

Polymer-Templated Synthesis of Hollow Carbon Spheres for Li-S Battery Cathodes

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Energy storage devices (ESD) with higher energy density, longer cycle life and lower cost are highly demanding. Li-S battery can be developed as promising ESD whose energy density is more than twice those of current Li-ion batteries. However, Li-S battery has several intrinsic problems such as poor electrical conductivity of sulfur and discharge product, Li_2S , and shuttle effects of lithium polysulfides dissolved in electrolytes. Sulfur encapsulation in carbon hosts has been widely studied to resolve those problems. In this study, we prepared hollow carbon spheres(HCS) by using polymer microspheres as templates. For this purpose, we prepared polymer microspheres by batch emulsifier-free emulsion copolymerization of styrene with acrylic acid. The polymer templates were coated with carbon gel of sucrose. The carbon gel-coated core-shell polymer were then simply heated to generate HCS by carbonization of the shell and pyrolysis of the core polymer simultaneously. The structure of HCS and S/C composites were investigated with various analyses. The electrochemical properties of S/C composites as high performance Li-S battery cathodes are to be presented in detail.