Electronic Supplementary Information (ESI) for

Phosphate functionalized CoS nanoparticles coupled with Fe_2O_3 nanocrystals decorated on N, S co-doped porous carbon spheres for advanced hybrid supercapacitors

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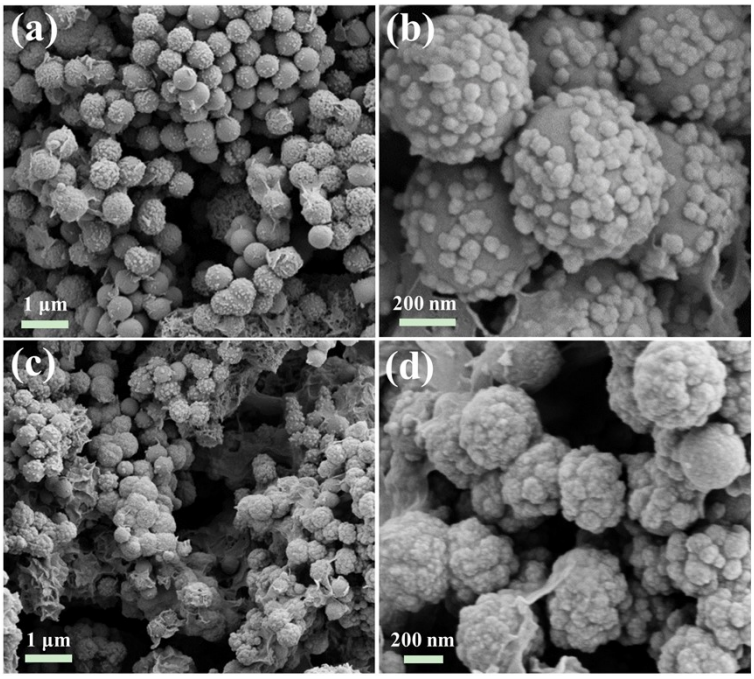

Fig. S1 SEM images of (a, b) NSC/CoS-1 and (c, d) NSC/CoS-3 composites.

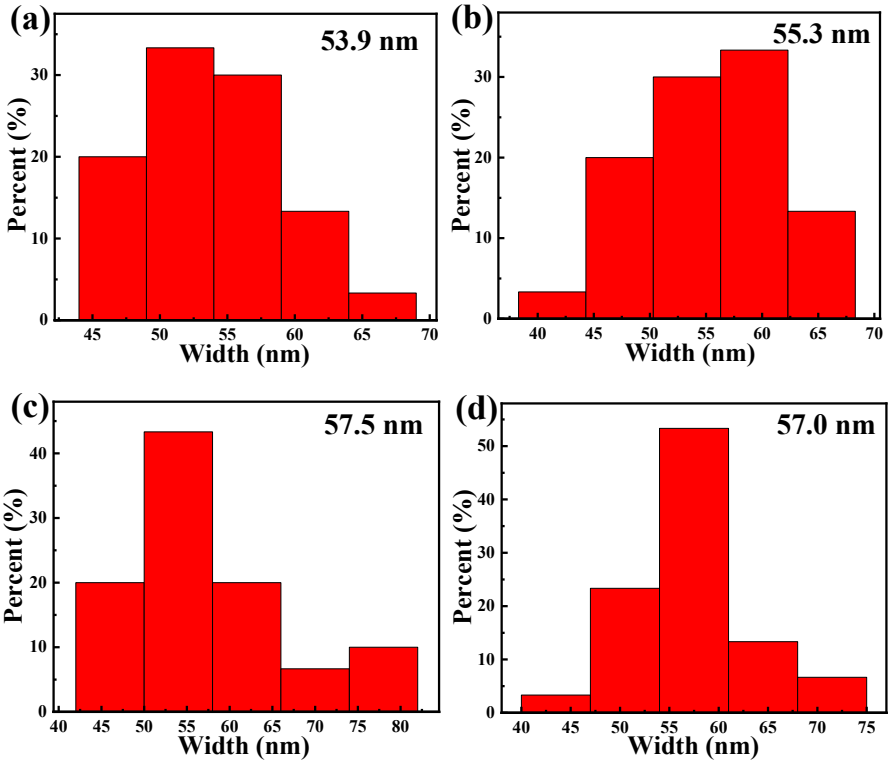

Fig. S2 The width distributions of (a) NSC/CoS-1, (b) NSC/CoS-2, (c) NSC/CoS-3, and (d) P-NSC/CoS-2.

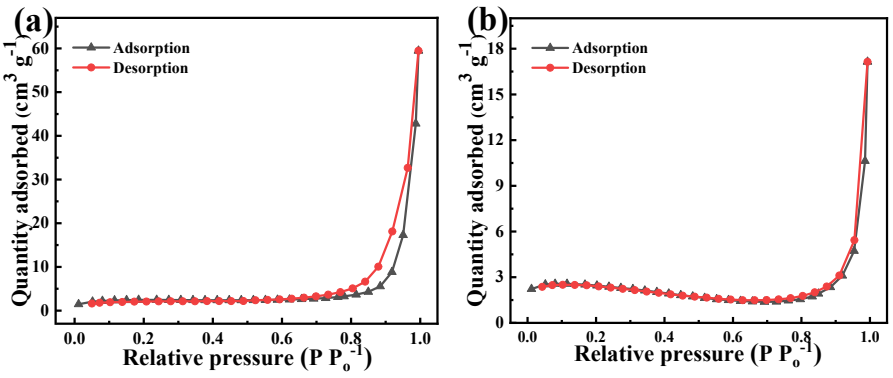

Fig. S3 (a) The nitrogen adsorption/desorption isotherms of P-NSC/CoS-2 and NSC/Fe_2O_3-2.

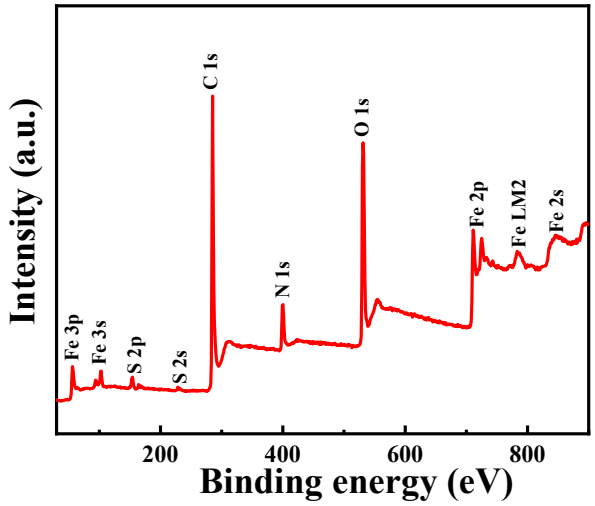

Fig. S4 XPS survey spectrum of the NSC/Fe_2O_3-2 composite.

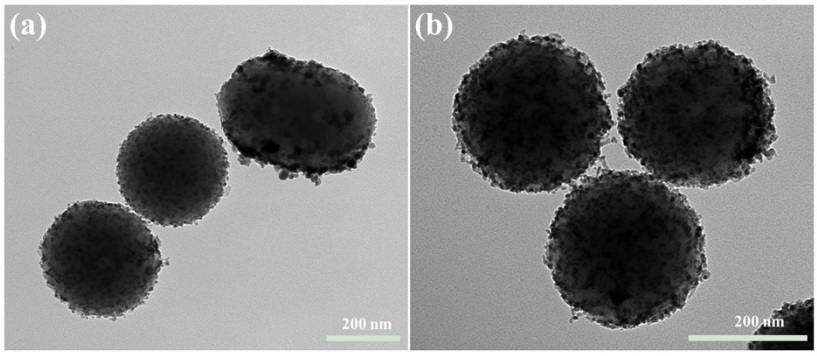

Fig. S5 TEM images of (a) NSC/Fe_2O_3-1 and (b) NSC/Fe_2O_3-3 composites.

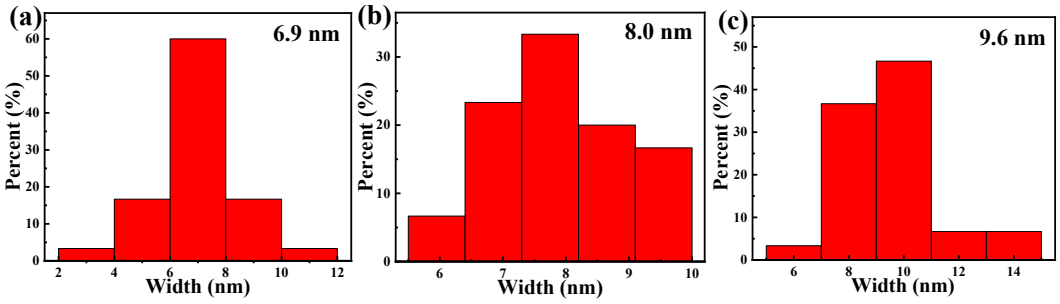

Fig. S6 The width distributions of (a) NSC/Fe_2O_3-1, (b) NSC/Fe_2O_3-2, and (c) NSC/Fe_2O_3-3.

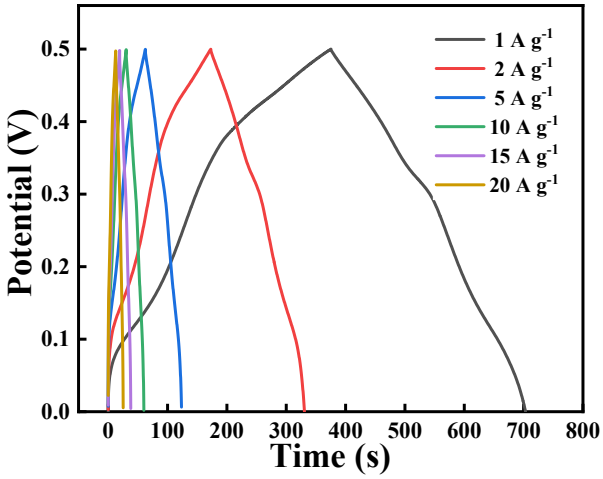

Fig. S7 GCD profiles of NSC/CoS-2 at 1-20 A g^{-1}.

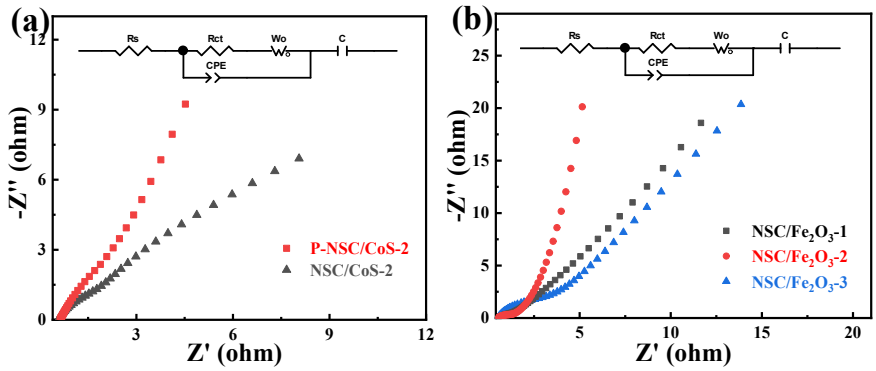

Fig. S8 Nyquist plots of the electrodes.

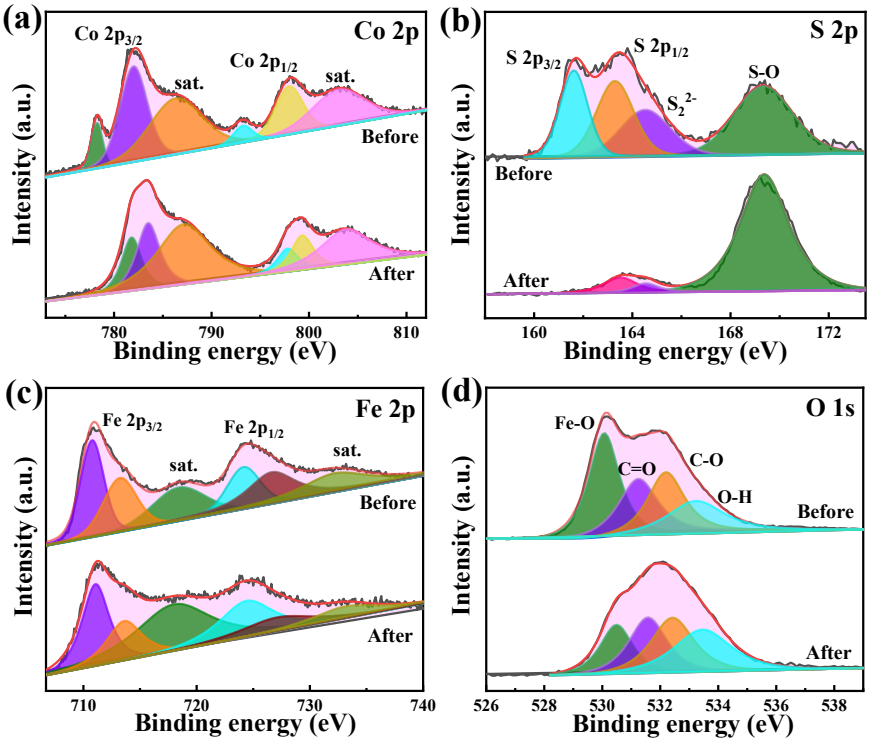

Fig. S9 (a) Co 2p and (b) S 2p of P-NSC/CoS-2 before and after the electrochemical tests; (c) Fe 2p and (d) O 1s of NSC/Fe_2O_3-2 before and after the electrochemical tests.

Table S1 A comparison of the P-NSC/CoS-2//NSC/Fe_2O_3-2 hybrid supercapacitor with those of advanced supercapacitors recently reported.

Supercapacitor devices	Energy density (Wh kg^{-1})	Power density (W kg^{-1})	Cyclic stability	Ref.
CoP-CoNC/CC//AC	39.2	1962	86.5%, 5 A g^{-1}	1
	30	9800	5000 cycles	
NiCoP@CoS/NF//AC	35.8	748.9	91.4%, 10 A g^{-1}	2
	28.5	7489.1	5000 cycles	
Zn-Co-O@CoS//NOPC	56.8	771.6	86.4%, 5 A g^{-1}	3
	22.2	7985.7	5000 cycles	
C, N-Co_xS_y/CNF//AC	37.29	813.6	90.5%, 10 A g^{-1}	4
	29	9546	5000 cycles	
MnO_{2-x}@CoS//NOPC	34.72	597.24	89.6%, 4 A g^{-1}	5
	12.73	5950	9000 cycles	
CoS@CC//RGO	38	533	—	6
	24	5333	5000 cycles	
Fe-Co-S/NF//RGO	43.6	770	89.6%, 5 A g^{-1}	7
	13.3	5510	5000 cycles	
FG-CoS//FG-CoS	35.2	250	117%, 200 mV s^{-1}	8
	16.82	1250	1000 cycles	
Co-Zn-S@CuO-CF//Fe-S/GO-NF	25.71	404	80%, 1.05 A g^{-1}	9
	8	8730	4500 cycles	
Co_3O_4/NiO/rGO//Fe_2O_3/RGO	37.83	750	86.9%, 1 A g^{-1}	10
	—	—	6000 cycles	
P-NSC/CoS-2//NSC/Fe_2O_3-2	64.3	873.6	94.2%, 5 A g^{-1}	This
	33.3	16216.2	10000 cycles	work

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