Sandwich-Type Functionalized Graphene Sheet-Sulfur Nanocomposite for Rechargeable Lithium Batteries

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Supplementary figures. Selected area electron diffraction (SAED) patterns, Thermal gravimetric analysis (TGA) curve, Brunauer-Emmett-Teller (BET) data, discharge profiles of Nafion-coated graphene sheet-sulfur (GSS) nanocomposite at different current densities, Scanning electron microscopy (SEM) characterization and elemental mapping analysis of the Nafion-coated functionalized graphene sheet-sulfur (FGSS) electrode before and after cycling, and electrochemical impedance spectroscopy (EIS) analysis.

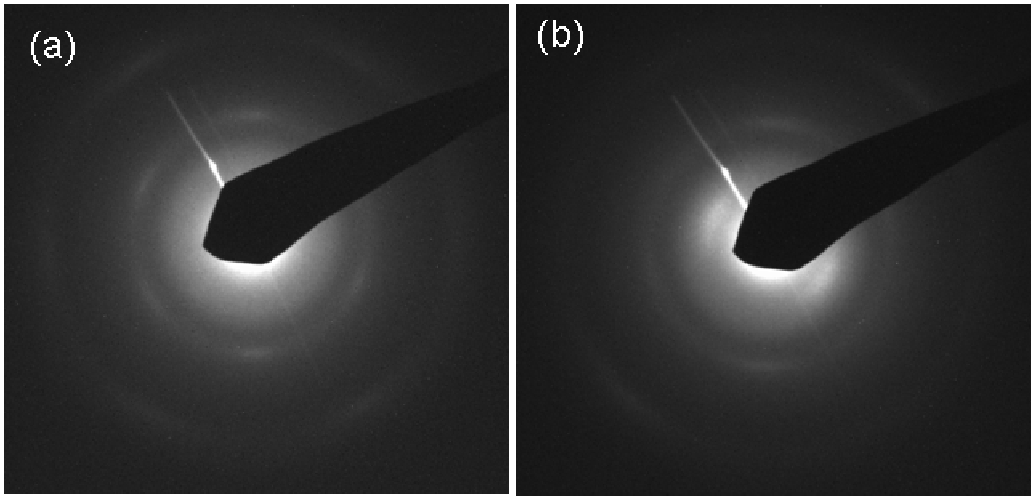


Figure S1. (a) SAED pattern recorded along the [0001] zone axis of graphene. (b) SAED pattern recorded perpendicular to the [0001] zone axis of graphene.

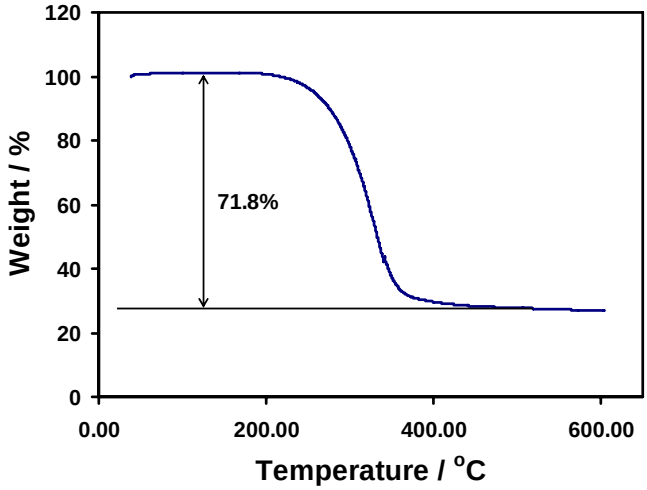
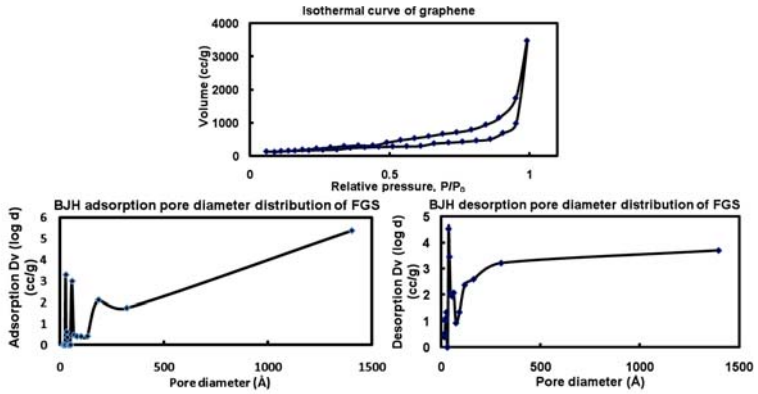
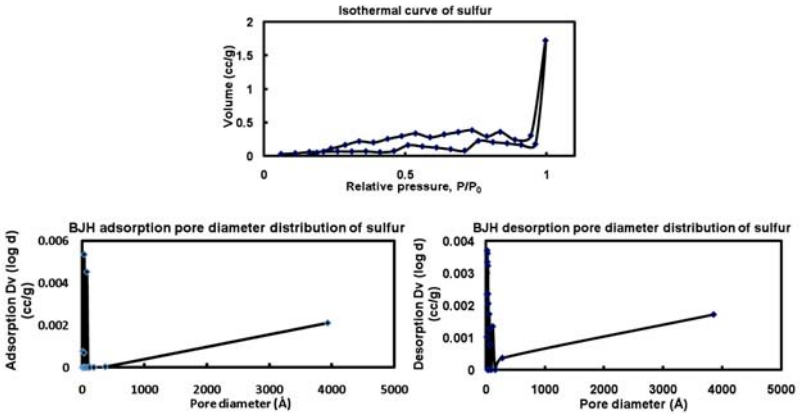


Figure S2. TGA curve of Nafion-coated functionalized graphene sheet-sulfur (FGSS) nanocomposite recorded in nitrogen with a heating rate of 10 $^{o}C \cdot min^{-1}$.

Functionalized graphene sheet (BET surface area: 578.2 m^2/g)



Sulfur (BET surface area: 0.23 m^2/g)



Functionalized graphene sheet-sulfur (BET surface area: 8.14 m^2/g)

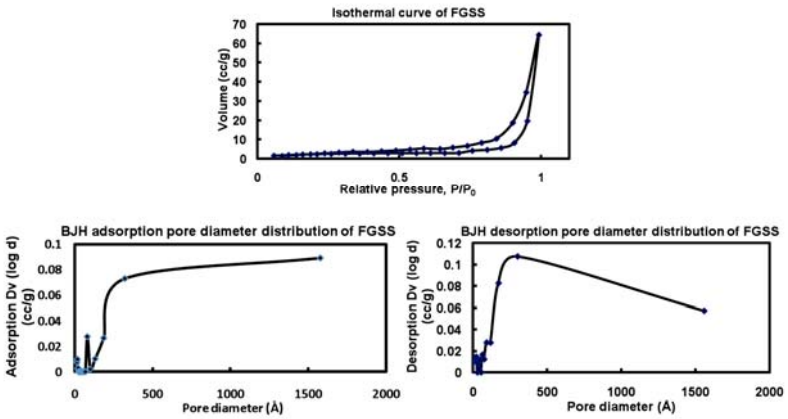


Figure S3. BET surface area measurements and pore diameter distribution of functionalized graphene sheets (FGS), sulfur, and the functionalized graphene sheet-sulfur (FGSS) nanocomposite.

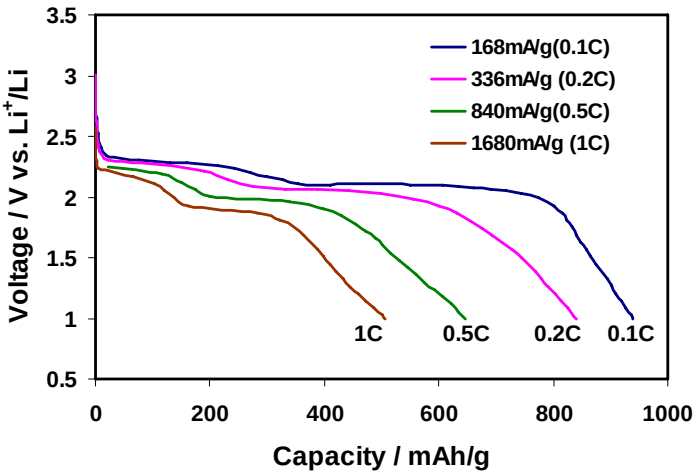


Figure S4. Discharge curves of Nafion-coated functionalized graphene sheet-sulfur (FGSS) nanocomposite at different current densities of 168 (0.1C), 334 (0.2C), 840 (0.5C) and 1680 $mA \cdot g^{-1}$ (1C), respectively.

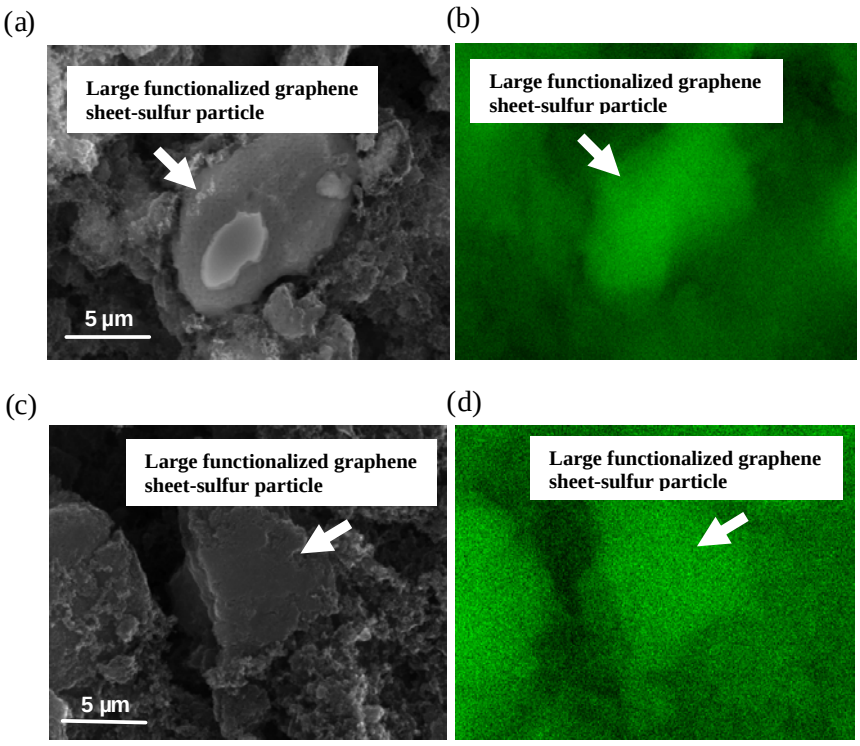


Figure S5. SEM images and S elemental mapping of the functionalized graphene sheet-sulfur (FGSS) composite electrode before and after cycling. (a) SEM before cycling. (b) S elemental mapping of the functionalized graphene sheet-sulfur (FGSS) composite electrode before cycling. (c) SEM after cycling. (d) S elemental mapping of the functionalized graphene sheet-sulfur (FGSS) composite electrode after cycling.

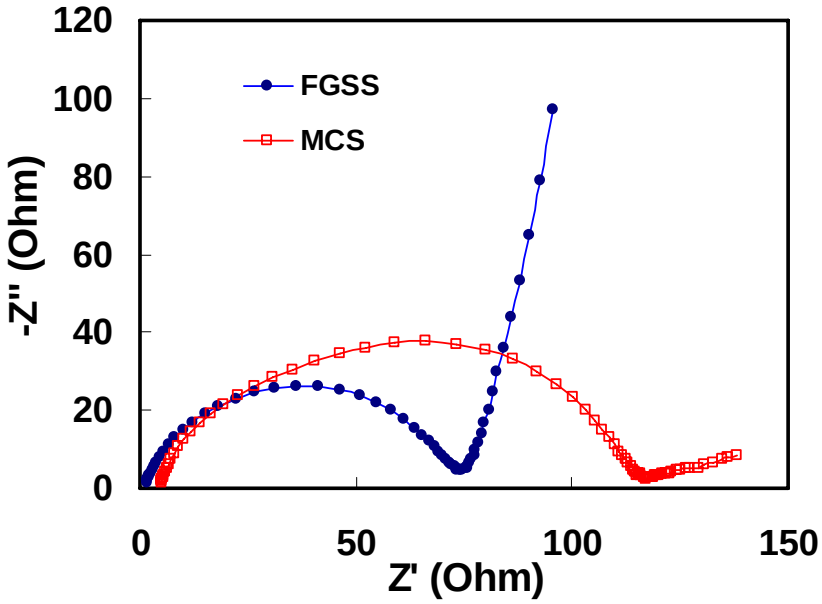


Figure S6. Electrochemical impedance spectra of the functionalized graphene sheet-sulfur (FGSS) composites and mesoporous carbon-sulfur composites.