Supporting Information

Covalent Confinement of Sulfur Copolymers onto Graphene Sheets Affords Ultrastable Lithium–Sulfur Batteries with Fast Cathode Kinetics

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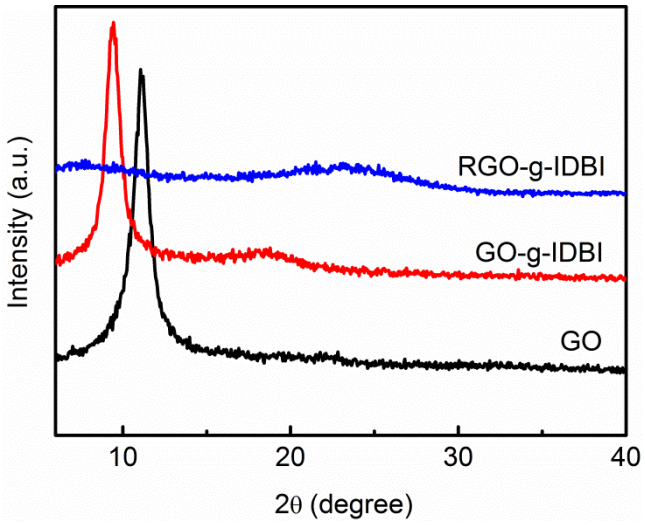

Figure S1. XRD patterns of GO, GO-g-IDBI, and RGO-g-IDBI.

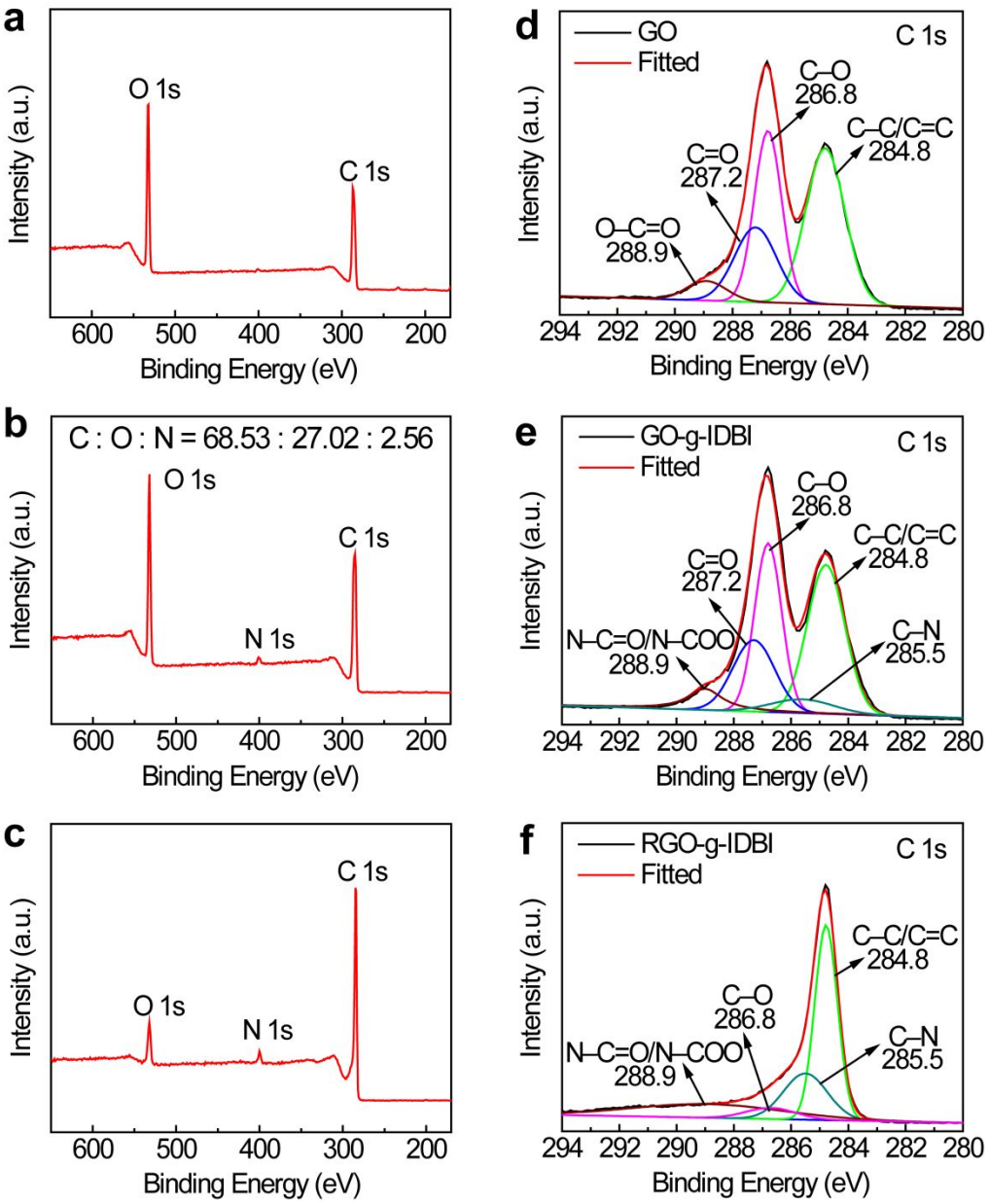

Figure S2. (a–c) XPS survey spectra of (a) GO, (b) GO-g-IDBI, and (c) RGO-g-IDBI. (d–f) C 1s XPS spectra of (d) GO, (e) GO-g-IDBI, and (f) RGO-g-IDBI.

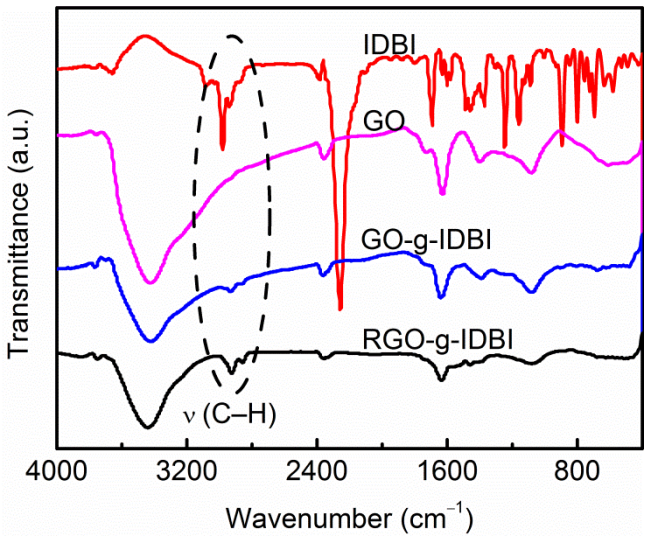

Figure S3. FT-IR spectra of IDBI, GO, GO-g-IDBI, and RGO-g-IDBI.

Figure S4. Optical images of (a) elemental sulfur, (b) poly(S-r-IDBI) grains (right) and powders (left), and (c) RGO-g-poly(S-r-IDBI) loose block (right) and powders (left).

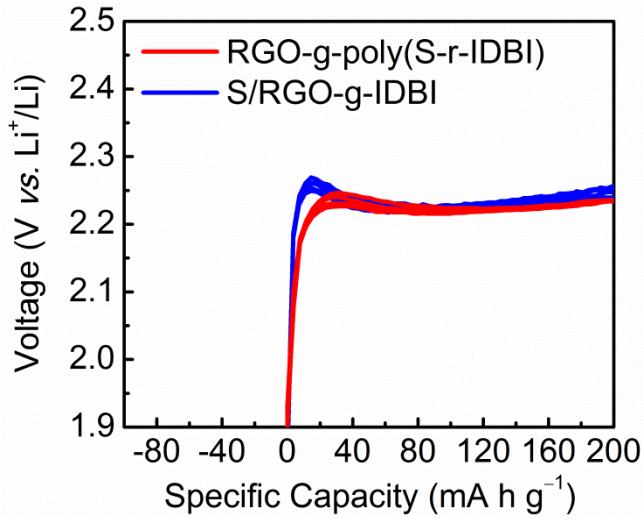

Figure S5. A magnified view of the initial parts of the charge plateaus of RGO-g-poly(S-r-IDBI) and S/RGO-g-IDBI cathodes recorded at 0.2 C for the 1st, 20th, 40th, 60th, 80th, and 100th cycles.

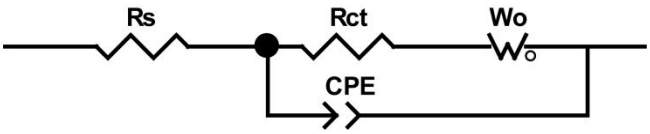

Figure S6. The equivalent circuit used for fitting the EIS curves. R_s refers to the serial resistance, R_{ct} refers to the charge transfer resistance at the electrode/electrolyte interface, W_o refers to the Warburg impedance, and CPE refers to the constant phase element.

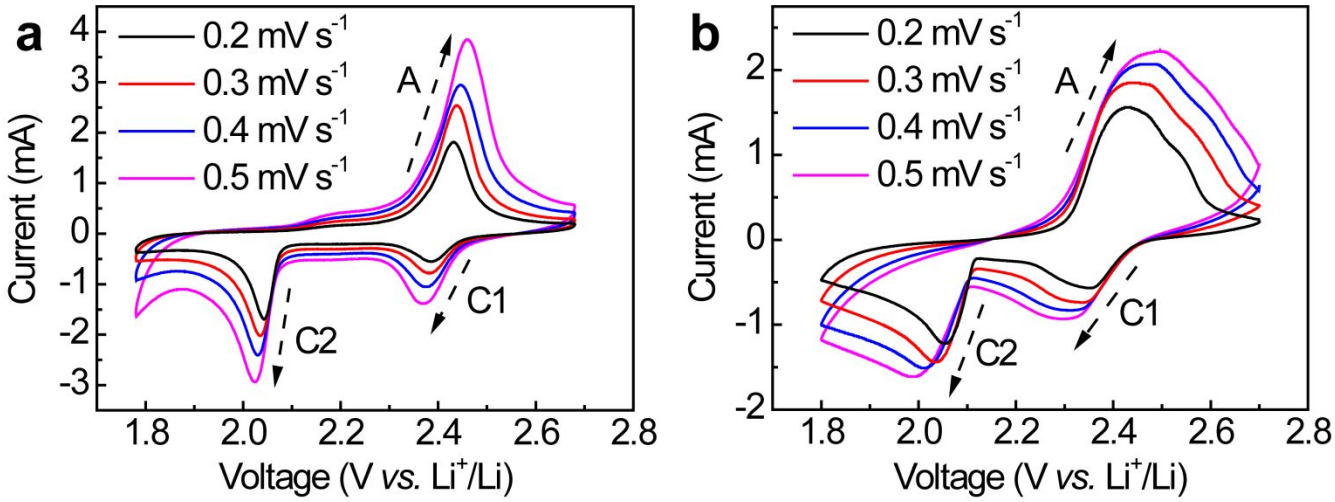

Figure S7. CV curves of (a) RGO-g-poly(S-r-IDBI) cathode and (b) S/RGO-g-IDBI cathode obtained at various scan rates from 0.2 to 0.5 mV s^{-1}. Note that the anodic peaks corresponding to the conversions from Li_2S/Li_2S_2 to lithium polysulfides and further to sulfur merged into one at relatively large currents. Therefore, these two anodic conversions were not differentiated for calculating the Li^+ diffusion coefficient in the anodic process.

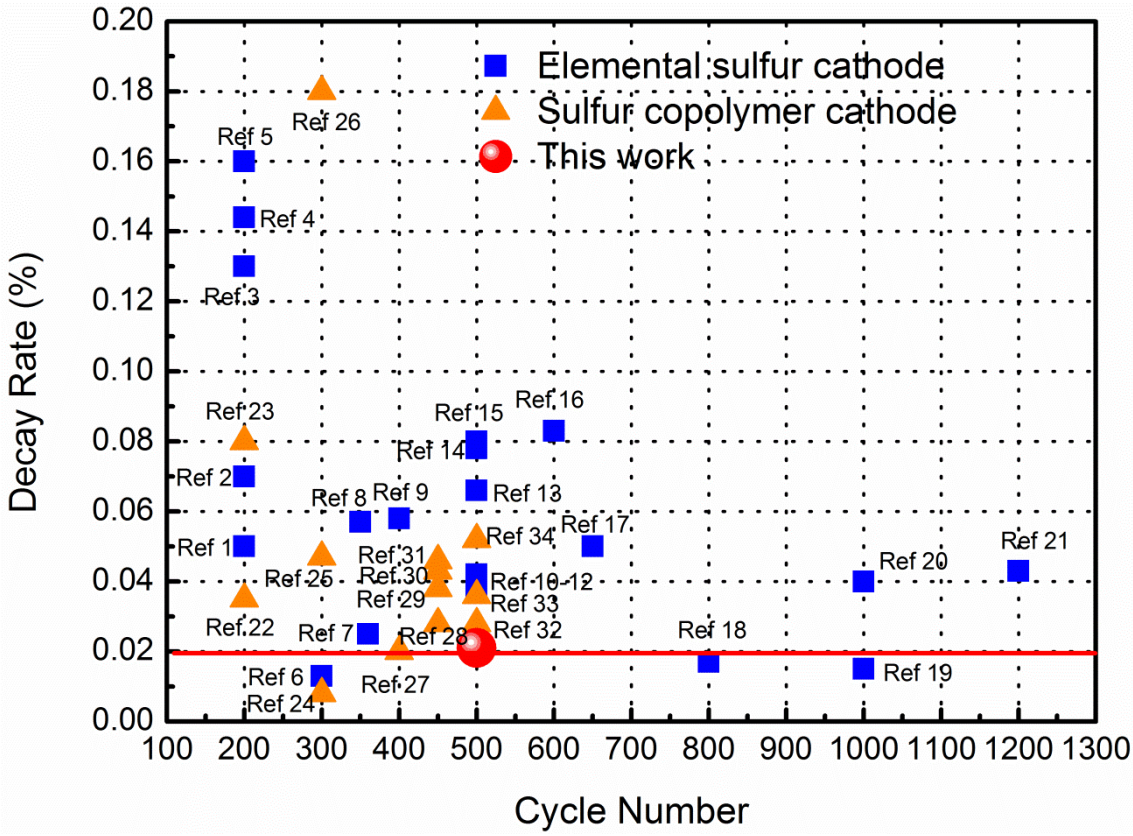

Figure S8. Comparison of the decay rates of elemental sulfur cathodes, sulfur copolymer cathodes, and this work.[1-34]

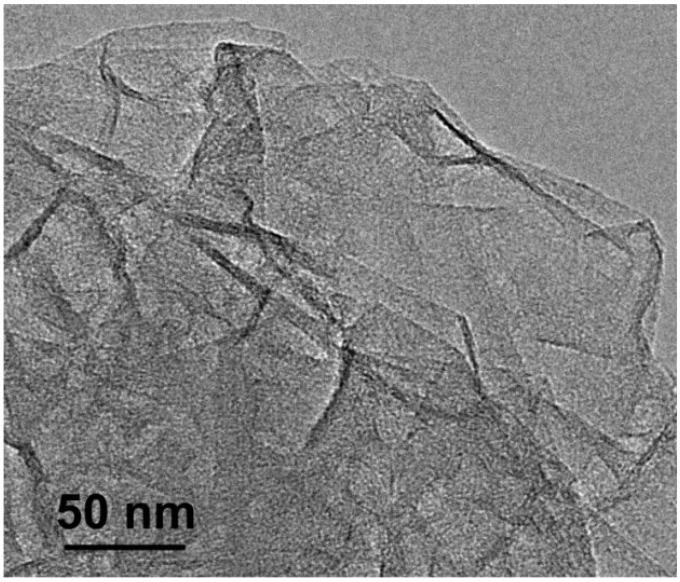

Figure S9. A TEM image of RGO-g-poly(S-r-IDBI) recorded at a relatively high magnification.

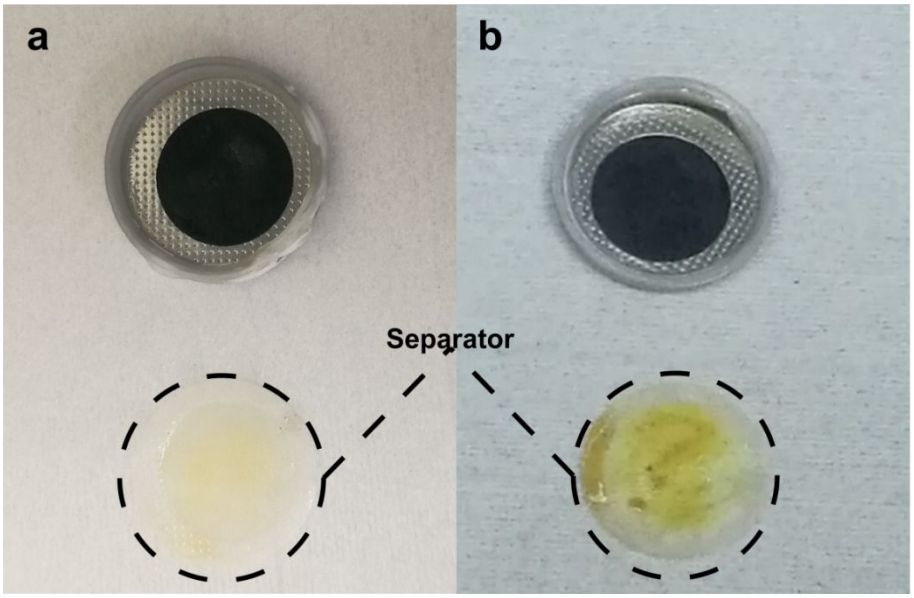

Figure S10. Optical images of the cathodes and membranes of the Li–S batteries disassembled after 500 cycles at 1 C. (a) RGO-g-poly(S-r-IDBI) cathode (top) and corresponding membrane (bottom). (b) S/RGO-g-IDBI cathode and corresponding membrane (bottom). The batteries were disassembled at charged state.

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