Polypyrrole coated cobalt sulfide as an effect host for sulfur cathode

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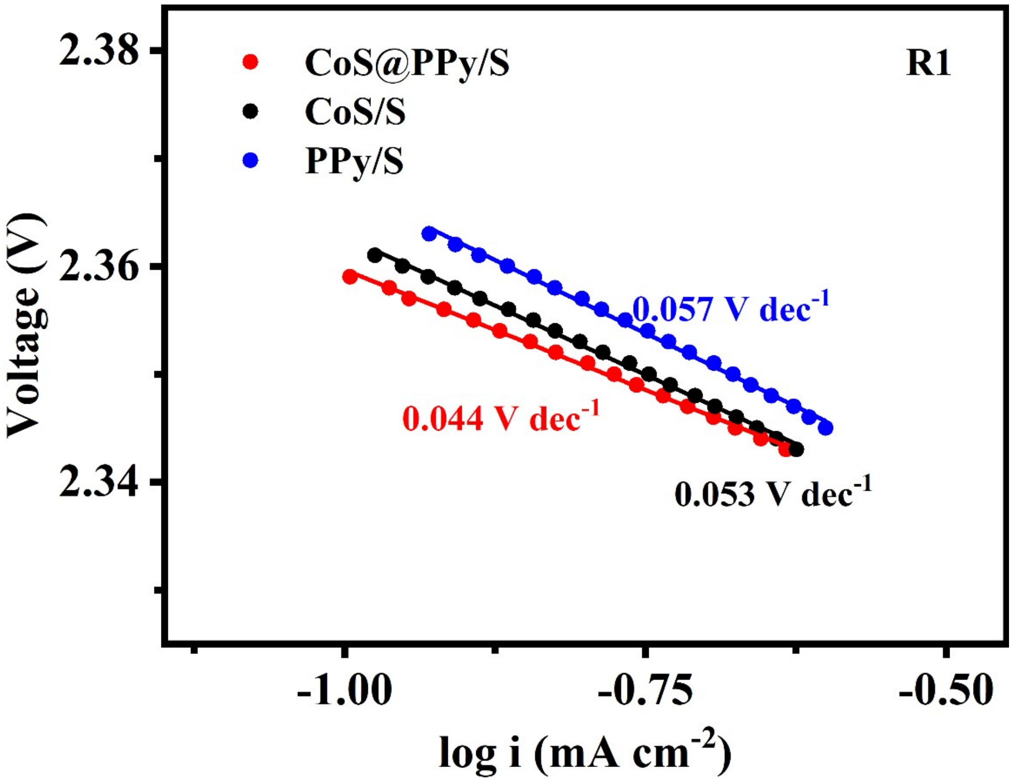

Fig. S1. Tafel plots calculated from the reduction peak R1.

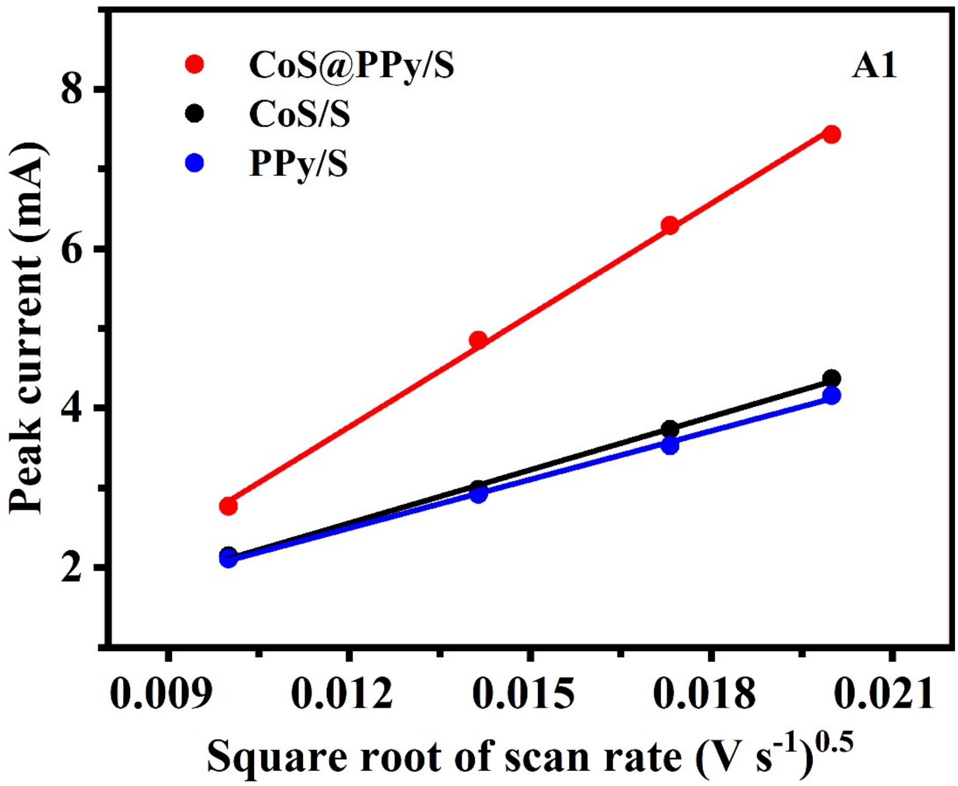

Fig. S2. The peak current values of peak A1 versus the square root of scan rates of the CoS@PPy/S, CoS/S, and PPy/S electrodes.

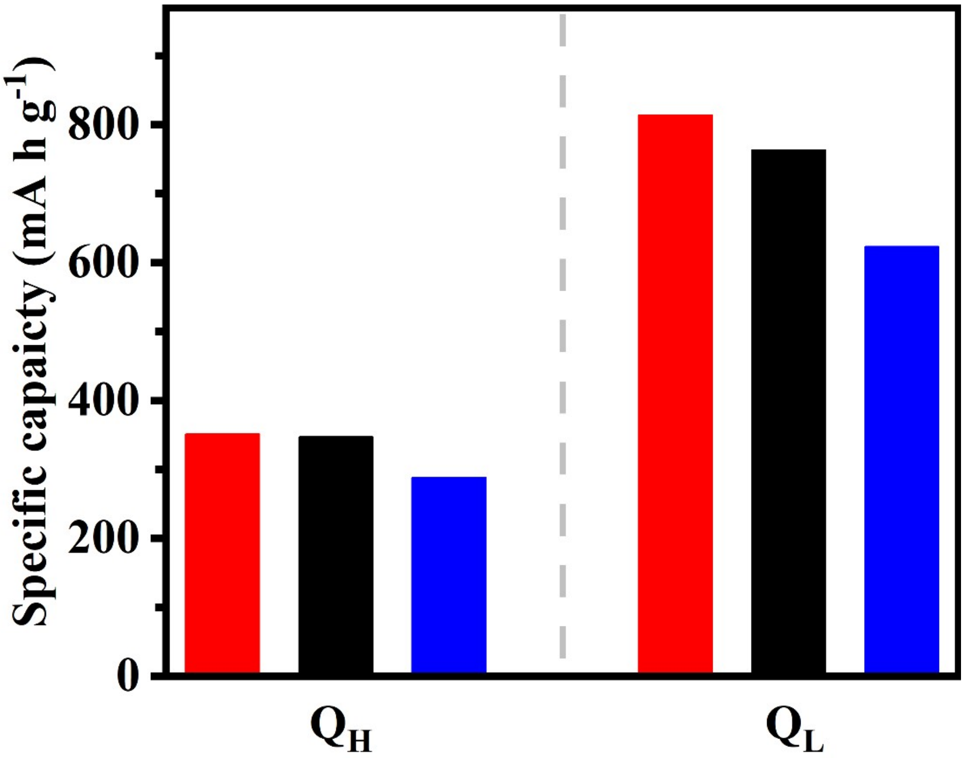

Fig. S3. Values of Q_H and Q_L in different electrodes

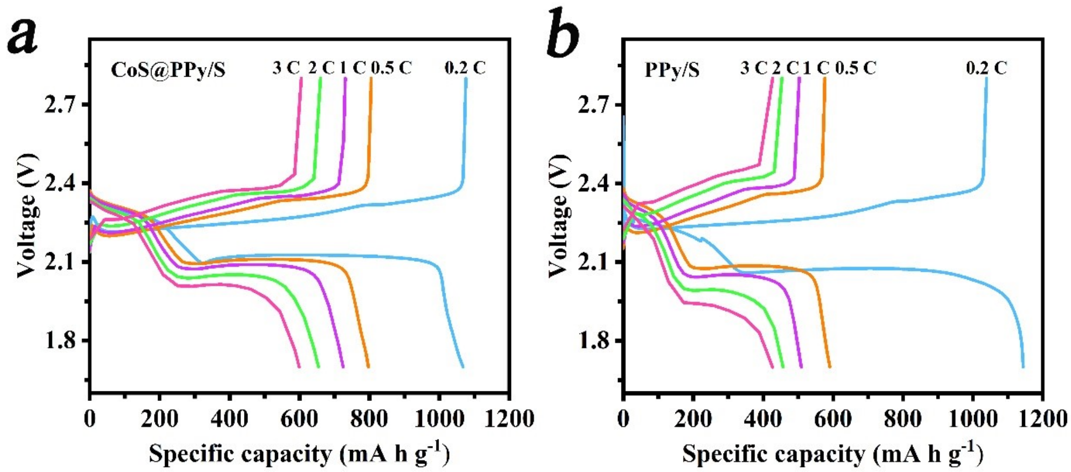

Fig. S4. Galvanostatic charge-discharge curves of (a) CoS@PPy/S and (b) PPy/S electrodes under different C-rates.

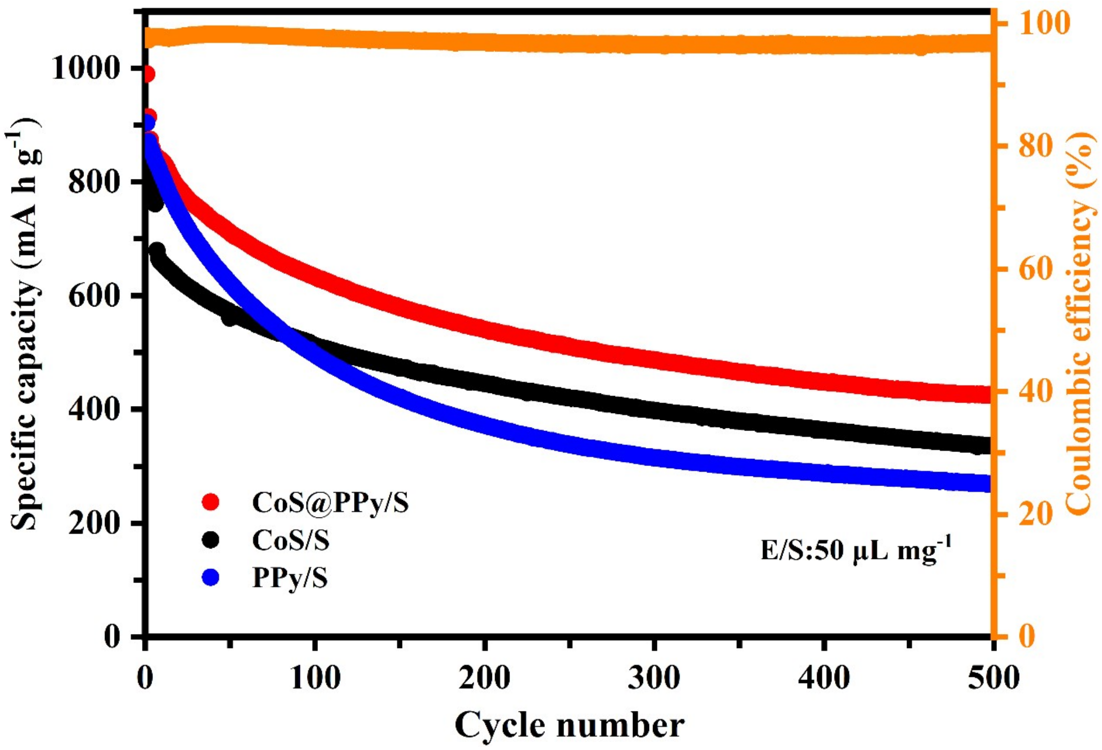

Fig. S5. Cycling performance of the three electrodes at 0.5 C.

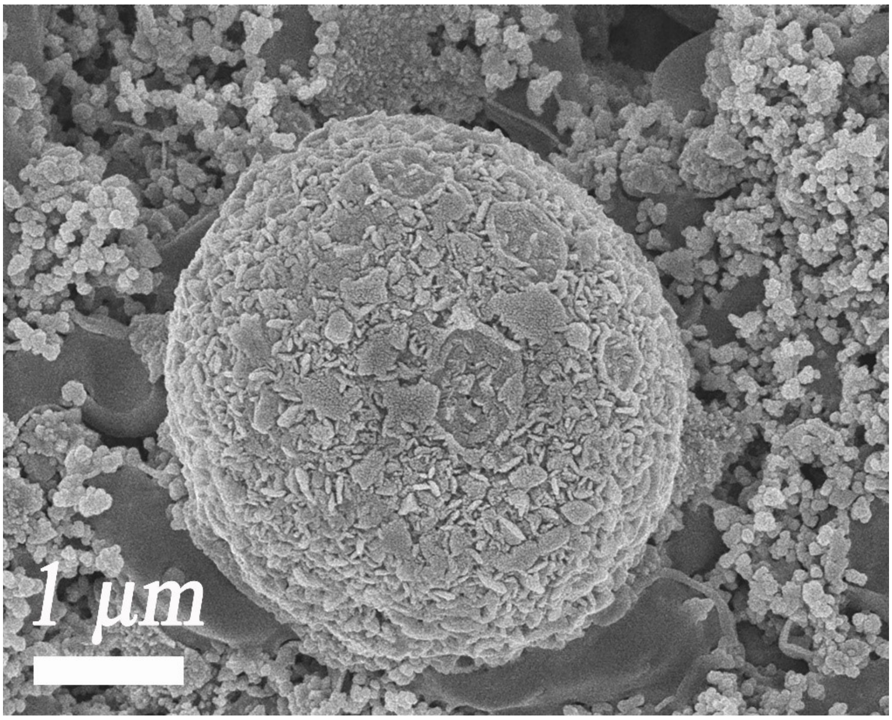

Fig. S6. SEM images of the CoS@PPy/S cathodes after 100 cycles.

Table S1. Lithium-ion diffusion rates (D_{Li+}, $cm^2\ s^{-1}$) between CoS@PPy/S, CoS/S and PPy/S electrodes

Sample	A1	A2	C1	C2
CoS@PPy	2.84×10^{-7}	6.00×10^{-7}	8.24×10^{-8}	2.95×10^{-8}
CoS	6.70×10^{-8}	1.23×10^{-7}	1.90×10^{-8}	1.79×10^{-8}
PPy	5.57×10^{-8}	1.16×10^{-7}	1.87×10^{-8}	1.39×10^{-8}

Table S2. Comparison with the related works in literature

Sample	S Loading (mg cm^{-2})	Rate (C)	Specific Capacity (mA h g^{-1})	Ref
CoS@PPy/S	1.1	2/3	678/625	This work
CoS/G/S	1.2-1.8	1/1.5	542/501	1
$CoMoS_3$/CoS/S	1.0	2	512	2
CoS/MWCNT-S	1.0-1.5	1/2	762/642	3
Hollow CoS/S	1.0-1.5	1/2	714/447	4
CoS@rGO/S	0.8-1.6	1/2	691/602	5
CoS_2/Fe_7S_8/NG-PP	1.0-1.4	2/3	620/555	6
TiO_2/S@PPy	2.0	1/2	586/402	7
PPy-AB/S	1.3-1.8	1/2	688/663	8
PPy/ZnO interlayer	1.3	1.5/2	501/404	9

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