Supporting Information

Assembling Sulfur Spheres on Carbon Fiber with Graphene Coated Hybrid Bulk Electrodes for Lithium Sulfur Batteries


Synthesis of Graphene Oxide

Graphite flakes (Alfa, cat #43209, 325 mesh flakes) were oxidized using the improved method. In a typical procedure to synthesize GO, 360 mL H$_2$SO$_4$ and 40 mL H$_3$PO$_4$ were added to the mixture of 2.0 g graphite flakes and 18.0 g KMnO$_4$. After stirred for 30 min at room temperature, the reactant was then heated in an oil bath at 50 °C for 12 h. After cooled to room temperature, the gray mixture was added with 400 mL ice and 5 mL 30% H$_2$O$_2$. After the supernatant was decanted away by centrifuging, the yellow precipitation was washed with 400 mL 15% HCl to dissolve the residual MnO$_2$. After centrifuged and washed with deionized water for several times, the pH of the supernatant was neutral. During the centrifugation process, the low-speed centrifugation was conducted to purify the GO nanosheets. The precipitation was dispersed with 1000 mL deionized water, and then dried in a vacuum freeze-dryer. A yellow flocculent GO aerogel was achieved after dried for 12 h under a vacuum degree of 10 Pa at 35 °C below the ice point.
Figure 1 is Raman spectrum of the CFS@G bulk electrode. The Raman spectroscopy shows that the two remarkable peaks around 1345 and 1590 cm\(^{-1}\) can be attributed to D band arising from the defects and disorders in carbonaceous material and G band associated with the \(E_{2g}\) mode of graphite. The intensity ratio (\(I_D/I_G\)) of the two bands is about 1.07.

Figure 2 is TGA curves of the CF and CFS@G bulk electrode.