Microporous Carbon Synthesized with Eutectic Salt for High-Performance Lithium-Sulfur Batteries

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Lithium-sulfur batteries (LSBs) are considered promising candidates as next-generation rechargeable batteries. However, the shuttle effect causes a decrease of active material in the cathode and forms an irreversible passivation layer composed of Li_2S on the lithium metal anode. It occurs decay of sulfur utilization and cycle stability. To mitigate the shuttle effect, micro-porous materials have been researching. Despite conventional silica template synthesis is commonly used to make porous carbon due to controllable porosity, it is harmful that hydrogen fluoride is used to remove the silica template. We suggest a simple one-step synthesis of microporous carbon with eutectic salt as a template. The mixture of glucose and eutectic salt is heated at 800℃ and washed with water to remove salts. It is demonstrated that eutectic-salt templated carbon (GL-I-800) shows a high surface area (844 $m^2\ g^{-1}$) and pore volume (1.6 $cm^3\ g^{-1}$), which is beneficial for suppressing the shuttle effect during the charge/discharge process. As a result, GL-I-800 showed a specific capacity of 780 mA g^{-1} at 500 mA g^{-1} and sulfur loading of 2 mg cm^{-2} with a low capacity loss of 0.36% per cycle for 100 cycles.