The effects of carbon material structure, morphology, surface area, pore volume, sulfur loading, electrolyte/sulfur ratio and metallic Pt nanoparticle decoration impact on the adsorption of polysulfides and battery performance are studied. Results show that carbon material carrying rod-like morphology and hexagonal meso-structure can have high sulfur loading due to its high specific surface area and large pore volume. While the one with polyhedral particles and ordered cubic meso-structure exhibits good cyclic stability and good capacity retention due to its good adsorption of polysulfides upon its cage-like pores. After in-situ decorating of Pt nanoparticles, the performance of cyclic stability as well as capacity retention significantly improved and better rate performance is also gained because of the chemisorption of polysulfides and electro-catalytic activity upon Pt.

Keywords: Ordered mesoporous carbon; lithium sulfur battery; polysulfides chemisorption; shuttle effect; electrocatalytic activity of Pt

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