Supporting Information

Enable Effective Polysulfide Trapping and High Sulfur Loading via Pyrrole Modified Graphene Foam Host for Advanced Lithium-Sulfur Batteries

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Figure S1. Photograph of Py-GF

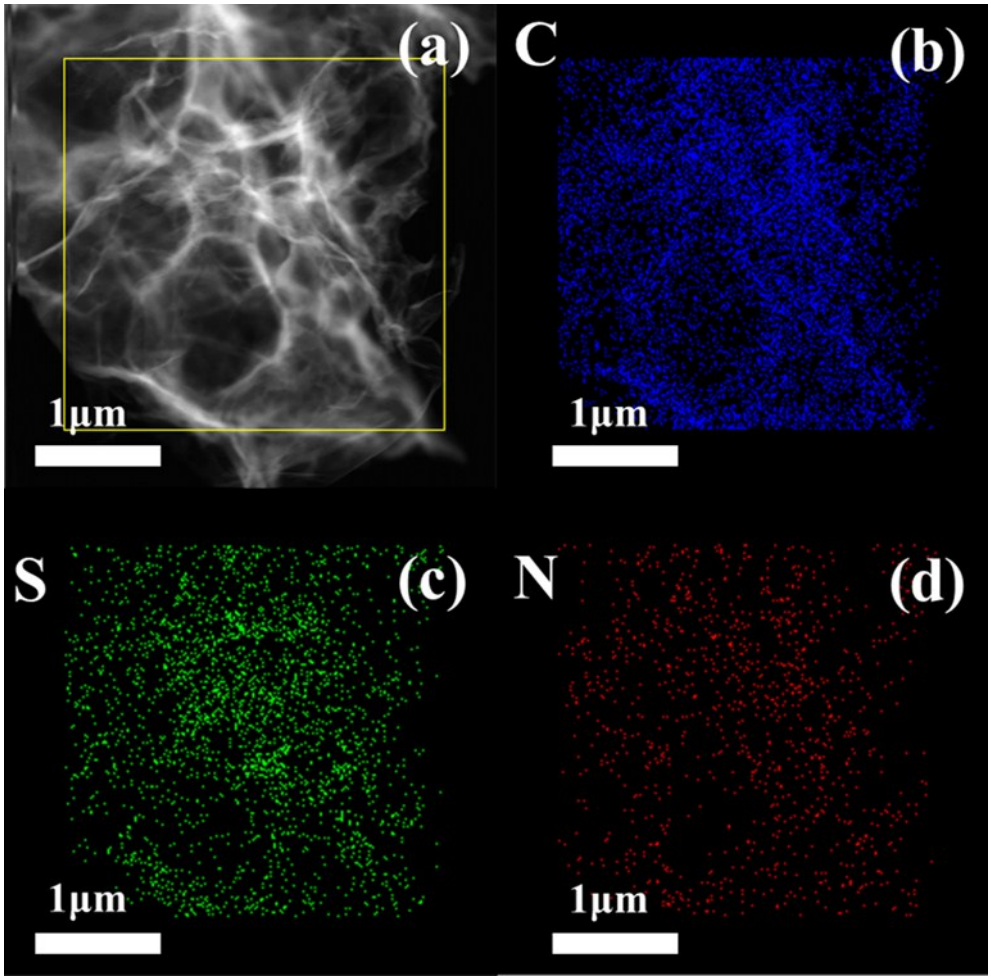

Figure S2. TEM images of (a) Py-GF@S cathode and the corresponding element mappings of (b) C, (c) S, (d) N.

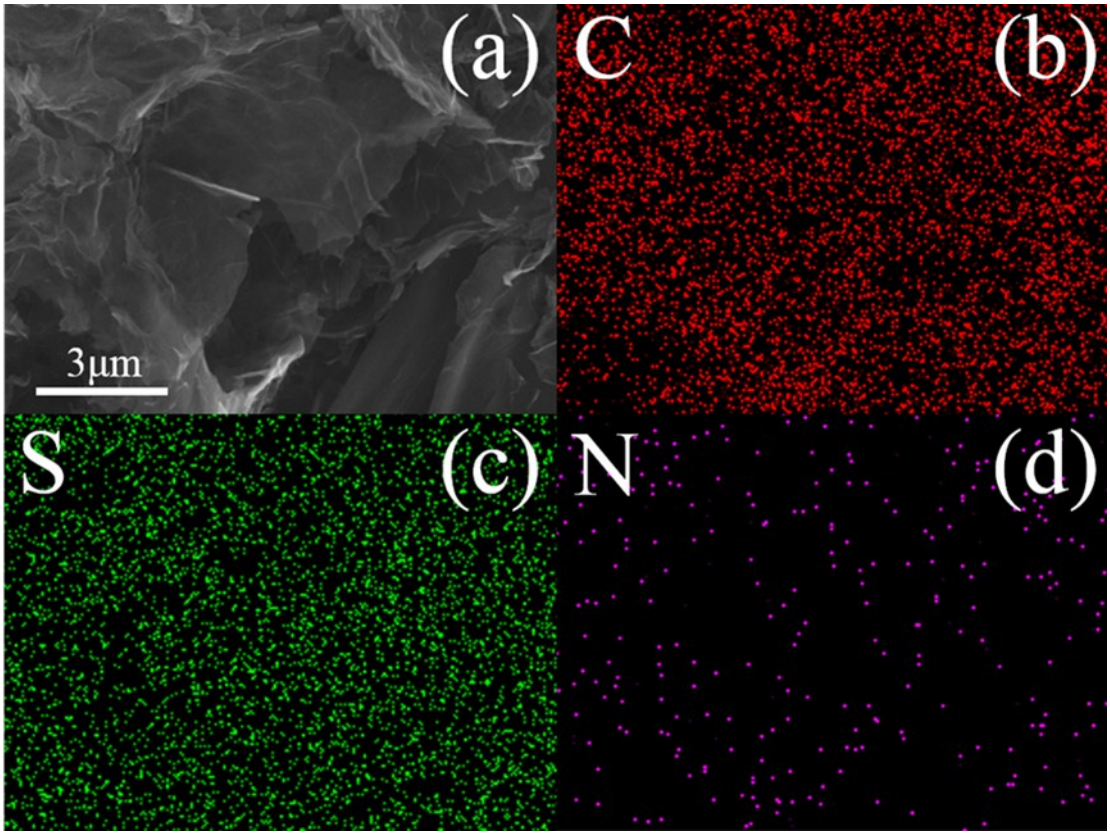

Figure S3. SEM images of (a) Py-GF@S cathode at 10000 times magnification and the corresponding element mappings of (b) C, (c) S, (d) N.

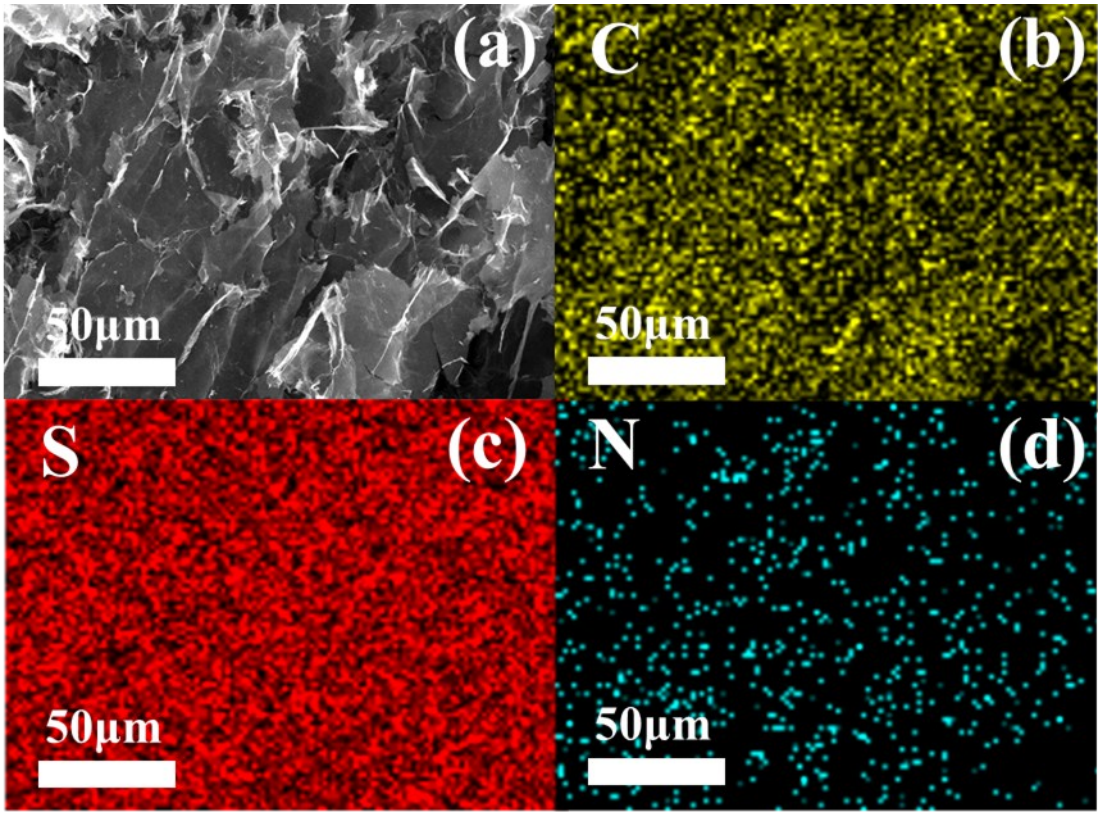

Figure S4. SEM images of (a) Py-GF@S cathode at 1000 times magnification and the corresponding element mappings of (b) C, (c) S, (d) N.

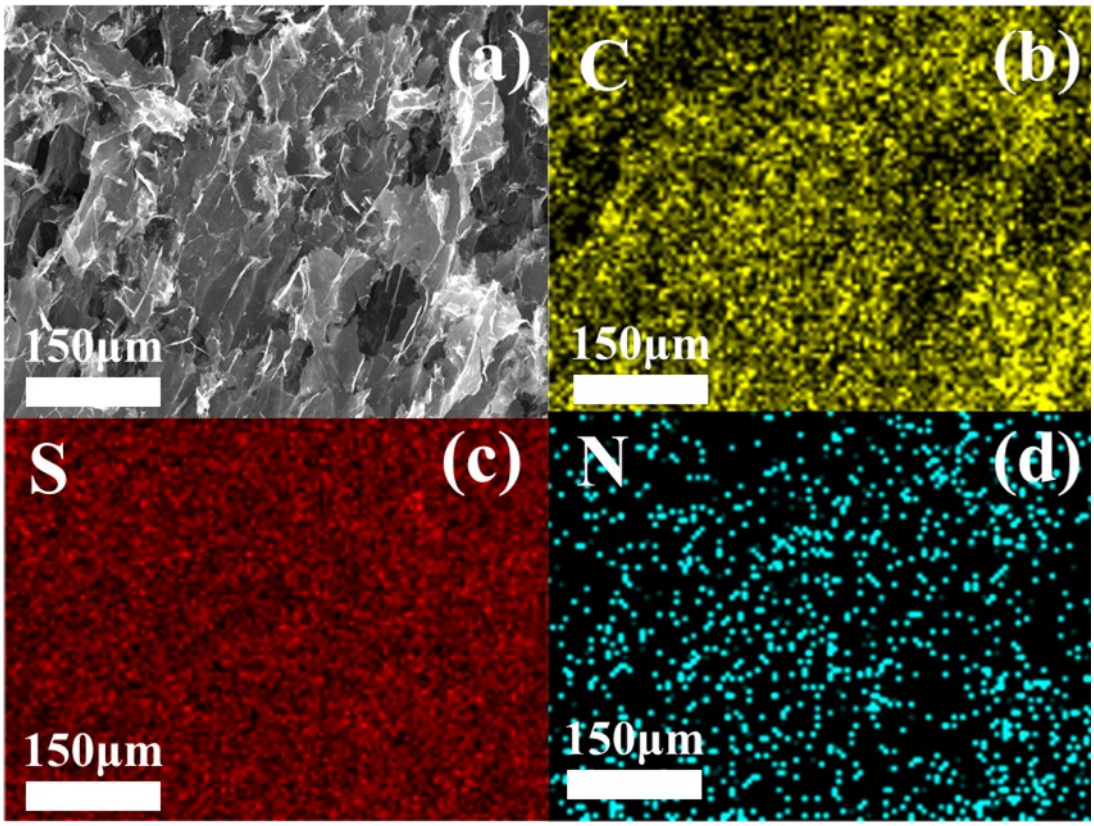

Figure S5. SEM images of (a) Py-GF@S cathode at 500 times magnification and the corresponding element mappings of (b) C, (c) S, (d) N.

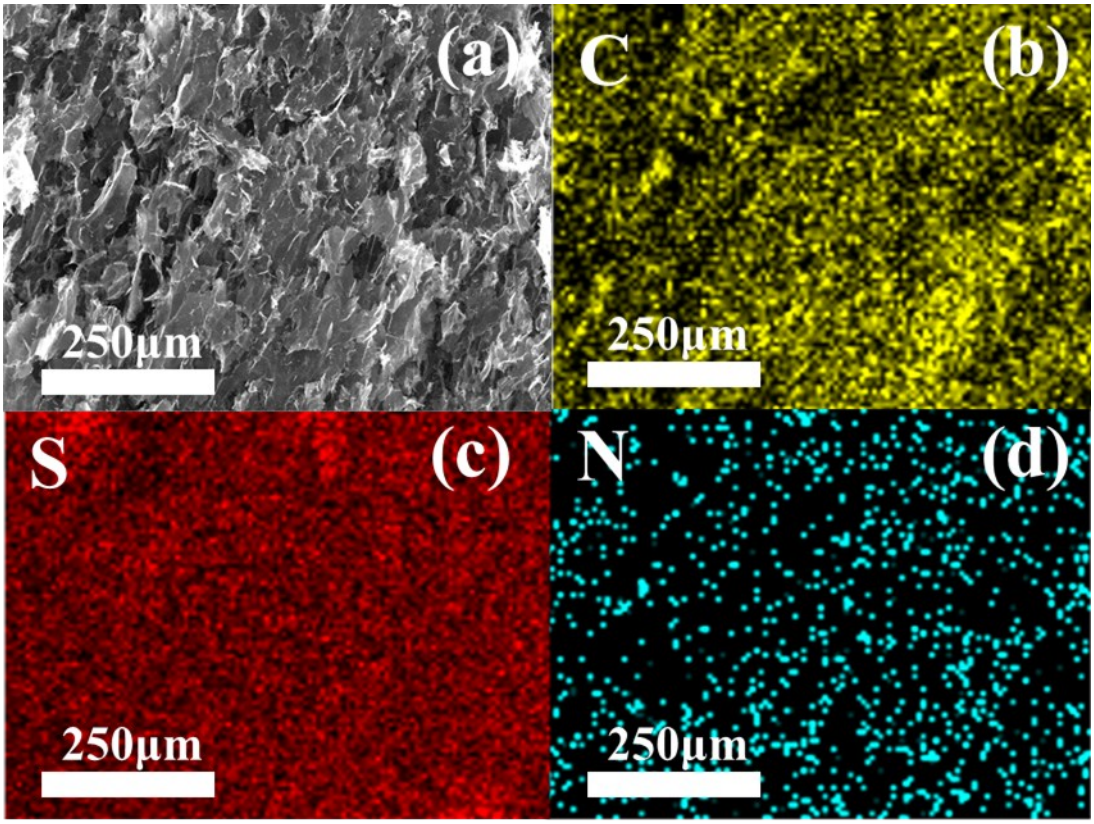

Figure S6. SEM images of (a) Py-GF@S cathode at 250 times magnification and the corresponding element mappings of (b) C, (c) S, (d) N.

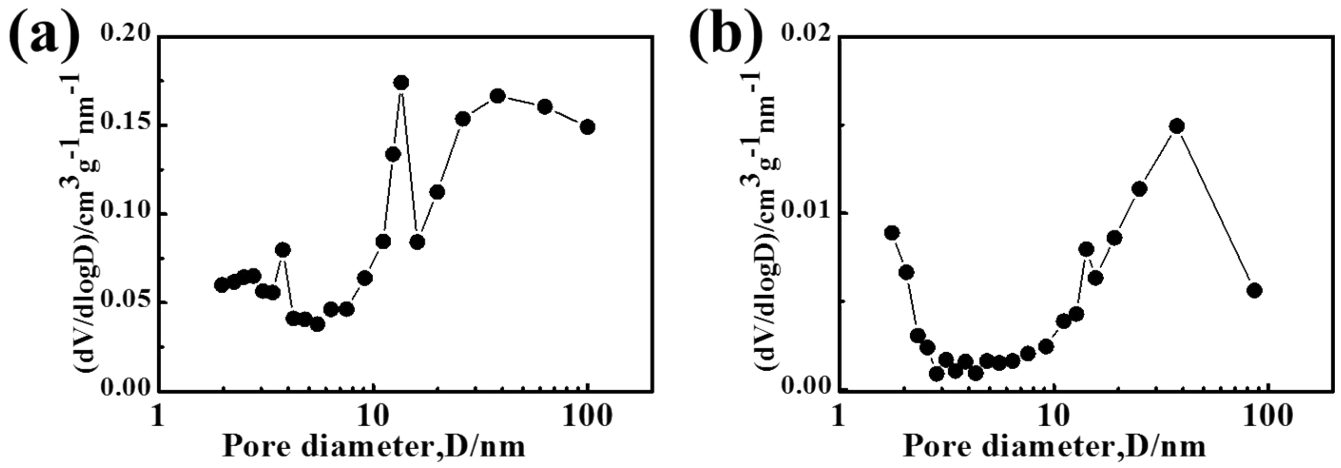

Figure S7. Pore-size-distributions of (a) Py-GF and (b) Py-GF@S.

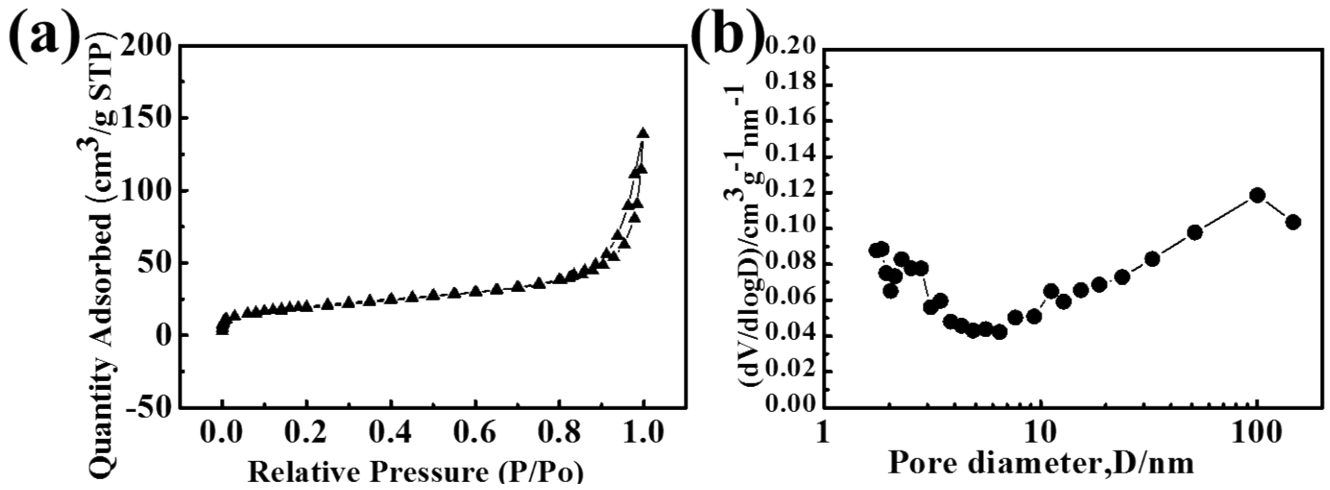

Figure S8. Nitrogen adsorption-desorption isotherms (a) and pore-size-distributions (b) of GF.

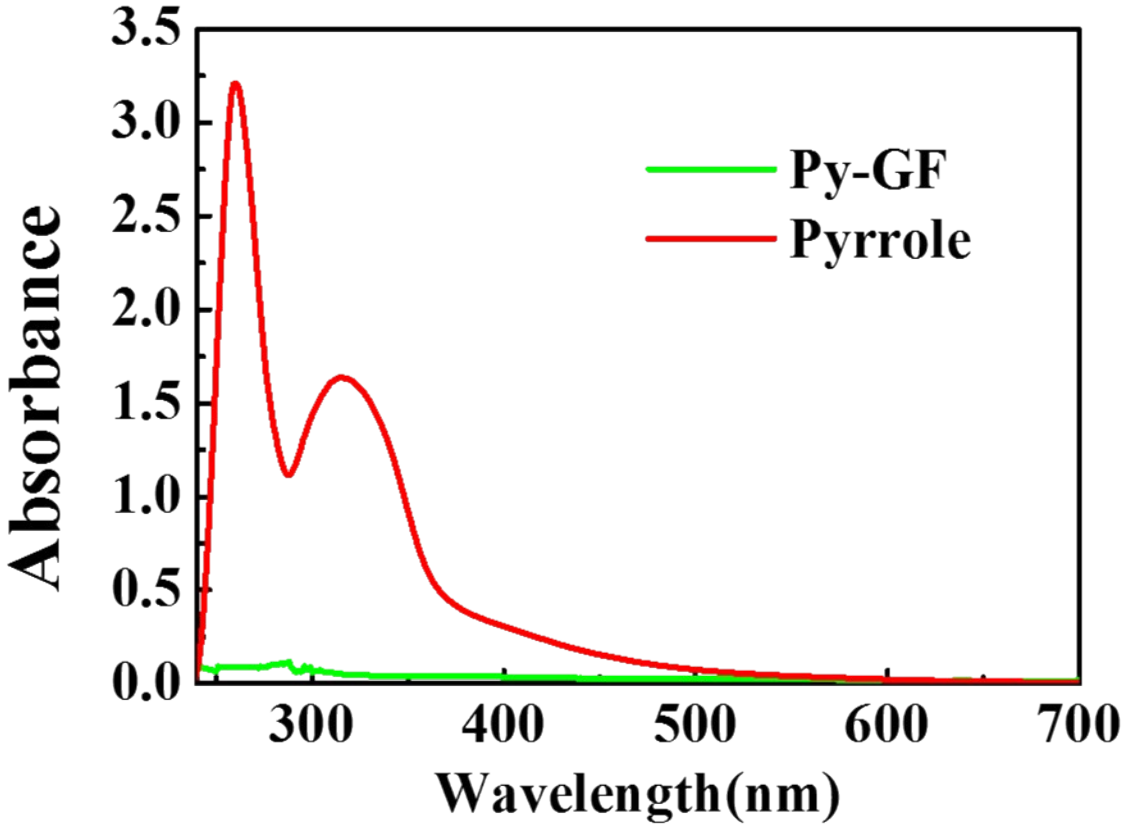

Figure S9. UV-Vis absorption spectra of pyrrole and Py-GF.

Table S1. Comparison with sulfur-based multi-composites integrated sulfur with both carbon materials and conductive polymers

Sample	Sulfur loading	Specific capacity	Capacity retention	Ref.
S-PPy/graphene multi-composite	--	~800 mA h g^{-1} at 0.1C	~600 mA h g^{-1} after 60 cycles (75% remained)	42
GA/S/PPy	4 mg cm^{-1}	986 mA h g^{-1} at 0.5 C	687 mA h g^{-1} after 100 cycles(69.9% remained)	43
Polyaniline-coated sulfur/carbon composite	0.875mg cm^{-1}	1405.5 m Ah g^{-1} at 1 C	596 m Ah g^{-1} after 100 cycles (42.4% remained)	44
pPAN-S/GNS	0.8 mg cm^{-1}	1500 m Ah g^{-1} at 0.1 C	~1200 m Ah g^{-1} after 100 cycles (80% remained)	45
Py-GF@S	6.2 mg cm^{-2}	985.8mAh g^{-1} at 0.5 C	797.9 mAh g^{-1} after 100 cycles (81.0% remained)	Our work

Table S2. Atomic percentage and weight percentage of element N and weight percentage of pyrrole in Py-GF and Py-GF@S composites.

Sample	N At%	N Wt.%	Pyrrole Wt.%
Py-GF	5.42	6.26	29.96
Py-GF@S	2.35	1.09	5.22