Supporting Information

A 3D Conductive Network of Porous Carbon Nanoparticles Interconnected with Carbon Nanotubes as Sulfur Host for Long Cycle Life Lithium-Sulfur Batteries

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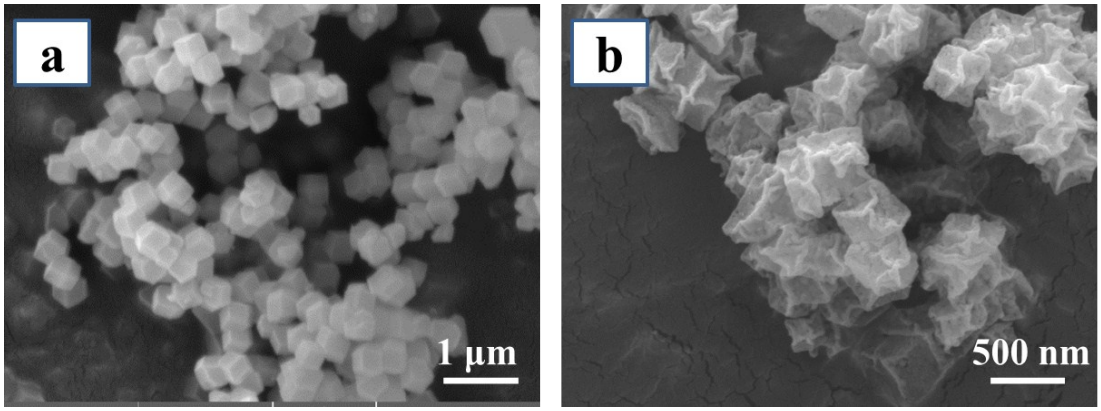

Fig. S1 SEM images of (a) ZIF-67 precursor and (b) Co-NC framework.

Tab. S1 The relative contents of Co, C and N (at%, wt%) in CNTs/Co-NC, Co-NC and NC composites.

Sample	Co	C	N
CNTs/Co-NC	5.62 (at%)	82.90 (at%)	11.48 (at%)
	22.30(wt%)	66.89(wt%)	10.81(wt%)
Co-NC	5.95(at%)	80.38 (at%)	13.68 (at%)
	23.29(wt%)	64.00(wt%)	12.71(wt%)
NC		85.46(at%)	14.54(at%)
		83.34(wt%)	16.66(wt%)

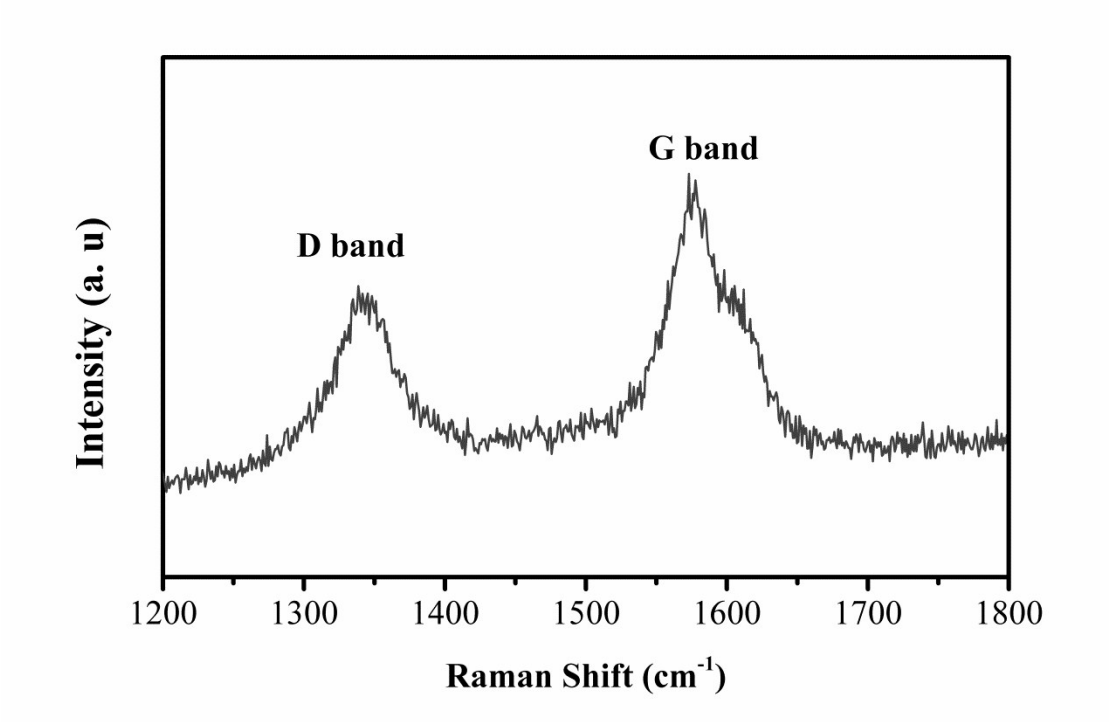

Fig. S2 Raman spectrum of CNTs/Co-NC composite.

Tab. S2 BET surface area, average pore diameter and pore volume dates of samples.

Samples	BET Surface Area /m^2 g^{-1}	Average Pore Diameter /nm	Pore（>2nm）volume /cm^3 g^{-1}	Micropore volume /cm^3 g^{-1}
ZIF-67	1481.22	1.9584	0.7252	0.6902
CNTs/ZIF-67	852.50	2.3954	0.5261	0.4026
Co-NC	308.14	6.2371	0.4035	0.1034
CNTs/Co-NC	159.13	8.7726	0.9876	0.0500
S@CNTs/Co-NC	21.82	4.8736	0.2800	0.0083

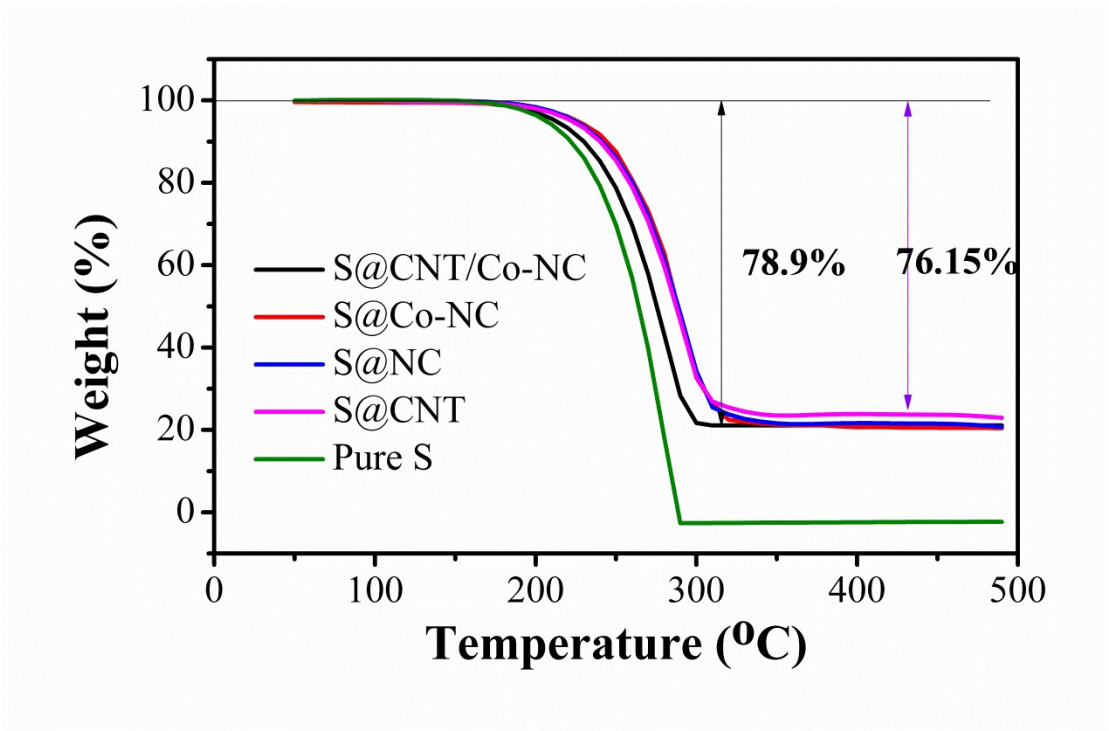

Fig. S3 TGA curves of S@CNTs/Co-NC, S@Co-NC, S@NC and S@CNTs.

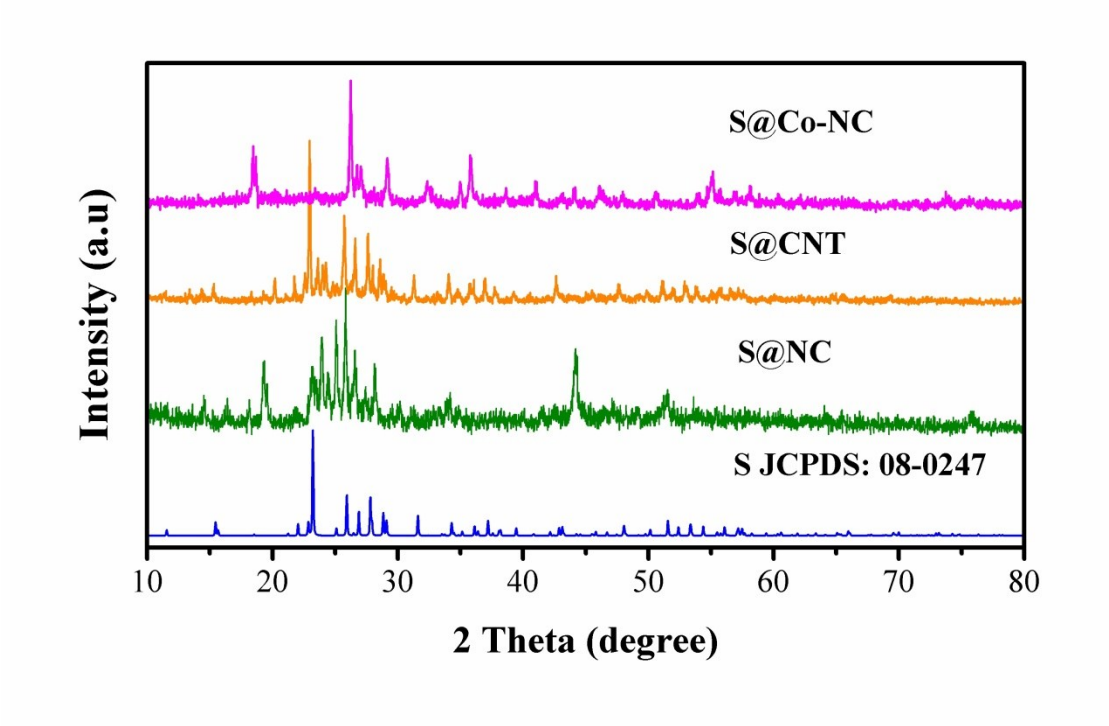

Fig. S4 XRD patterns of S@Co-NC, S@NC and S@CNTs.

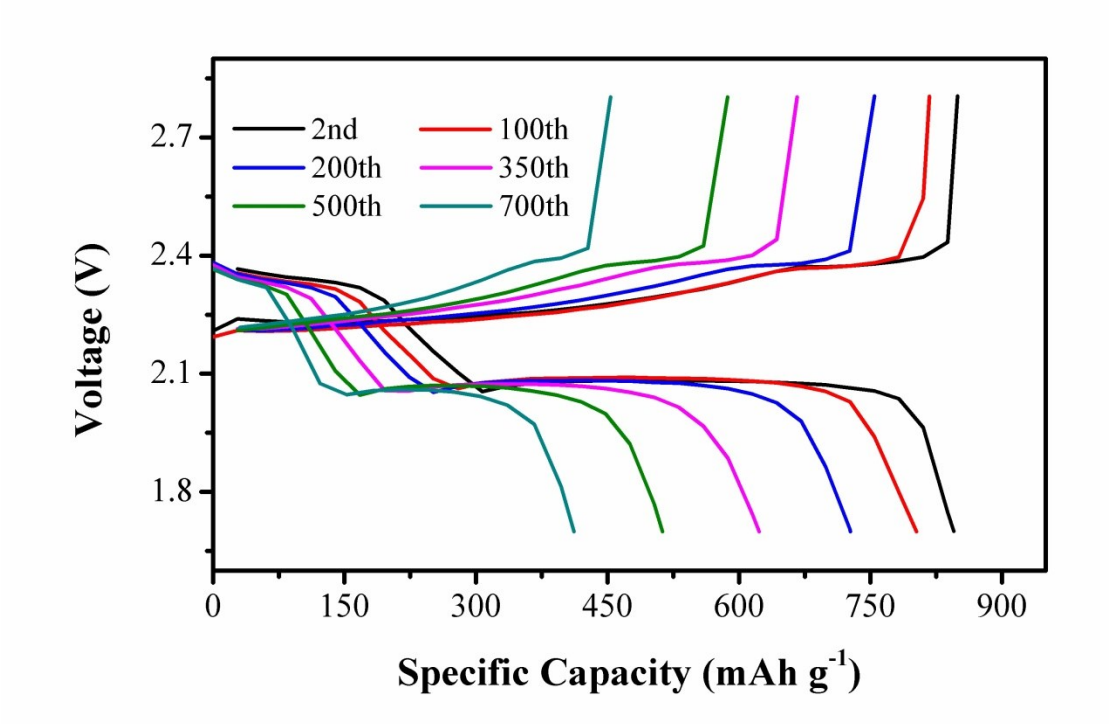

Fig. S5 Discharge/charge profiles of S@CNTs/Co-NC electrode at different cycles.

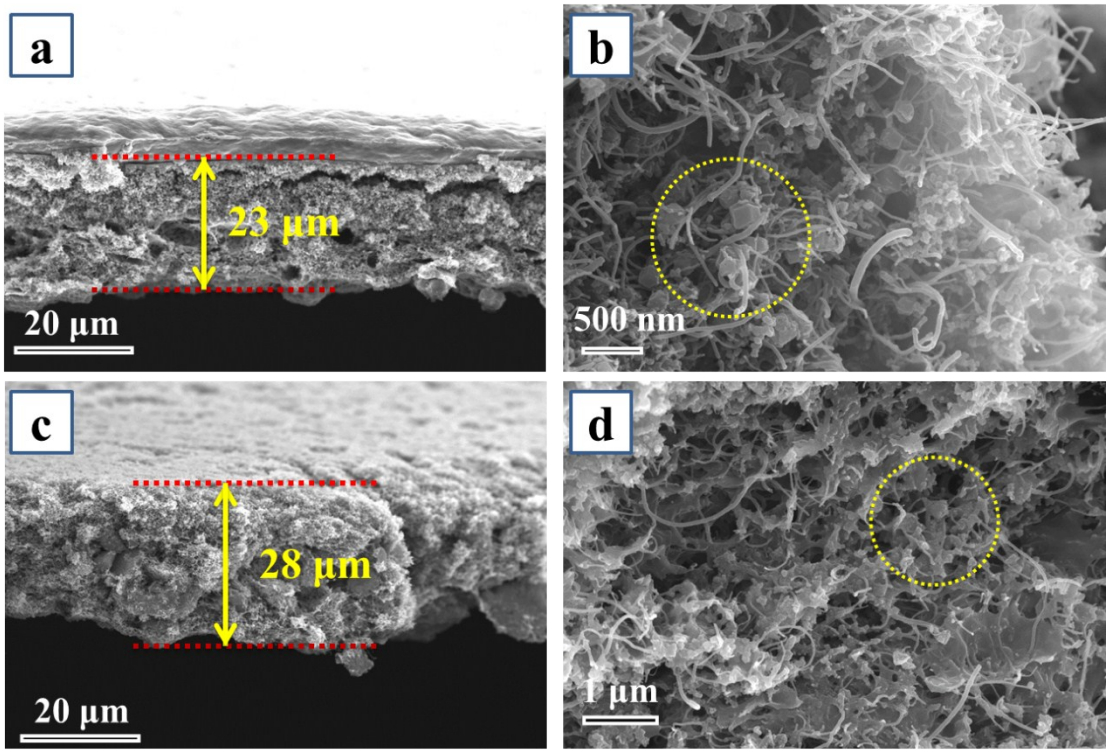

Figure S6 Typical SEM images of the cross-sections and the corresponding magnified sections of the S@CNTs/Co-NC electrode (a and b) before cycling and (c and d) after 500 cycles at o.5 C current density.

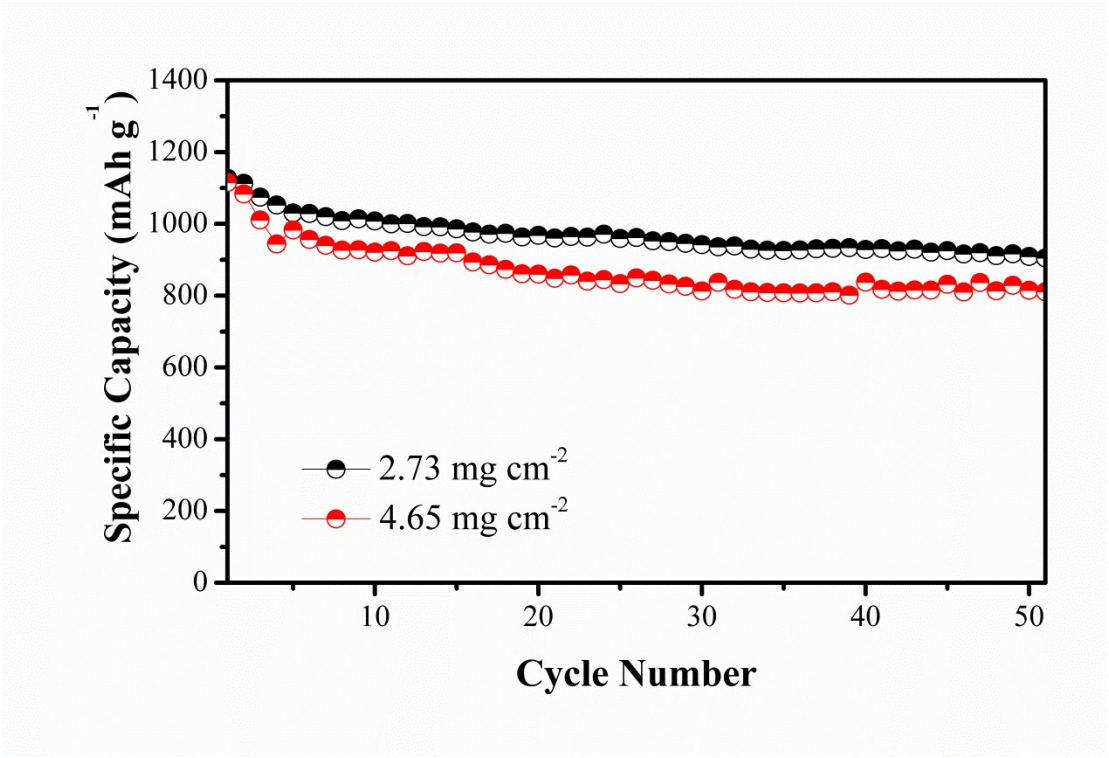

Figure S7. Cycle performances of S@CNTs/Co-NC electrodes with different area sulfur loadings.

Table S3 Comparison of the electrochemical performances among this work and the other similar structures reported in recent years.

Cathode Materials	Sulfur Content wt%	Sulfur Loading mg/cm^2	Rate	Initial Capacity (mAh/g)	Cycled Number	Decay Per Cycle	Ref.
S@CNTs/Co-NC	78.9	1.57	0.5 C	954.3	500	0.067 %	This work
	78.9	1.62	1.0 C	836.6	700	0.072 %	This work
	78.9	4.65	0.1 C	1115.3	50	0.54%	This work
S@Co-NCNT/NP	78	1.2	1.0 C	910	500	0.053 %	S1
S@Co-N-GC	70	1.24	0.2 C	1440	200	0.198 %	S2
H-S-C	57	0.80	1.0 C	832	500	0.088 %	S3
P-CNT/S-1	67.8	Not Provided	0.2 C	1191	200	0.124 %	S4
S@CNTs/Co_3S_4-NBs	70	3.5	1.0 C	954	500	0.042 %	S5
S-H-NCNT	79	3.52	0.5 C	979	200	0.115 %	S6
PC/CNT	74.4	1.32	0.5 C	1123.9	200	0.193 %	S7
HPCC-S	65	1.0	1.0 C	714	250	0.139 %	S8
HCSs/S-LBL	65	0.9-1.1	0.6 C	850	200	0.162 %	S9
GSH@PC-S	77	Not Provided	1.0 C	914	150	0.187 %	S10

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