

Sulfur infiltrated mesoporous graphene-silica composite as a polysulfide retaining cathode material for lithium- sulfur batteries

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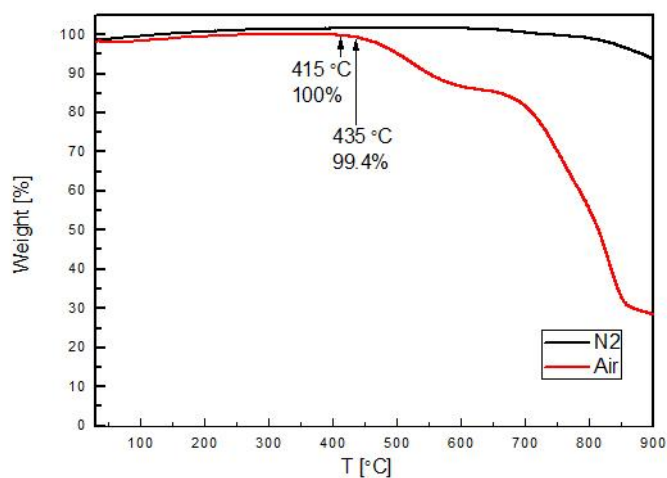


Figure S1: Thermogravimetric analysis (TGA) plots at $4\text{ }^{\circ}\text{C min}^{-1}$ heating rate under N_2 (black line) and Air (red line) atmospheres for m-GS-60

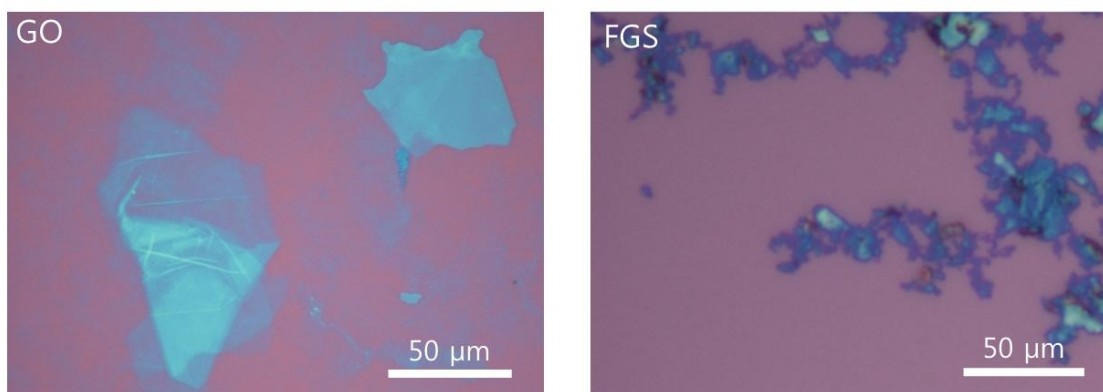


Figure S2: Optical microscopy image of (left) GO, and (right) FGS after 10 min sonication process.

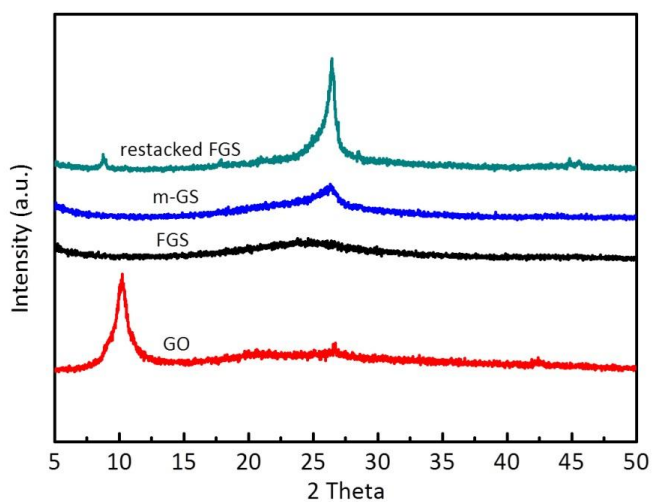


Figure S3: WAXS patterns of GO (Red), FGS (Black), m-GS (Blue), and restacked FGS (Green).

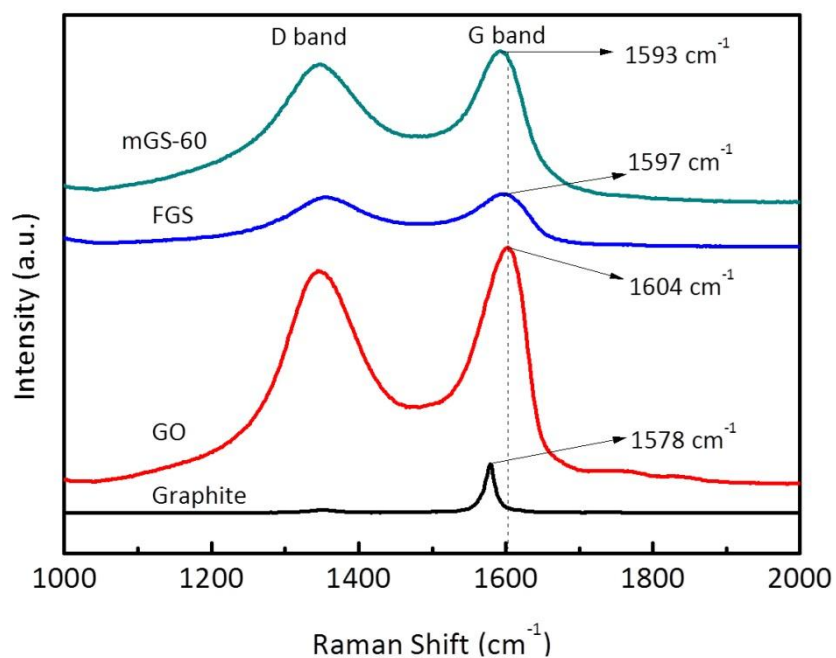


Figure S4: The Raman spectra during the oxidation and exfoliation processes for graphite, GO, FGS, and mGS-60.

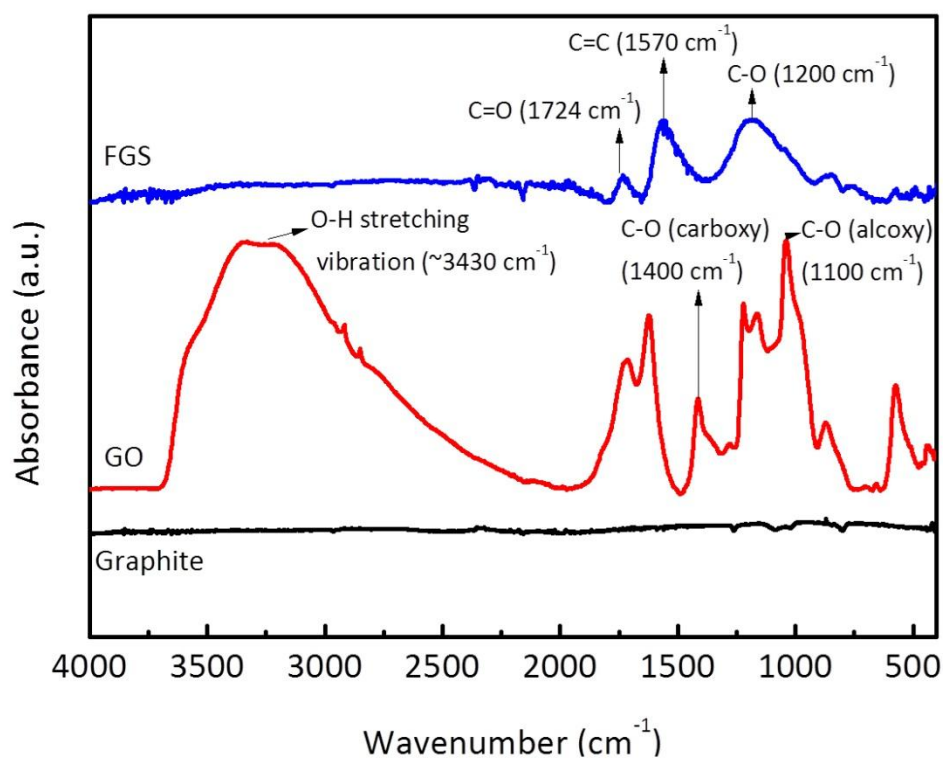


Figure S5: FT-IR spectra of graphite, GO and FGS.

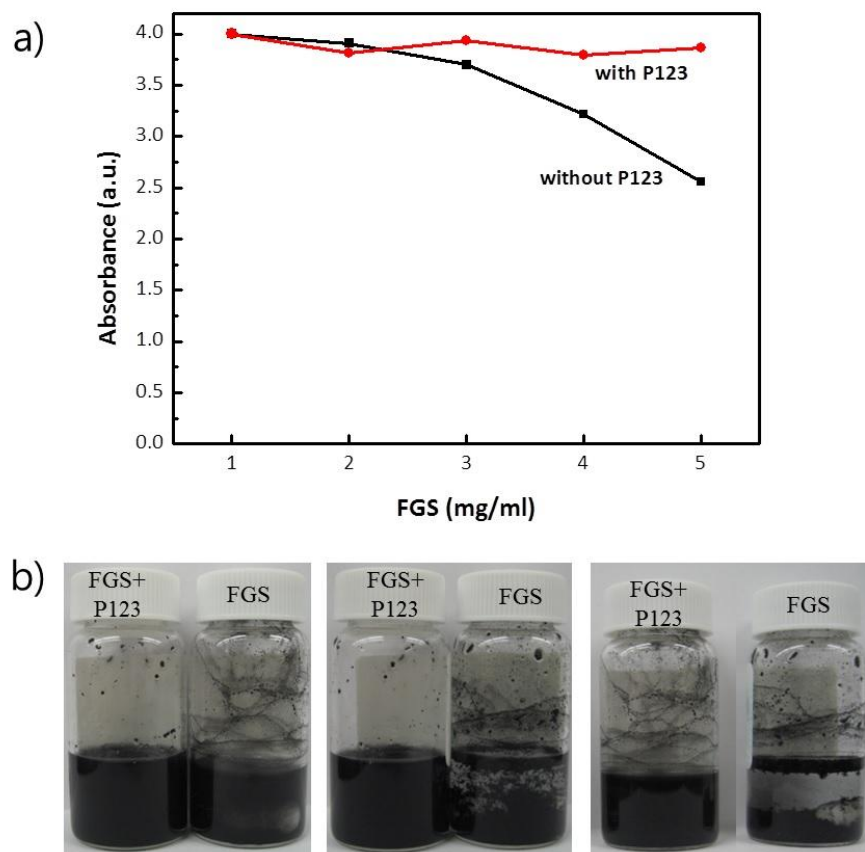


Figure S6: a) Absorbance intensity of UV-Vis spectrum of FGS from 1 to 5 mg/mL concentration (red line) with P123, and (black) without P123 resting 60 min after sonication at wavelength of 300 nm. b) Photo images of FGS dispersion (5 mg/ml) in the absence or presence of P123 (3 mg/ml) after settling down for (L) 30 min, (M) 1 hr, (R) 19 hr.

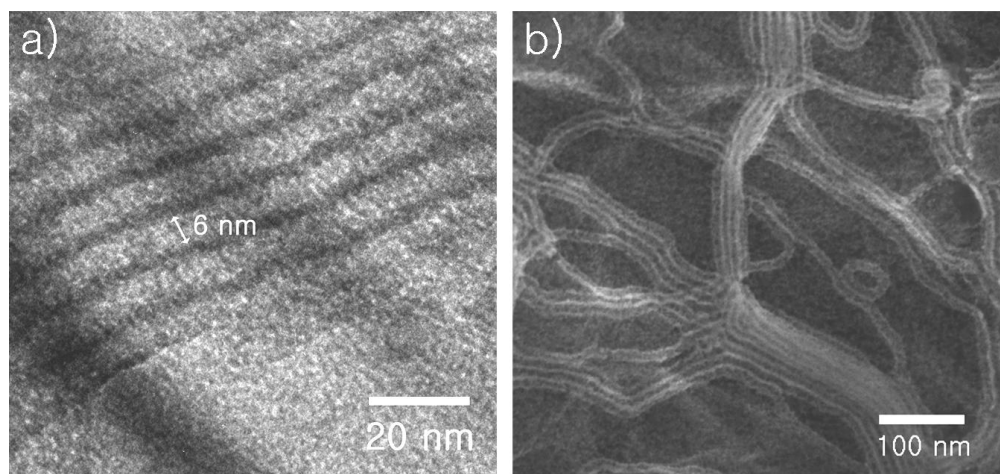


Figure S7: a) High resolution TEM of m-GS-60 and b) High resolution SEM image of m-GS-50.

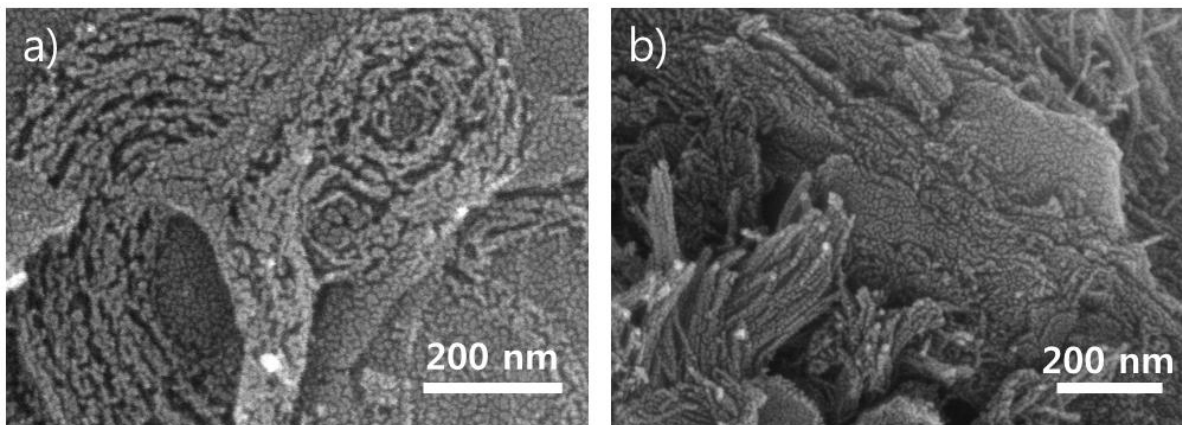


Figure S8: (a, b) Carbon negative replica of m-GS-60.

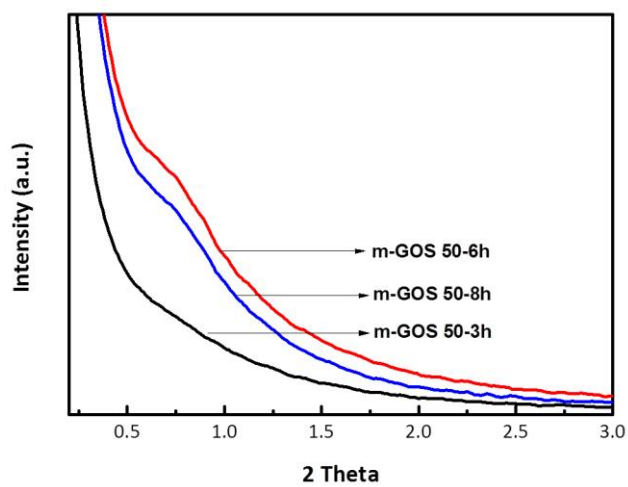


Figure S9: SEM image of m-GOS-50 with various reaction times at 100 °C; (a) 3hr, (b) 6hr, and (c) 8hr. (d) SAXS pattern of the samples.

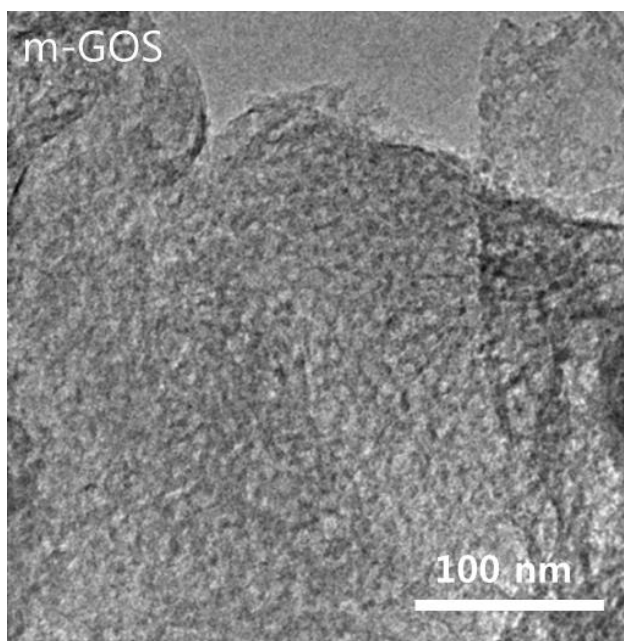


Figure S10: TEM image of m-GOS-50 at 100°C for 24 hr.

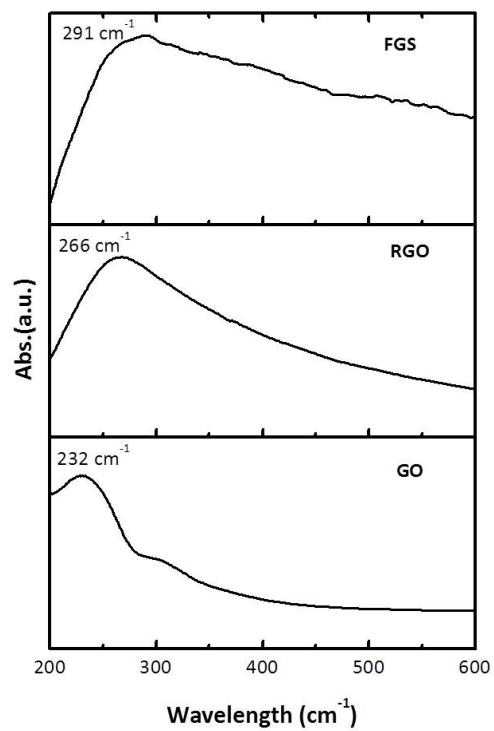


Figure S11: UV-vis Spectrum of GO, RGO, and FGS dispersion in water. RGO indicates the GO reduced at 135°C in water for 48 hr.

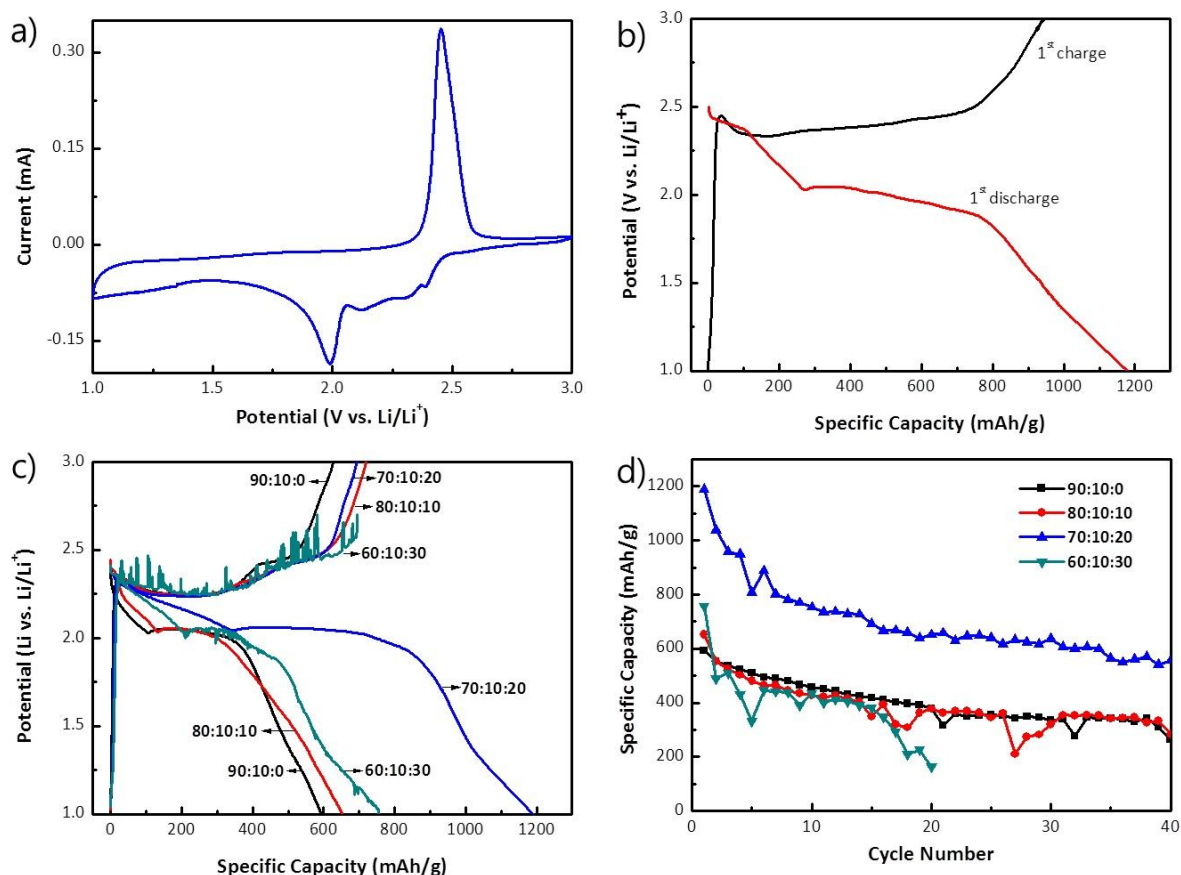


Figure S12: (a) CV of S@m-GS-60, (b) The charge-discharge curves of S@m-GS-60 at C/10. Scan rate=0.1 mV/s. (c) The charge-discharge curves of m-GS-60 with various amounts of conductive carbon. (d) Discharge capacity vs. cycle number of m-GS-60 with different amounts of conductive carbon. The sample with the high content of conductive carbon (60:10:30) shows the unstable charging curve because of the passivation of anode by polysulfide shuttling and/or the detachment of cathode structure from the electrode.

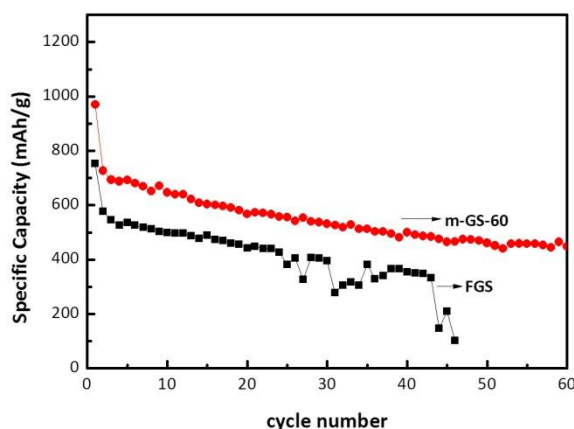


Figure S13: Discharge capacity vs. cycle number of m-GS-60 and FGS at C/5

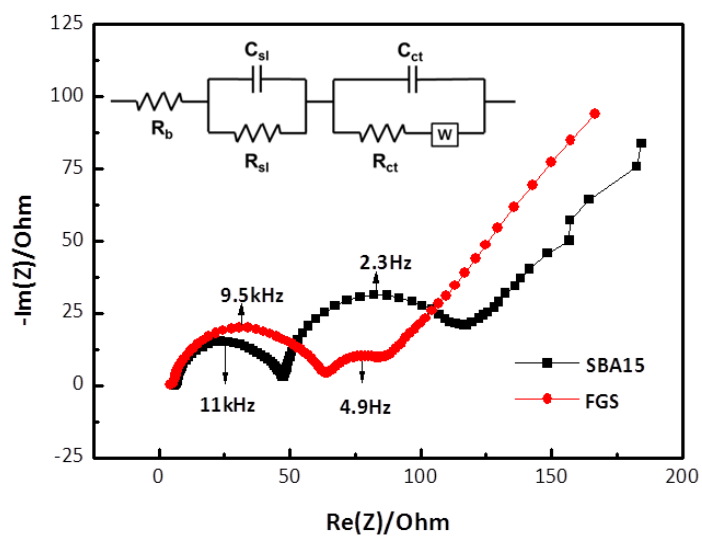


Figure S14: Nyquist plots of S@SBA15 and FGS.