Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Supplementary Information

MOF-derived NiO-$NiCo_2O_4$@PPy hollow polyhedron as a sulfur immobilizer for lithium-sulfur batteries

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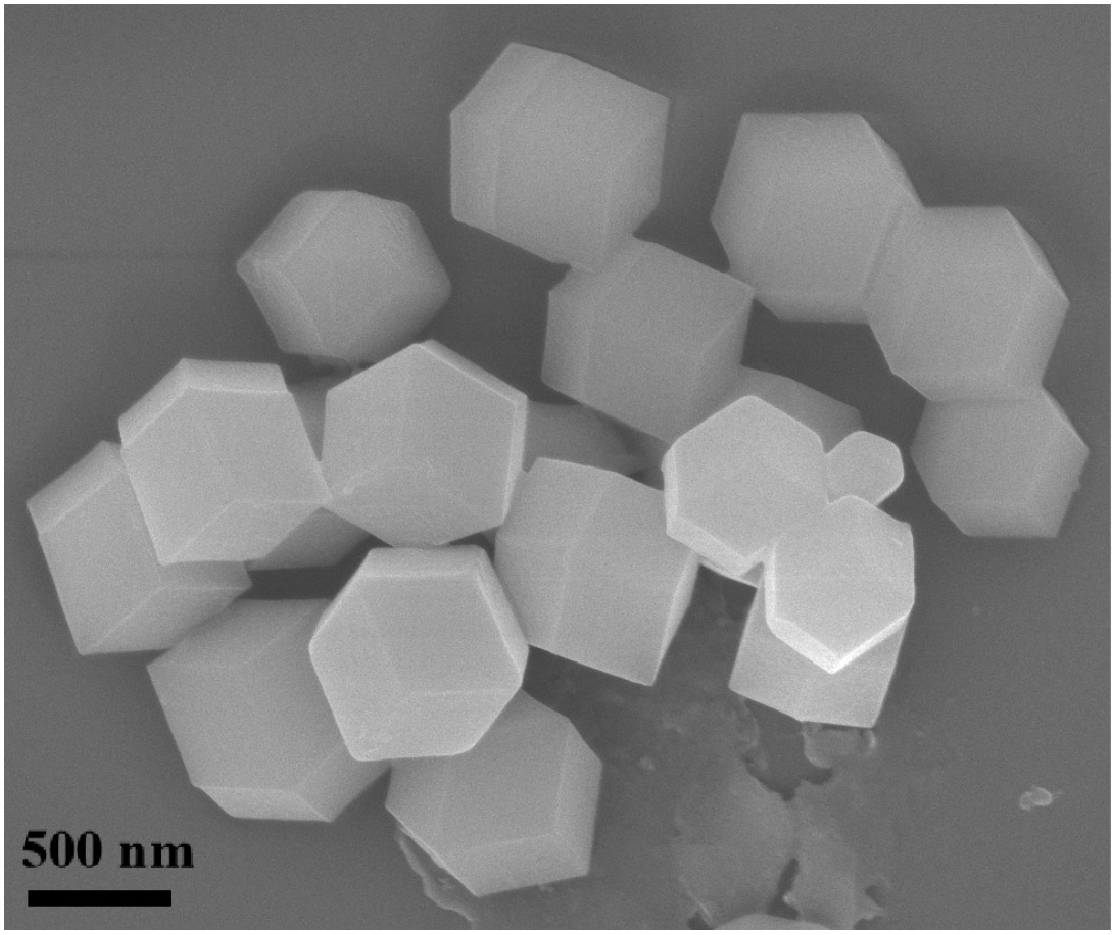

Figure S1. FESEM image of ZIF-67.

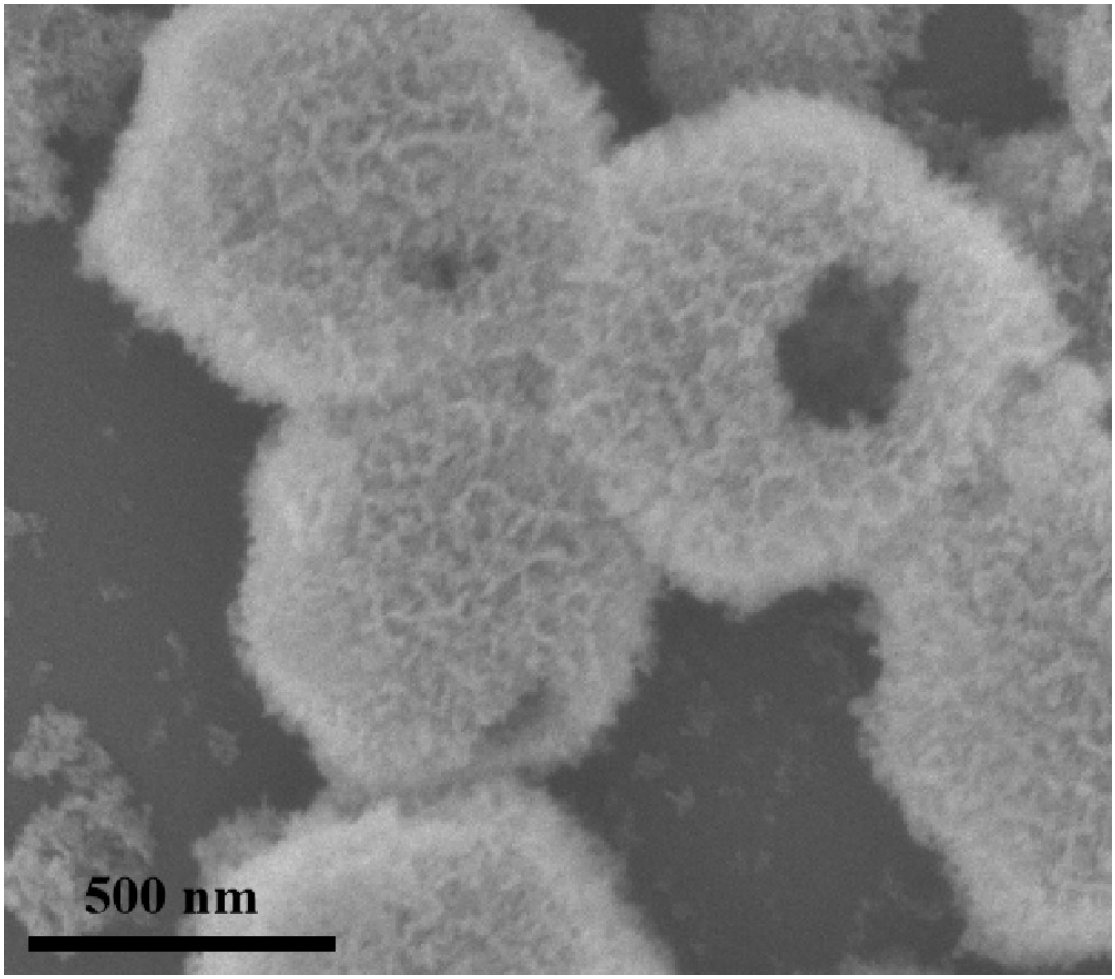

Figure S2. FESEM image of NiO-$NiCo_2O_4$ polyhedron.

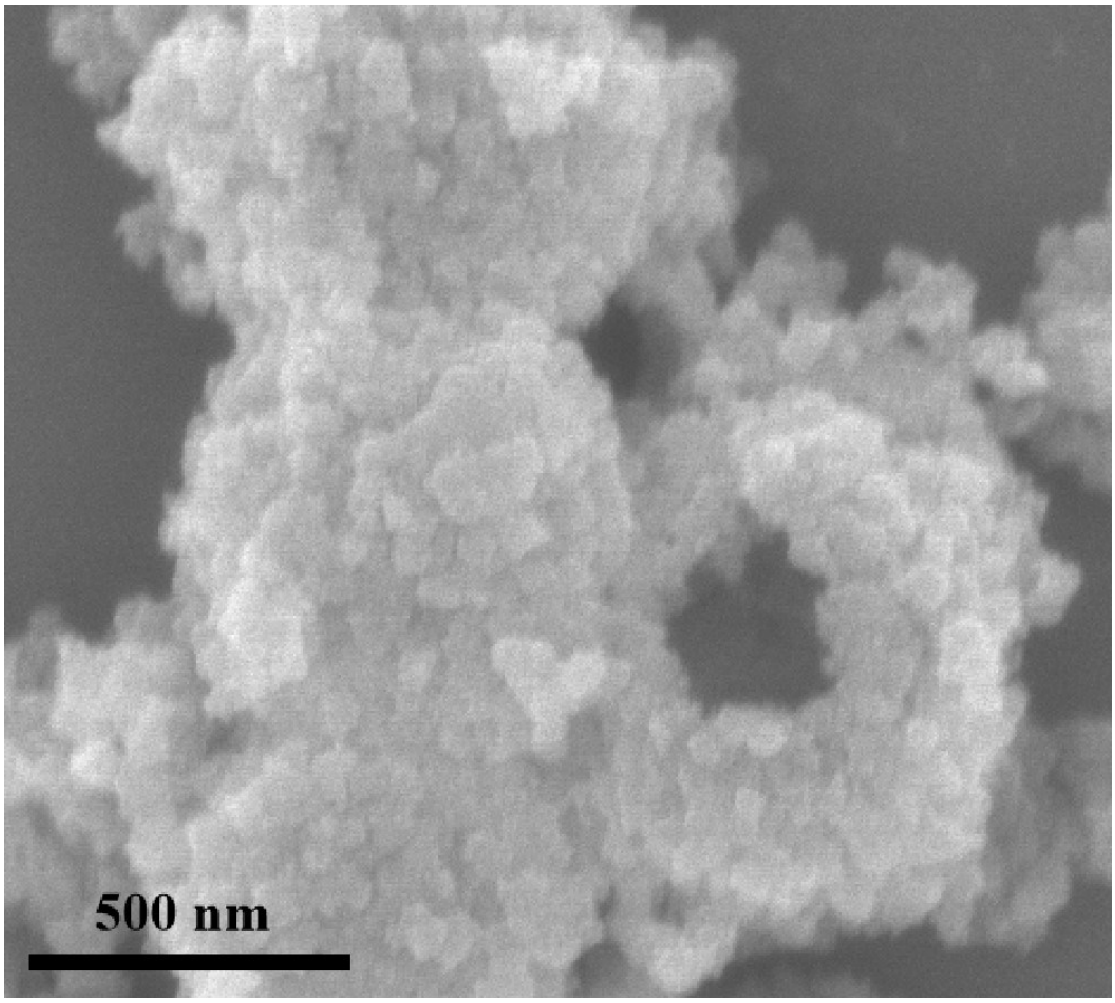

Figure S3. FESEM image of NiO-$NiCo_2O_4$@PPy.

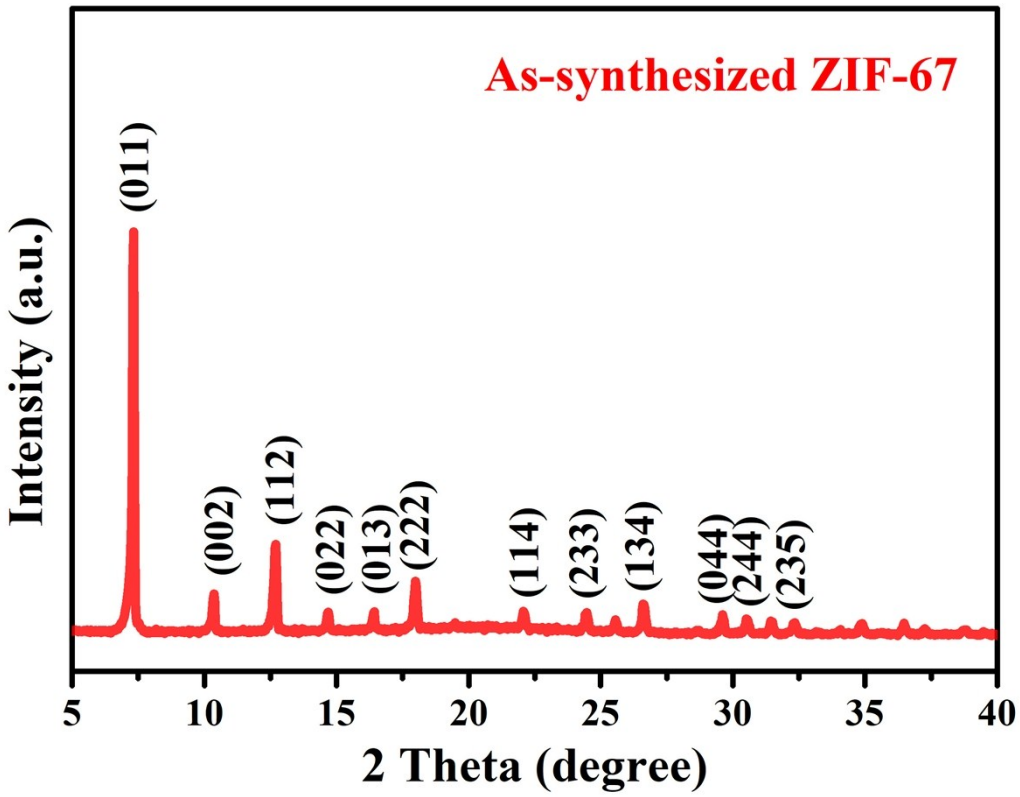

Figure S4. XRD pattern of the as-synthesized ZIF-67.

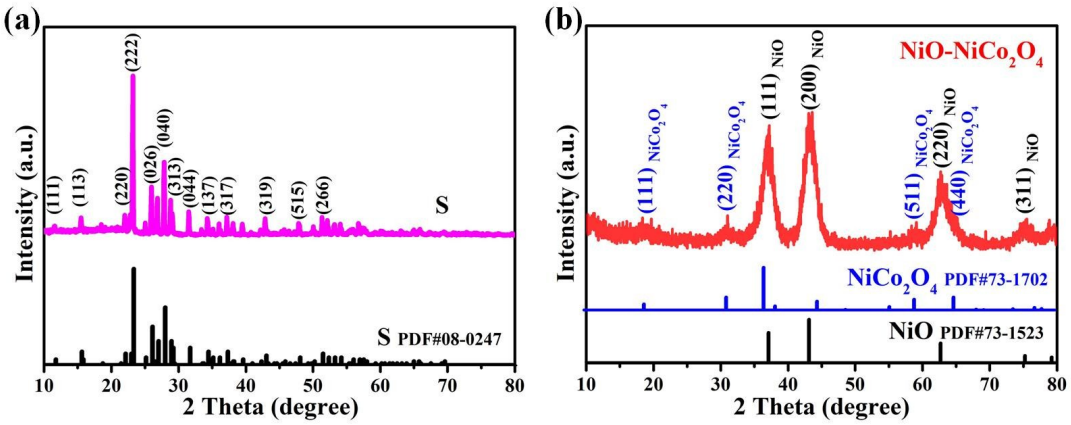

Figure S5. XRD patterns of (a) S and (b) NiO-$NiCo_2O_4$.

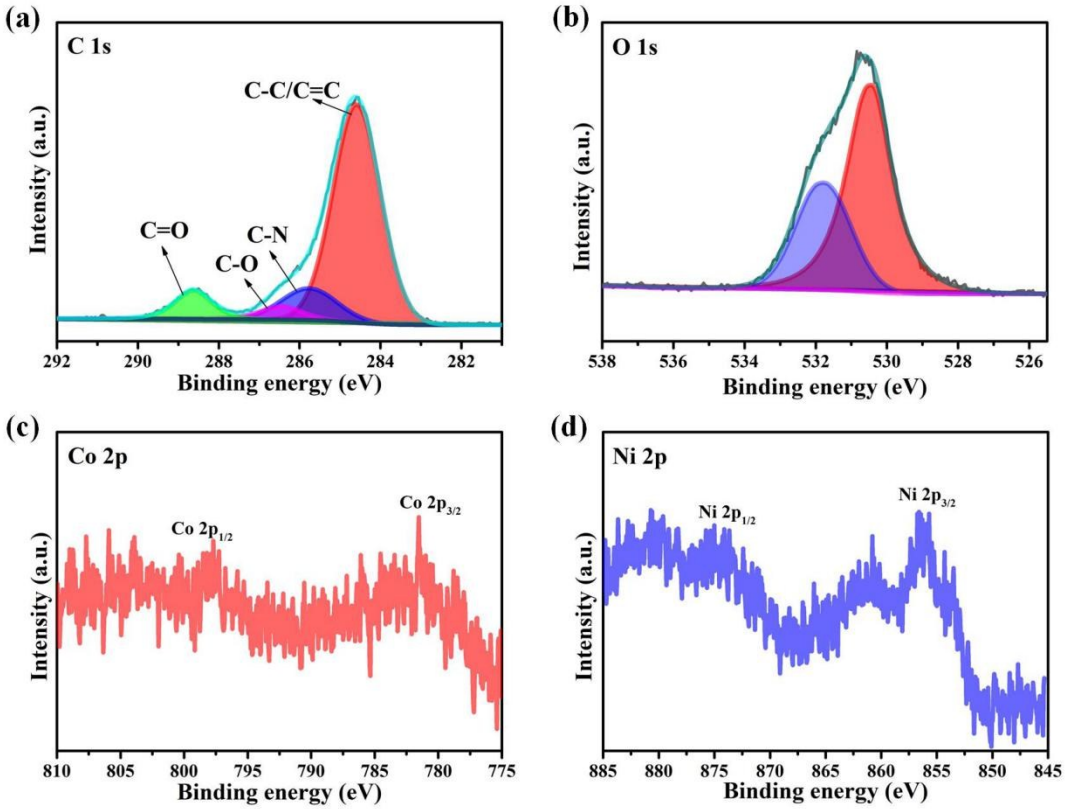

Figure S6. (a) C 1s, (b) O 1s, (c) Co 2p and (d) Ni 2p spectra of S/NiO-$NiCo_2O_4$@PPy.

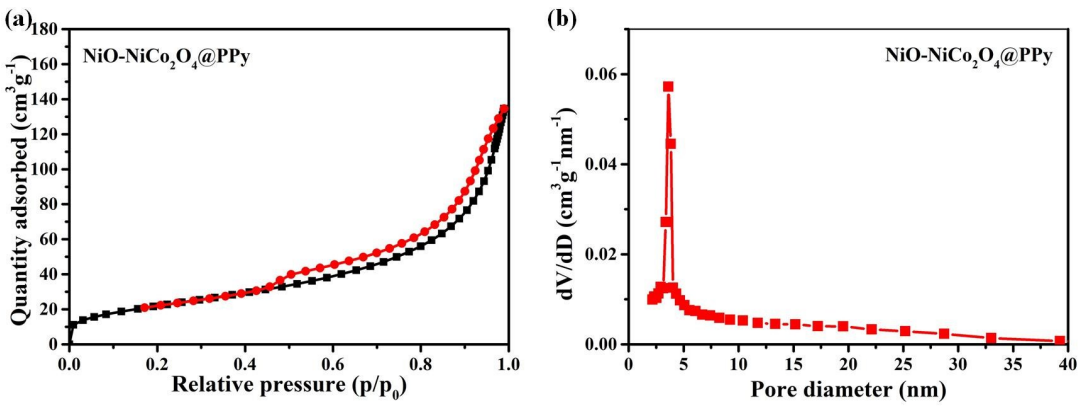

Figure S7. (a) Nitrogen adsorption-desorption isotherms and (b) pore size distribution curve of $NiO\text{-}NiCo_2O_4$@PPy composite.

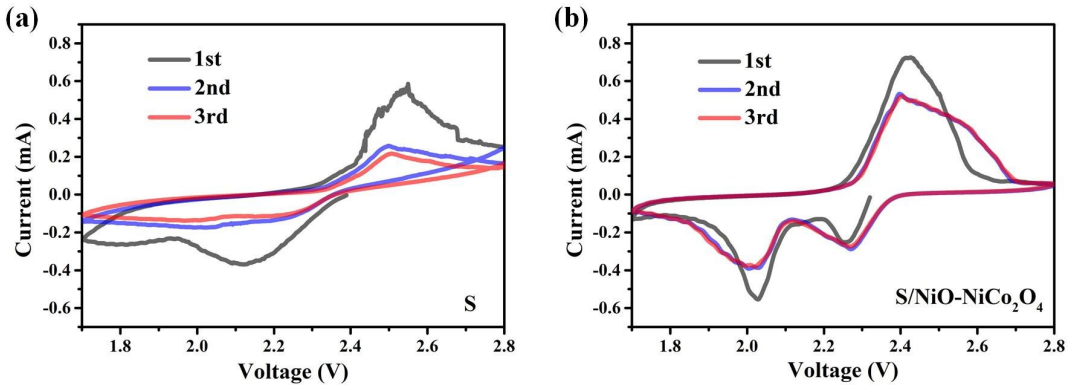

Figure S8. CV curves of (a) S and (b) S/NiO-$NiCo_2O_4$.

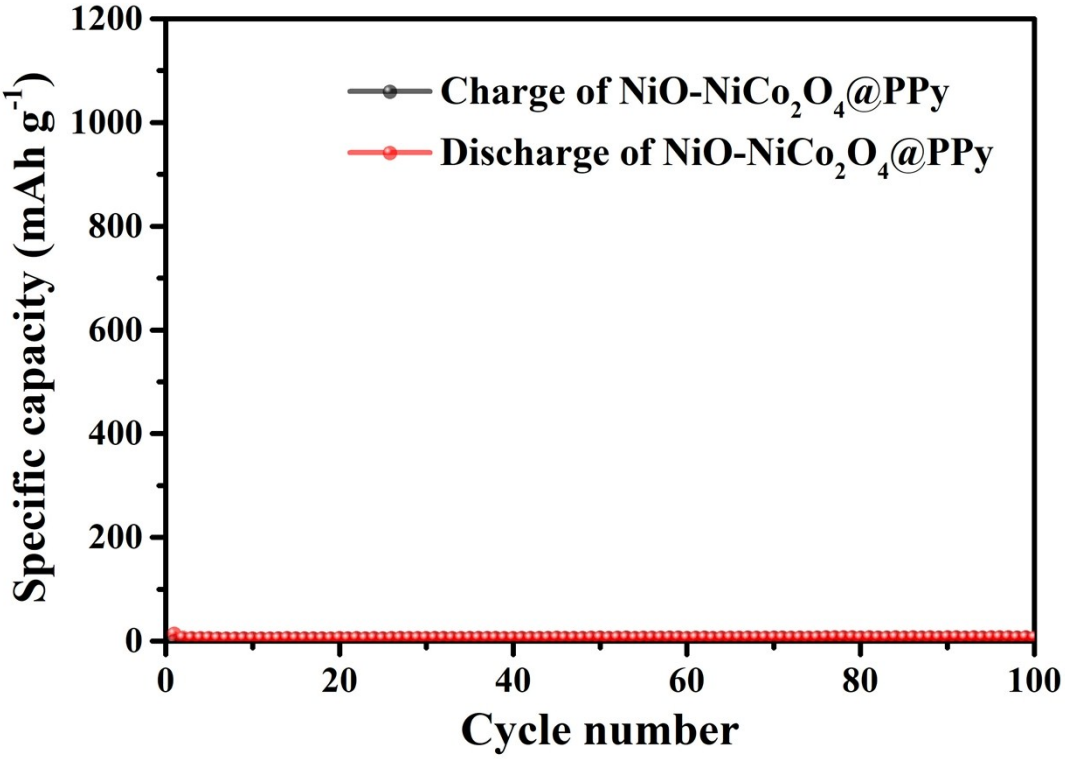

Figure S9. Cycling performance of NiO-$NiCo_2O_4$@PPy at 335 mA g^{-1}.

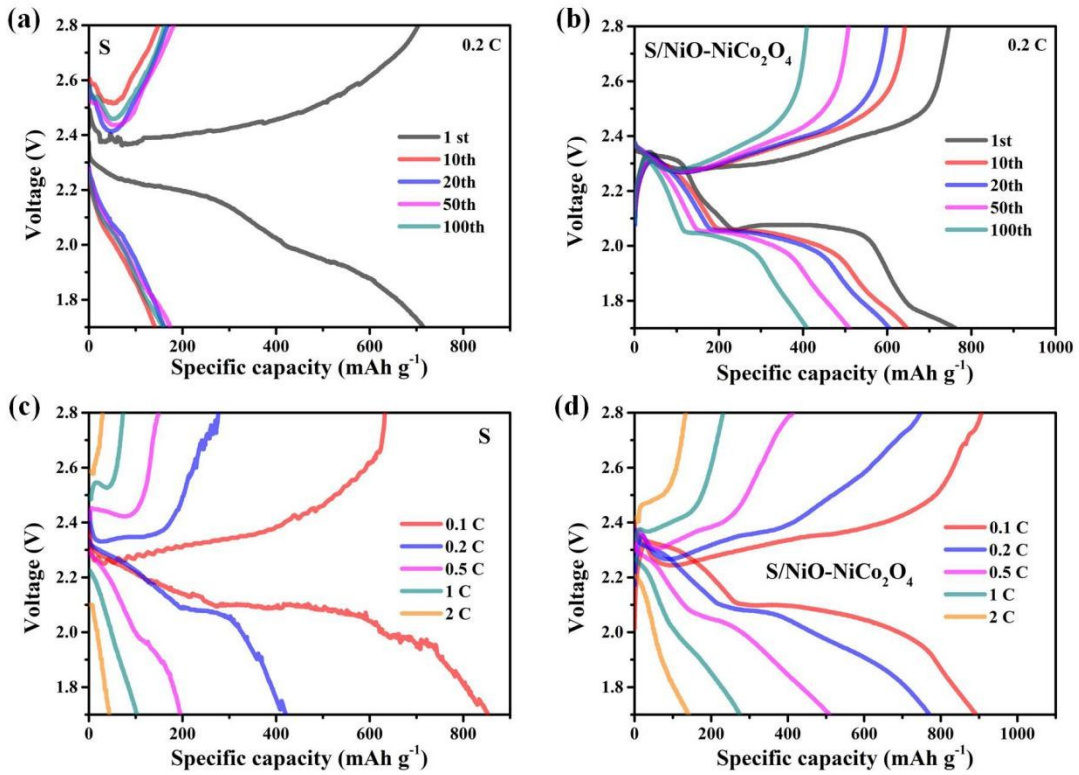

Figure S10. Charge-discharge profiles of (a) S and (b) S/NiO-$NiCo_2O_4$ at 0.2 C. Charge-discharge profiles of (c) S and (d) S/NiO-$NiCo_2O_4$ at various current densities from 0.1 to 2 C in the voltage range of 1.7-2.8 V.

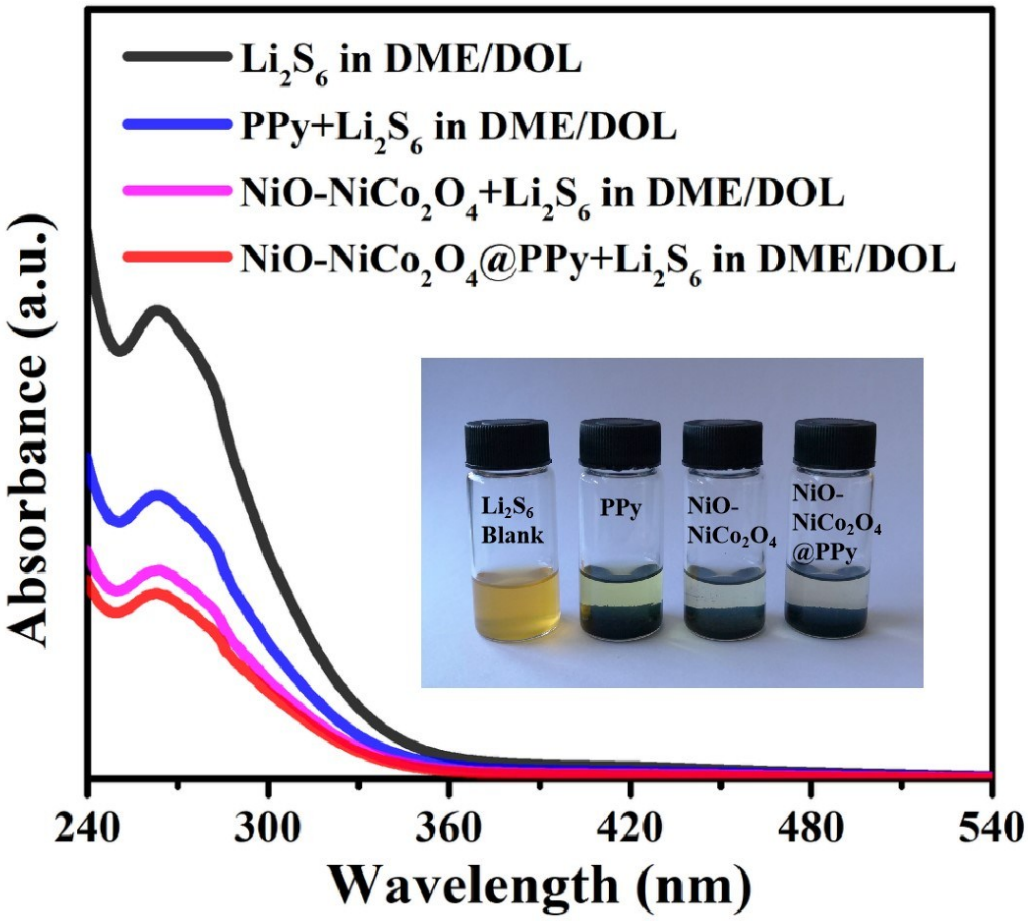

Figure S11. UV-Vis spectra of Li_2S_6 in DME/DOL, PPy+Li_2S_6 in DME/DOL, NiO-$NiCo_2O_4$+Li_2S_6 in DME/DOL, and NiO-$NiCo_2O_4$@PPy+Li_2S_6 in DME/DOL. Inset: photographs of sealed vials of Li_2S_6 in DOL/DME and Li_2S_6 in DOL/DME after being in contact with PPy, NiO-$NiCo_2O_4$, and NiO-$NiCo_2O_4$@PPy for 5 h.

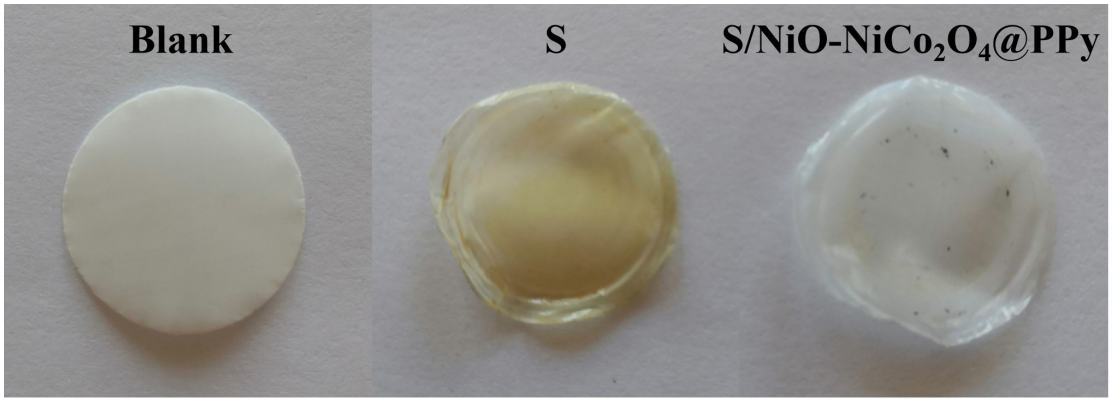

Figure S12. Photographs of separators of batteries with pure sulfur and S/NiO-$NiCo_2O_4$@PPy after cycling, compared to photograph of separator before cycling (blank).

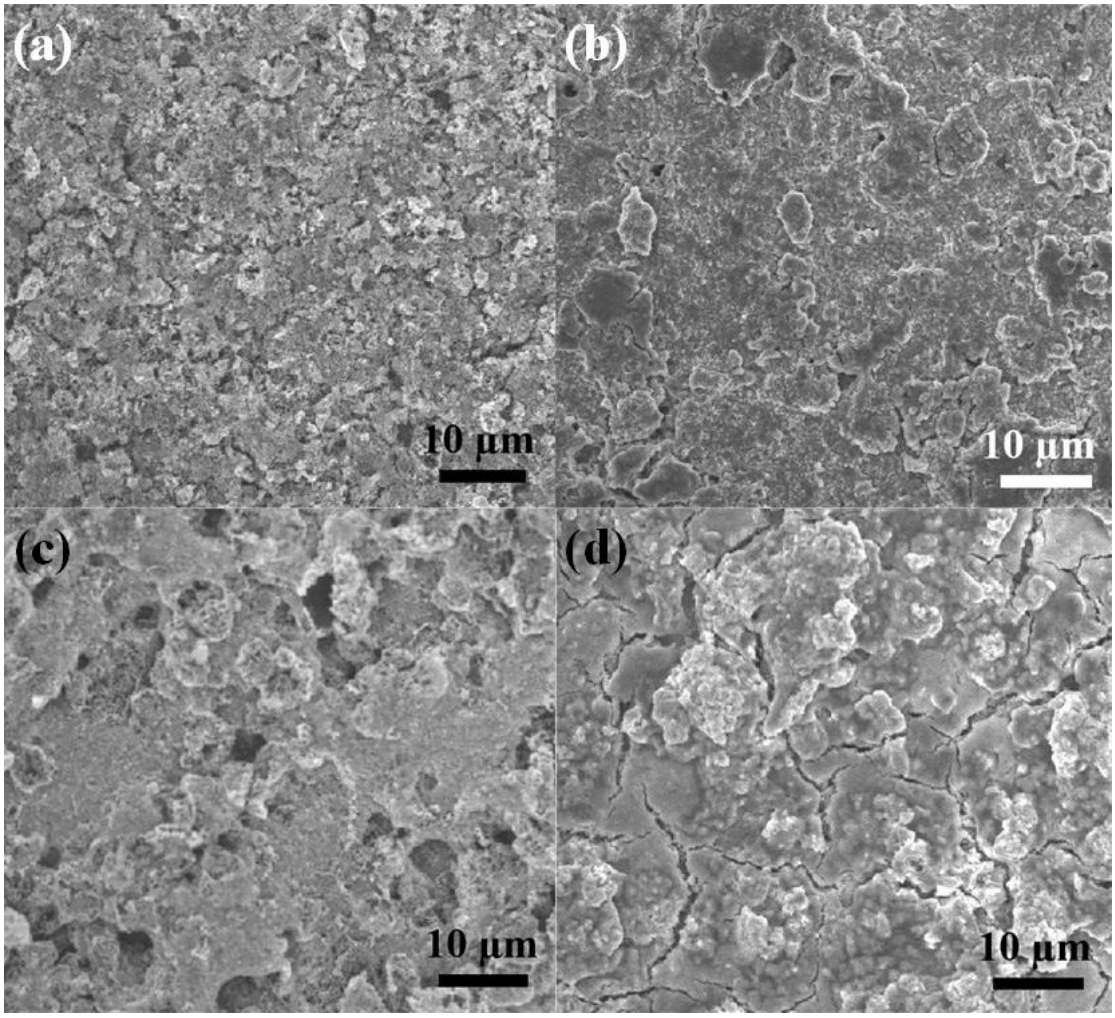

Figure S13. SEM images of S/NiO-$NiCo_2O_4$ cathode (a) before cycle and (b) after 100 cycles at 0.2 C. SEM images of S cathode (c) before cycle and (d) after 100 cycles at 0.2 C.

Table S1. Comparison of the related electrodes with this work.

Materials	Capacity (mAh g^{-1})	Current density	Sulfur content	Areal loading (mg cm^{-2})	Cycle	Ref.
S-PPy-based sandwich electrode	383	0.1 C	—	—	500	[1]
S/PPy	613 475	0.1 C 1 C	—	—	50 50	[2]
$NiCo_2O_4$/S	601	0.5 C	27%	—	200	[3]
S-Co_3O_4 nanotubes	538	0.2 C	78%	—	100	[4]
Co_3O_4/S/ACNTs	496	0.5 C	58.73%	1.5	550	[5]
S/NiO-$NiCo_2O_4$@PPy	**641** **411**	**0.2 C** **1 C**	**61.5%**	**2**	**100** **200**	**This work**

References

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