Supporting information

Cobalt-Zinc Carbides Embedded in N-doped Porous Carbon Nanospheres as Polysulfides Mediator for Efficient Lithium-Sulfur Batteries

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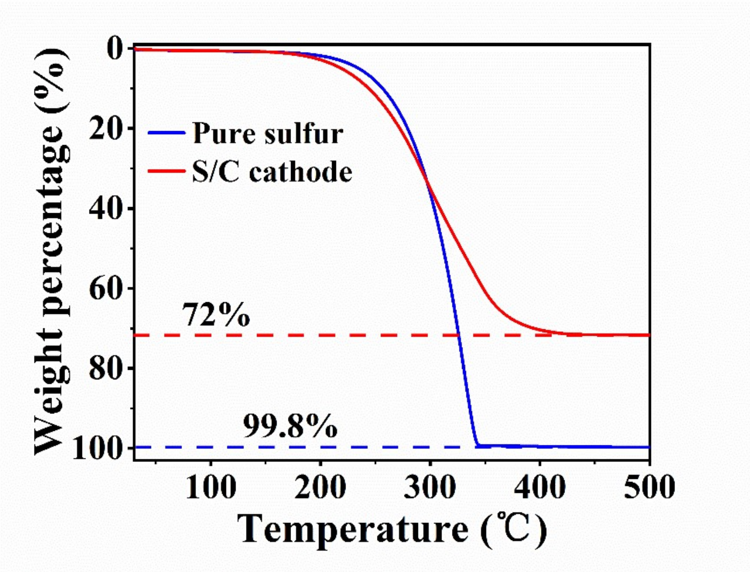

Figure S1 Thermogravimetric curve of the sulfur/carbon (S/C) composite cathode.

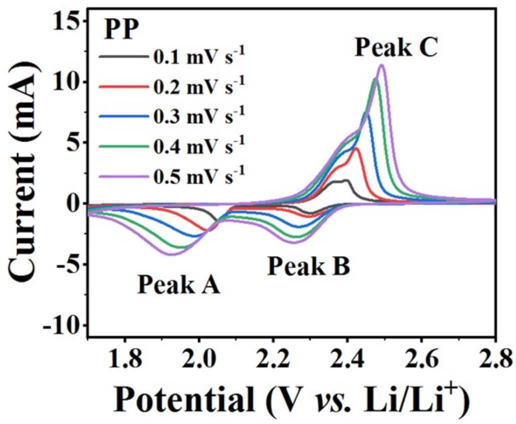

Figure S2 CV curves of the PP battery at different scanning rates.

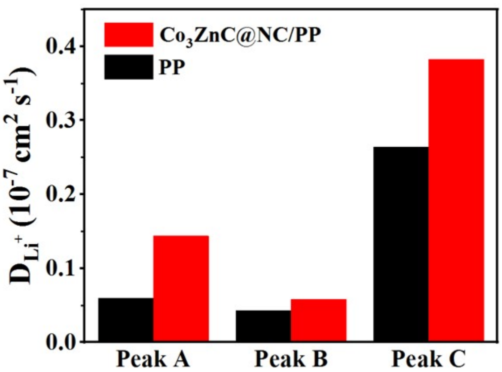

Figure S3 Comparison of the calculated lithium ion diffusion coefficient (D_{Li+}) by linear fitting of the three peak currents of peaks A, B and C for the Co_3ZnC@NC/PP battery and PP battery, respectively.

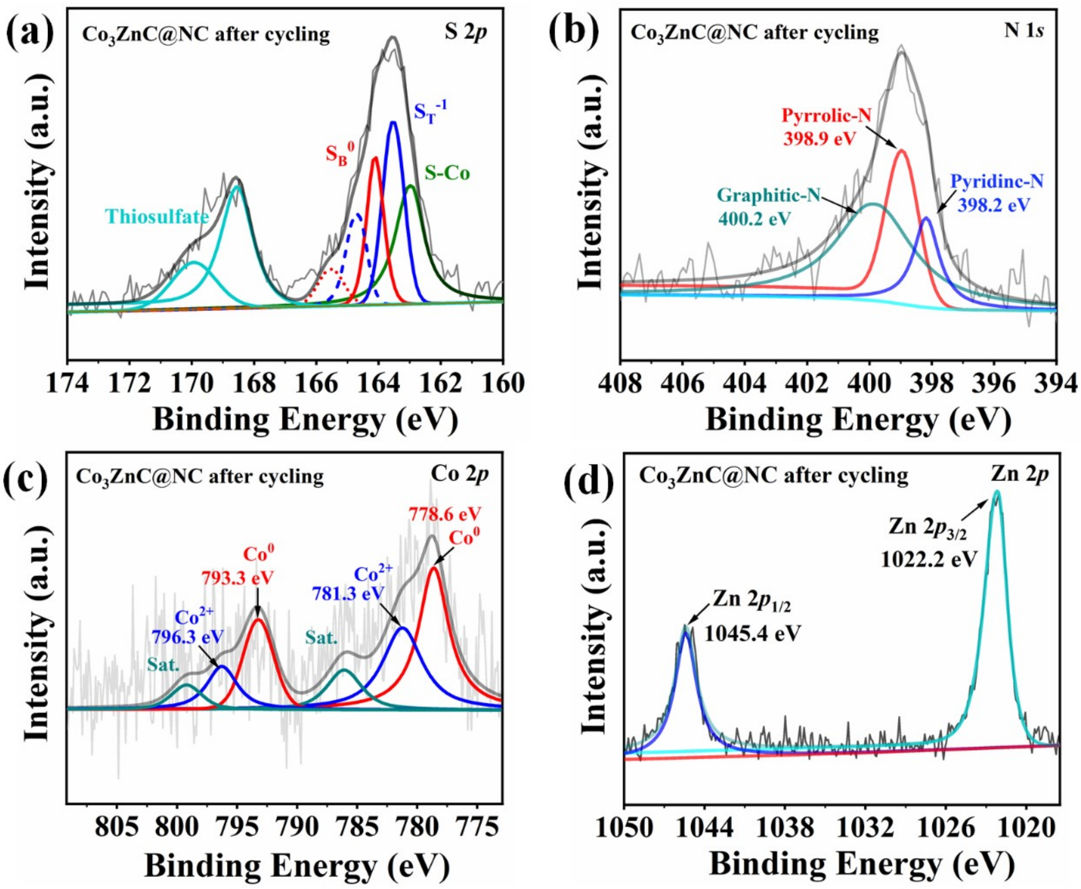

Figure S4 XPS spectra of Co_3ZnC@NC after battery cycling for 50 charge/discharge cycles at 0.5 C. (a) S 2*p*; (b) N 1s; (c) Co 2*p*; (d) Zn 2*p*.

Table S1 Comparison of the electrochemical performances of Co_3ZnC@NC interlayer-based Li-S batteries with recently reported composite analogues.

Catalyst material	Sulfur loading ($mg\ cm^{-2}$)	Initial capacity ($mAh\ g^{-1}$)@ Current density	Cyclic capacity ($mAh\ g^{-1}$) @current/cycles	Rate capability ($mAh\ g^{-1}$)	Ref.
Co_3ZnC @NC	**1.2~1.3**	**1659.8@0.1 C 1047.3@1 C**	**695.8@1 C/250**	**734 @5 C**	**This work**
	6.2 (E/S: 6 μL mg^{-1})	**1249.2@0.2 C**	**805.4@0.2 C/50 (~5 mA h cm^{-2})**	/	
		1008.7@0.5 C	**542.8@0.5 C/50**	/	
VN@NC	1.2～1.3	1594.8@0.1 C	712.1@1 C/500	766.5 @5 C	*J. Power Sources* **2023**, 566, 2329223
	4.5 (E/S:8 μL mg^{-1})	934@0.2 C	811@0.2 C/70	/	
$CoFe_2O_4$/N-doped carbon nanofibers	6.3	940@0.2 C	690@0.2 C/450	/	*Chem. Eng. J.* **2024**, 481, 148374
ZnS@CoS_2 nanocages	/	1443@0.1 C	507@2 C/650	688@3 C	*J. Energy Storage* **2024**, 75, 109505
VN QDs/NC	3.2 (E/S:8.8 μL mg^{-1})	1214@0.2 C	1085@0.2 C/200 726@2 C/1000	752@4 C	*Chem. Eng. J.* **2023**, 459, 141526
ZnCo-LDH/rGO	1.2	1365.4@0.2 C	837.7 @1 C/500	796.5@5 C	*J. Alloy. Compd.*, **2023**, 968, 172059
FeNi@NC	1.43	1378.8@0.1 C	455@1 C/500	874@2 C	*Chem. Eng. J.* **2023**, 474, 145751
	4.99	6.25 mA h cm^{-2}@0.1 C	4.28 mA h cm^{-2}@0.1 C/100	/	
Ni-$CoSe_2$ @NC	2.4	930.3@0.2 C	399.2@0.5 C/400	242.8@3 C	*RSC Adv.*, **2024**, 14, 15358–15364
Zn–Co SA@DNC	1.5	1344@0.2 C	732@1 C/800 cycles	596@6 C	*J. Mater. Chem. A*, **2023**, 11, 12025–12033
	5.4 (E/S:9 μL mg^{-1})	/	4.3 mA h cm^{-2} @0.1 C/100	/	