Effect of mesoporous carbon structures on electrochemical performances of lithium-sulfur batteries

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Compared with conventional lithium-ion batteries, lithium-sulfur (Li-S) batteries have much higher theoretical capacity (1675 mAh/g) and energy density (2600 Wh/kg). Sulfur as the raw material of Li-S batteries is cheap, abundant and environmentally friendly. However, the problems such as poor conductivity of sulfur, large volume change, and severe dissolution of the intermediate polysulfides lead to poor cycle stability and serious capacity deterioration. Ordered mesoporous carbons (OMCs), as one of sulfur hosts, can effectively improve the conductivity of the cathode and significantly reduce the dissolution of polysulfides in electrolyte. The present work involves the synthesis of a series of mainstream OMCs (CMK-1, CMK-3, and CMK-5) with different structures. The effect of the OMCs structure on the kinetics of lithiation and de-lithiation in carbon-sulfur composite cathode for Li-S batteries is also investigated in detail by comparing the electrochemical performances.