# β-Cyclodextrin Functionalized r-GO nanofilms for High Performance Lithium-Sulfur Batteries

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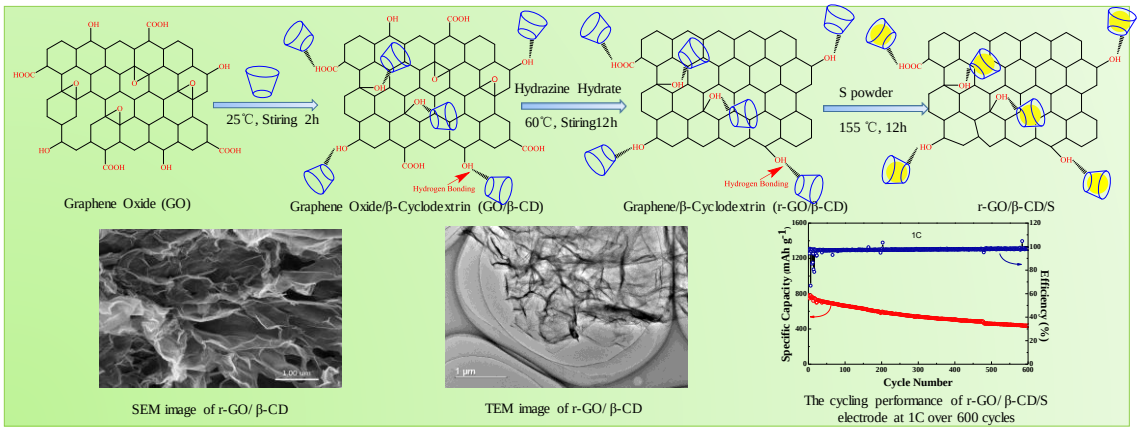
Lithium-sulfur batteries attract soaring attention due to their high theoretical specific capacity (~1675 mA h $g^{-1}$) and low cost of sulfur [1-4]. However, their practical application is mainly limited by the low conductivity of sulfur and $Li_2S/Li_2S_2$, the severe shuttling effects of intermediate polysulfides and the large volume change of sulfur cathode. Here we report a β-cyclodextrins-reduction graphene oxide (β-CD-r-GO) organic-inorganic hybrid nanofilm to be served as an efficient sulfur host. The β-CD, consisting seven glucose units and presenting toroidal in shape with a hydrophobic inner cavity and a hydrophilic exterior, is grafted on graphene oxide (GO) by hydrogen bonds, and then β-CD-r-GO hybrid nanofilms are prepared by the introduction of hydrazine hydrate at 60 °C, as shown in the schematic diagram. The capacity of 437.2 mA h $g^{-1}$ after 600 cycles is obtained at 1C with the coulombic efficiency of almost 100%. Such a unique β-CD based composite structure with a hydrophobic inner space is expected to afford high sulfur contents and alleviate the volume expansion. While, the r-GO can effectively enhance the utilization of sulfur as the conductive matrix. Based on this understanding, we propose a new strategy to optimize the electrochemical performance of lithium-sulfur batteries.

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