Supporting information

In-situ Incorporation of FeS Nanoparticles/Carbon Nanosheets Composite with An Interconnected Porous Structure as A High-Performance Anode for Lithium Ion Batteries

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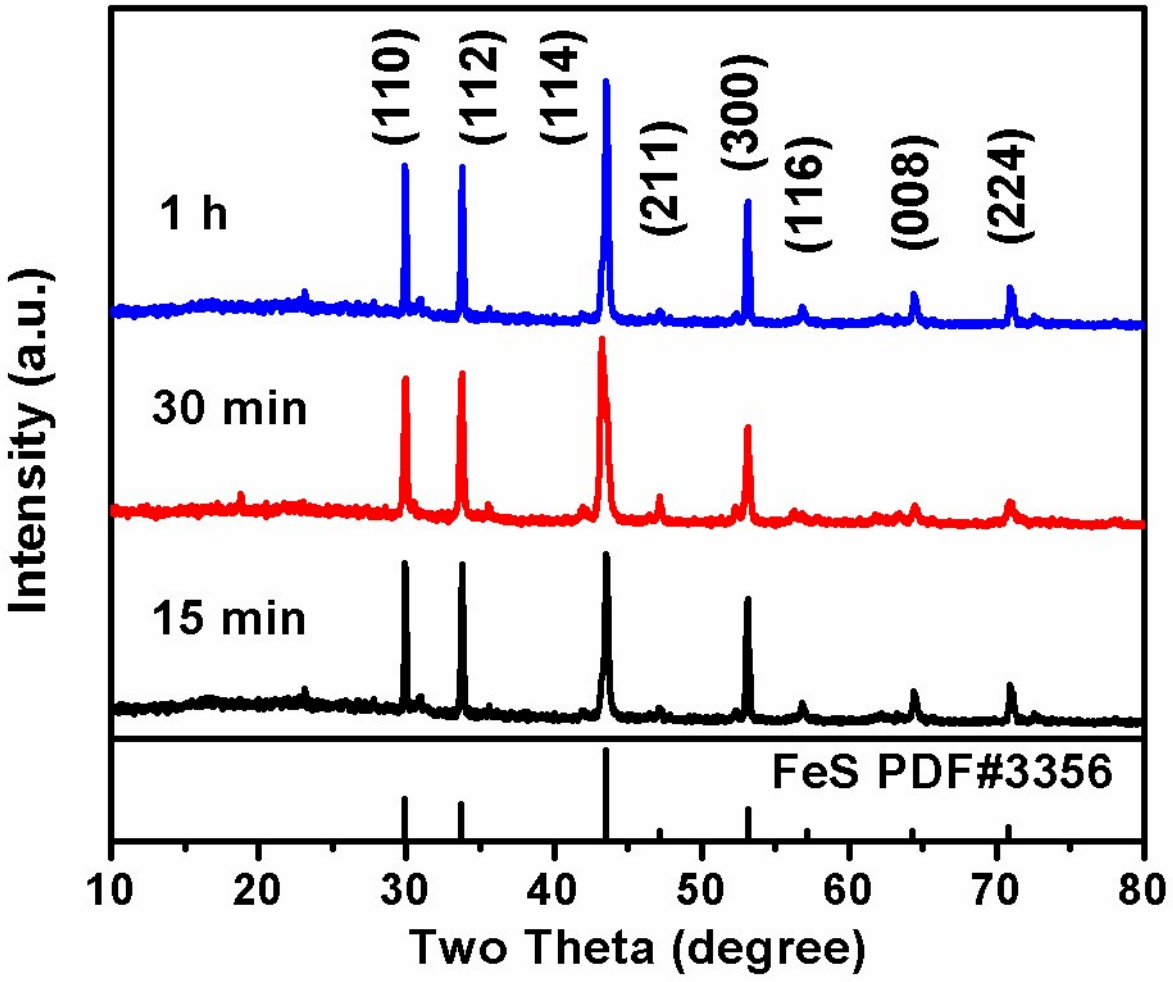


Fig. S1 XRD patterns of FeS@CNS samples with different anneal times.

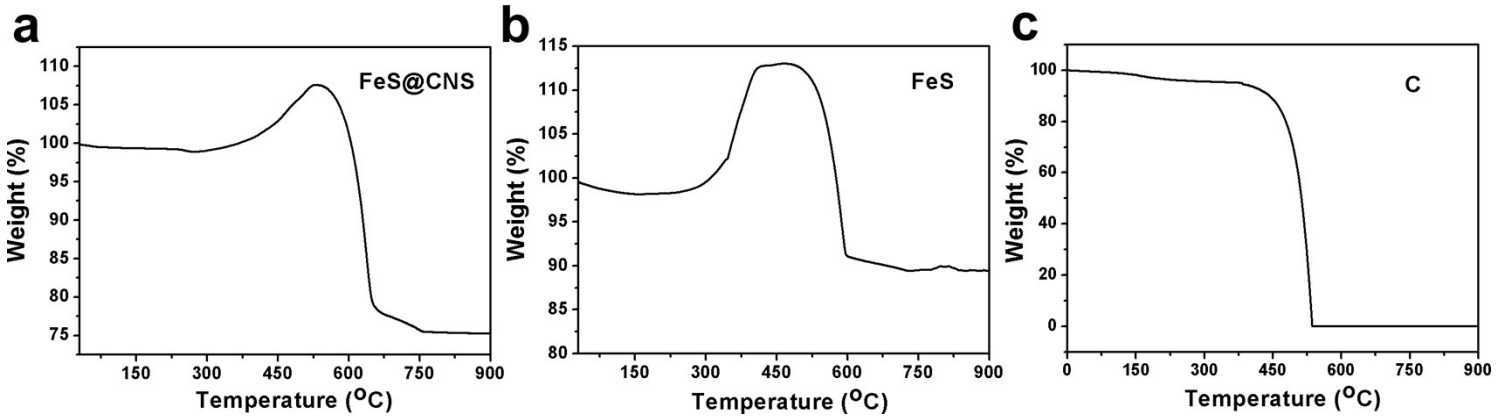


Fig. S2 TGA curves of FeS@CNS, FeS and C

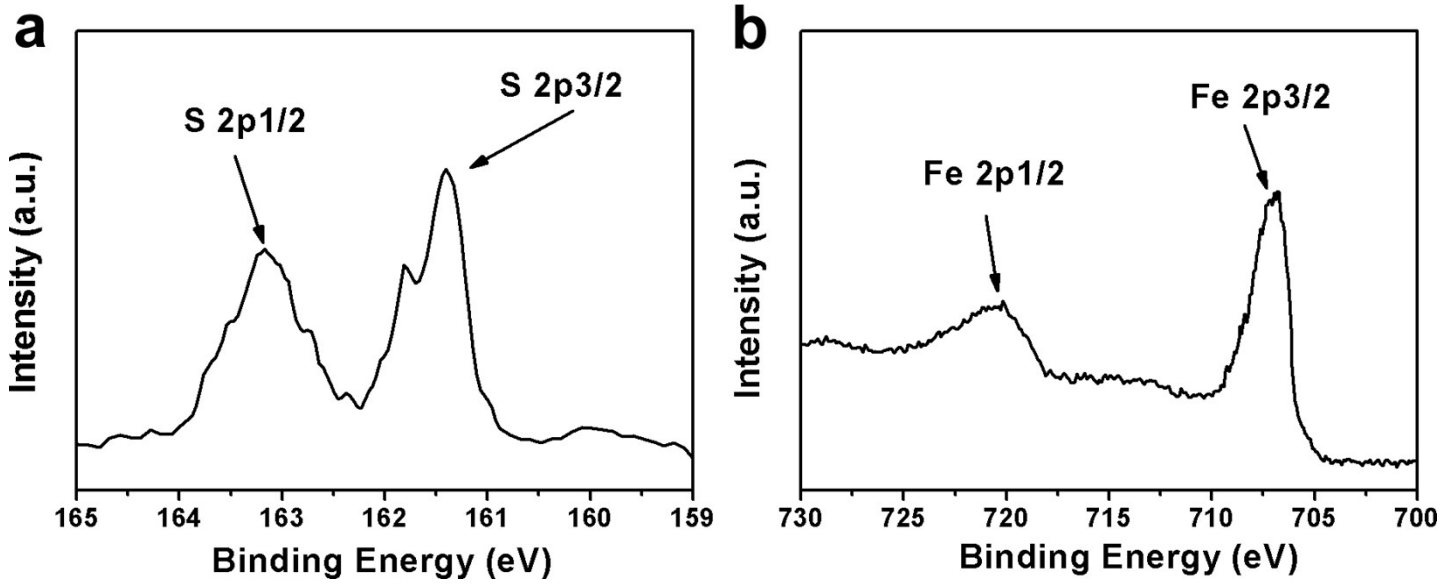


Fig. S3 XPS spectra for the FeS@CNS nanostructure: (a) S 2p, (b) Fe 2p spectra.

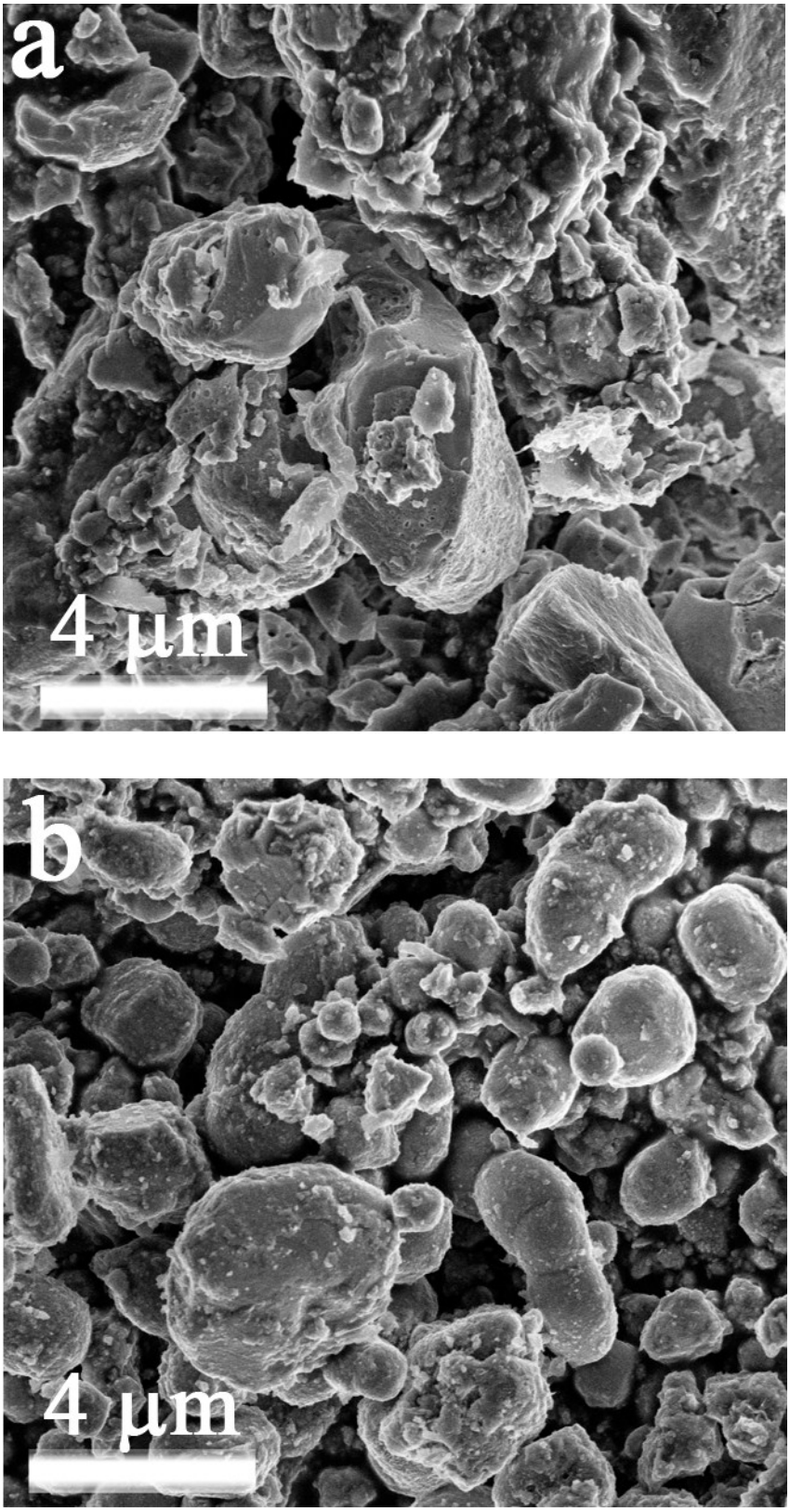


Fig. S4 SEM images of FeS (a) and FeS/C (b).

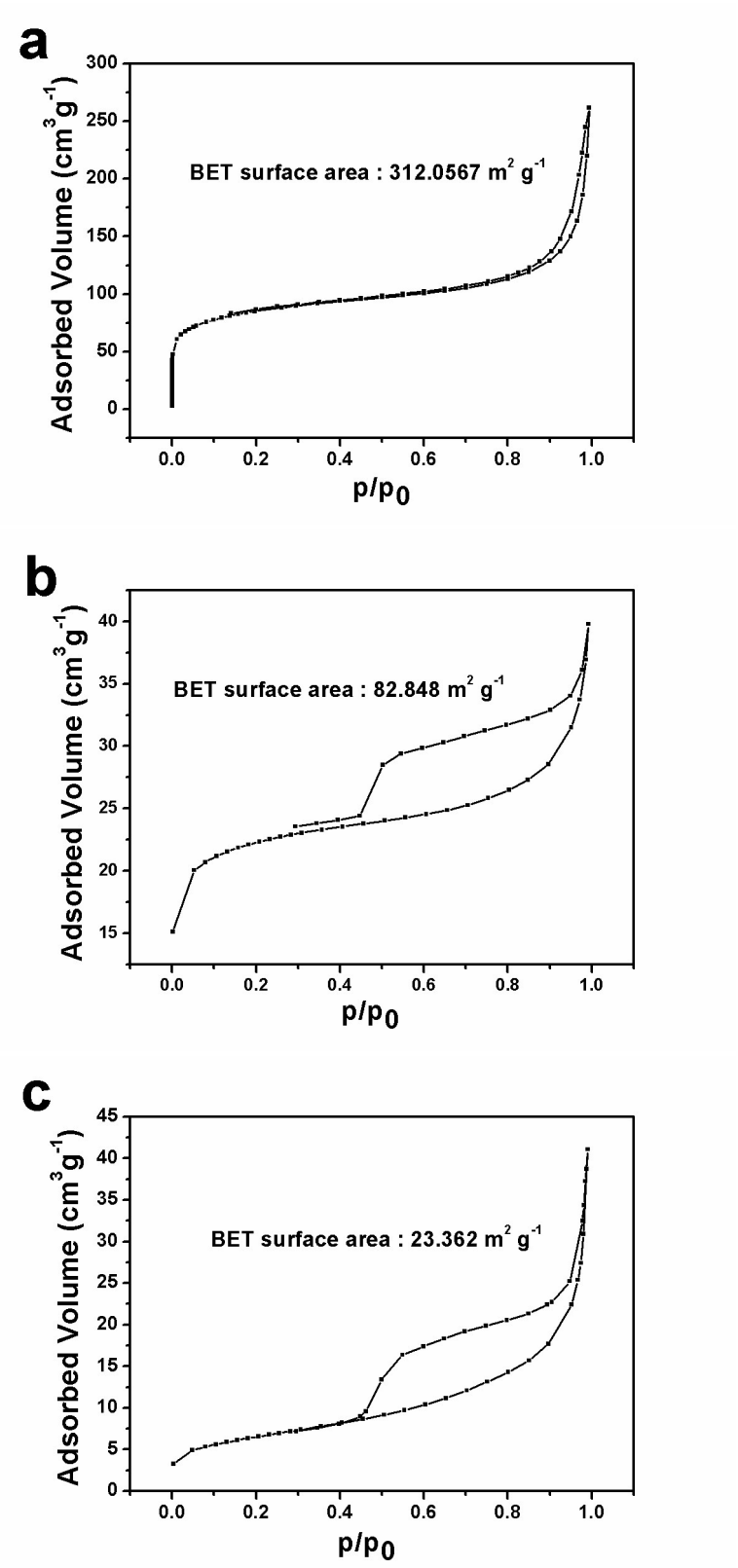


Fig. S5 Nitrogen adsorption-desorption isotherms of FeS@CNS (a), FeS/C (b) and FeS (c).

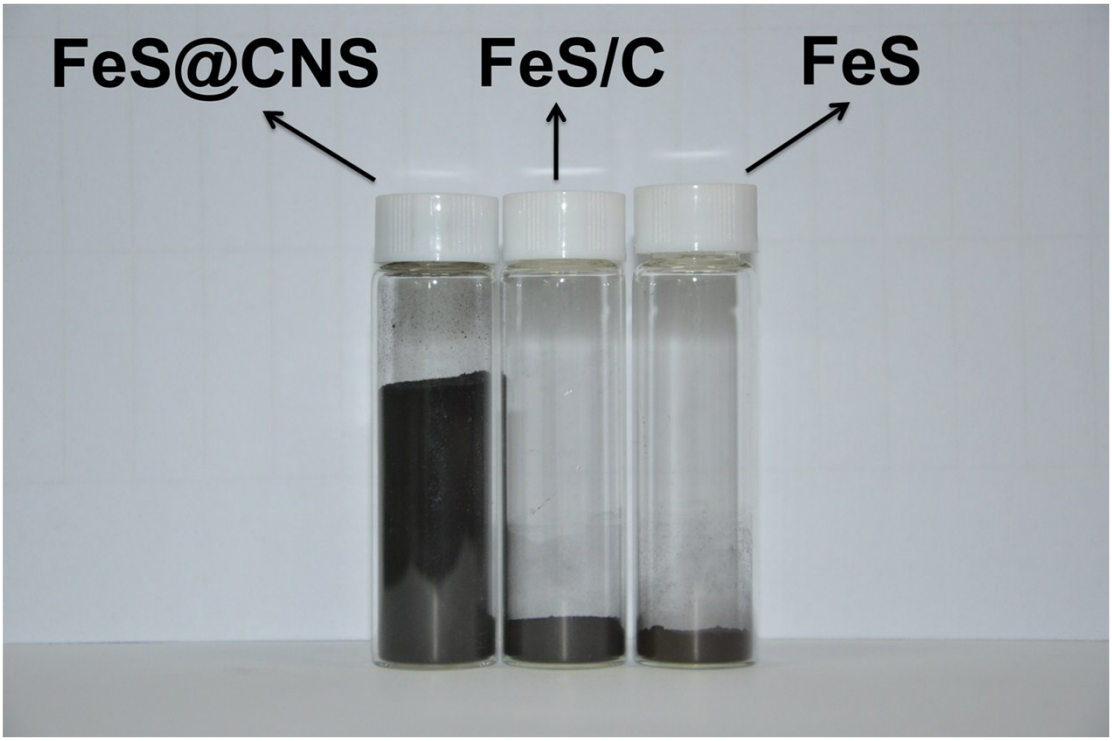


Fig. S6 Digital photo of different samples with equal weight (500 mg).

Table S1 Comparison of the electrochemical performance of FeS@CNS with previous reported FeS-based materials.

Materials	Cycling stability			Rate capability		Reference
	Current density	Cycling number	Capability	Current density	Capability	
FeS@CNS	1 A g^{-1}	150 cycles	703 mA h g^{-1}	5 A g^{-1}	532 mA h g^{-1}	This work
FeS @ carbon nanowires	0.5 C	50 cycles	400 mA h g^{-1}	10 C	322 mA h g^{-1}	1
FeS microsheet	0.1 A g^{-1}	20 cycles	677 mA h g^{-1}	2 A g^{-1}	150 mA h g^{-1}	2
FeS microcrystals				3 mA cm^{-1}	285 mA h g^{-1}	3
FeS@C/Carbon cloth	0.15 C	100 cycles	420 mA h g^{-1}	7.5 C	370 mA h g^{-1}	4
	1.2 C	200 cycles	300 mA h g^{-1}			
FeS thin film	0.25 C	60 cycles	532 mA h g^{-1}			5
FeS @ TiO_2	0.8 A g^{-1}	100 cycles	355 mA h g^{-1}	4 A g^{-1}	160 mA h g^{-1}	6
	0.4 A g^{-1}	500 cycles	430 mA h g^{-1}			
FeS @ RGO	0.1 A g^{-1}	40 cycles	978 mA h g^{-1}	1 A g^{-1}	200 mA h g^{-1}	7
FeS @ Ag	0.1-0.2 C	55 cycles	421.7 mA h g^{-1}			8
C @ FeS	0.1 A g^{-1}	100 cycles	615 mA h g^{-1}	6 A g^{-1}	266 mA h g^{-1}	9

FeS @ carbon microsphere	1 A g^{-1}	50 cycles	734 mA h g^{-1}			10
	5 A g^{-1}		541 mA h g^{-1}			

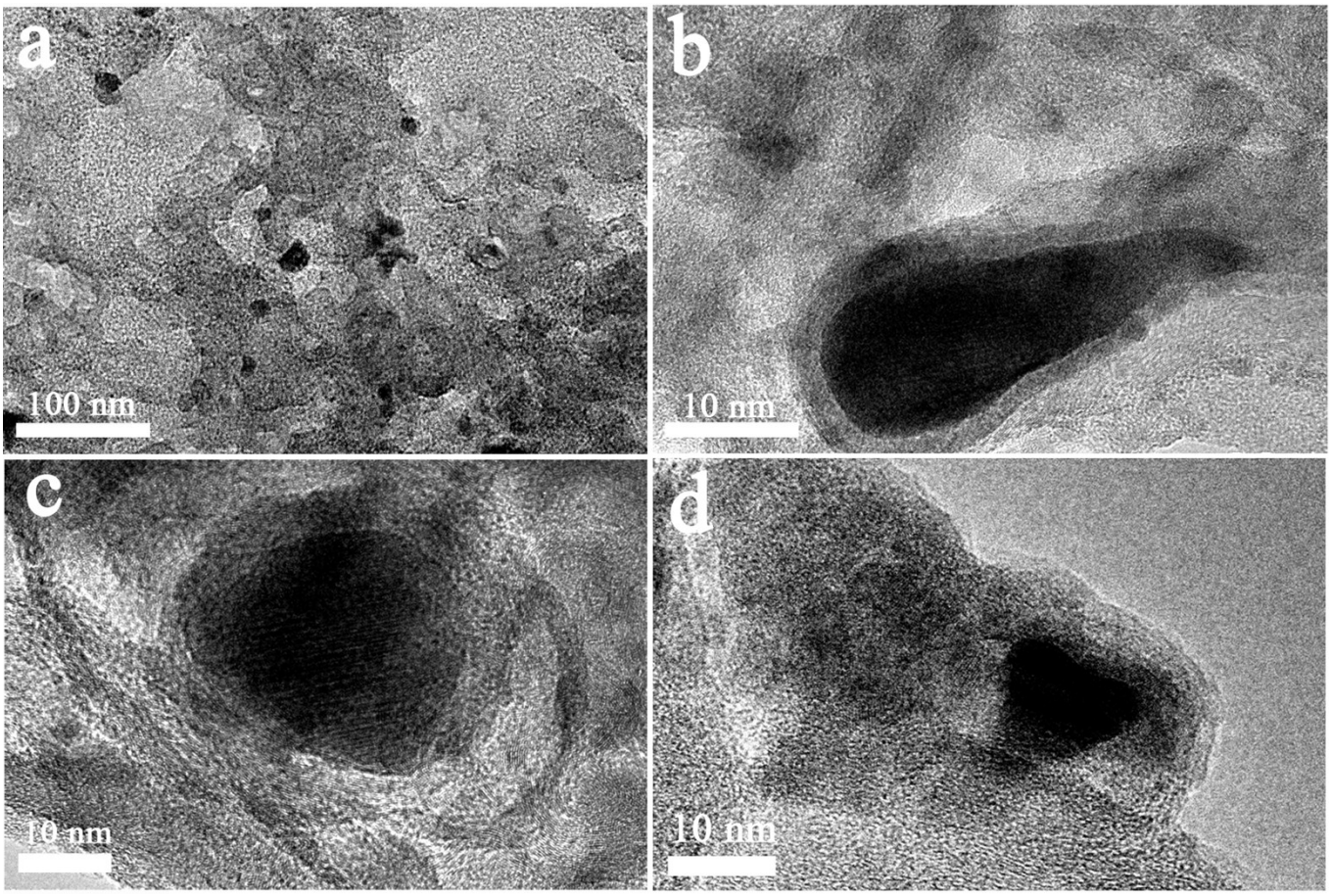


Fig. S7 (a,b) TEM images of FeS@CNS after 150 cycles at 1 A g^{-1}.

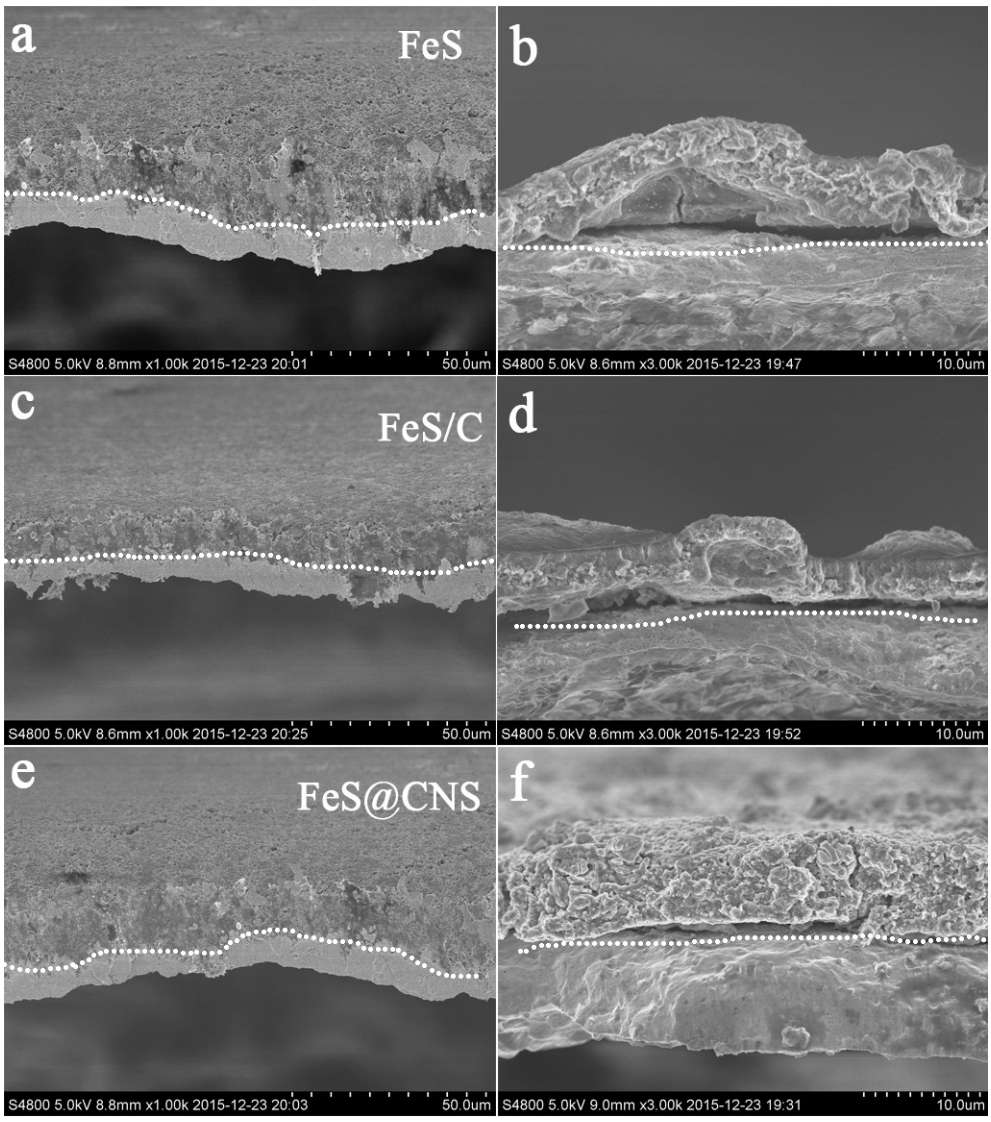
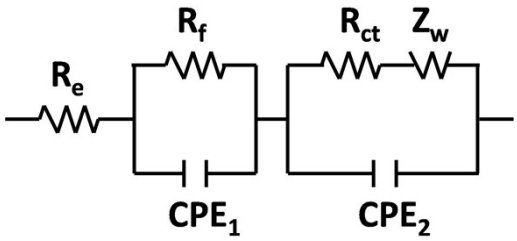


Fig. S8 SEM images of FeS (a, b) , FeS/C (c, d) and FeS@CNS (e, f) active materials before and after cycling test.

Table S2 Equivalent circuit model and corresponding fitted parameters for FeS@CNS, FeS/C and FeS electrodes.

Equivalent circuit	Sample	R_f/Ω	R_{ct}/Ω
	FeS@CNS	16.9	36.4
	FeS/C	23.6	68.1
	FeS	30.8	84.5

References

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