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Supplementary Information

A Green and Facile Strategy for the Low-Temperature Rapid Synthesis of Li_2S@PC-CNT Cathodes with High Li_2S Content in Advanced Li-S Batteries

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1. Figures

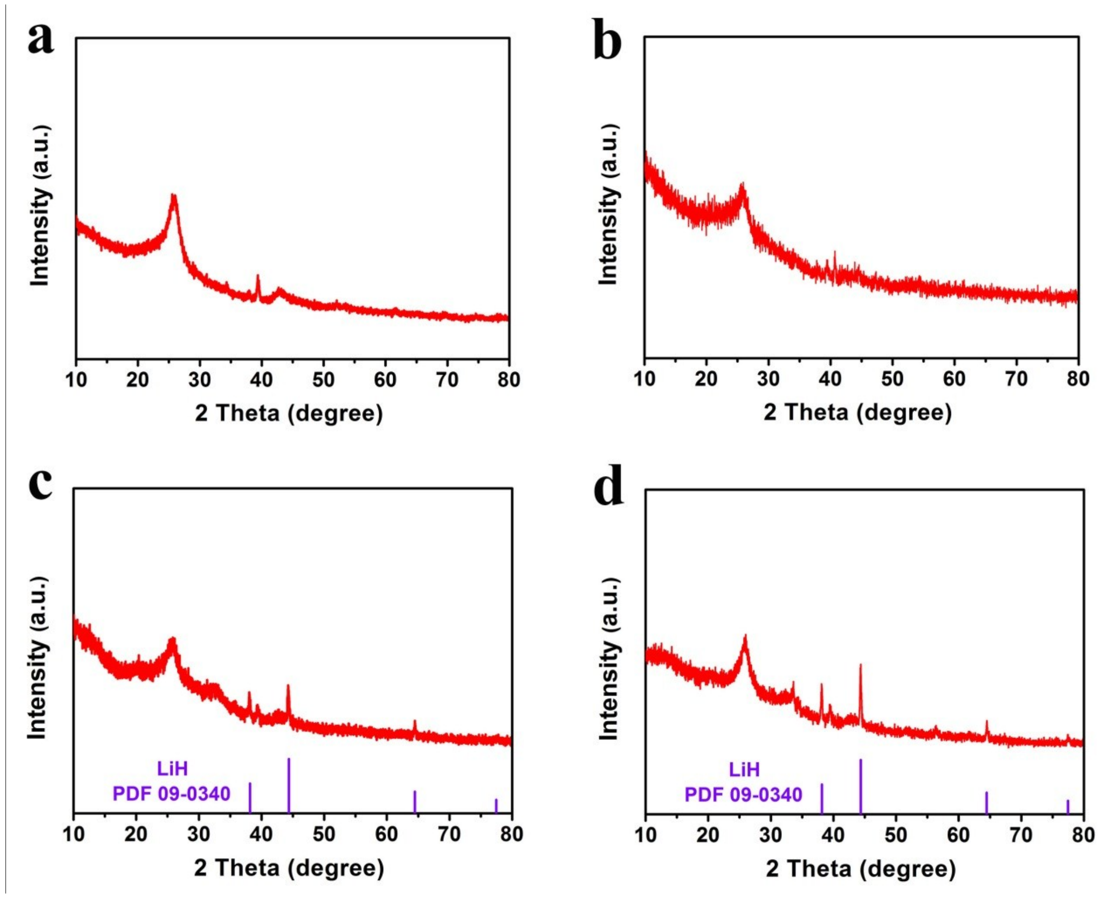

Fig. S1. XRD patterns of (a) CNT, (b) the solid residue of CNT–CS_2 mixture after heating to 330 ^{o}C, (c) the mixture of CNT–LiH, (d) the product of CNT–LiH after heating to 330 ^{o}C.

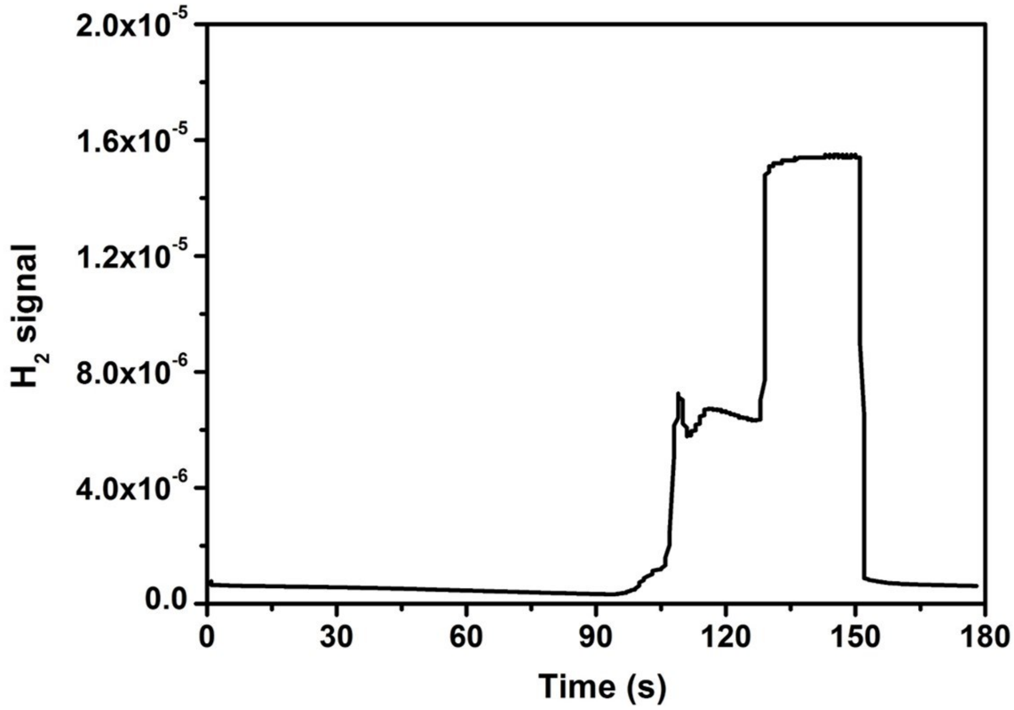

Fig. S2. Hydrogen signal of the gaseous products generated from the reaction between LiH and CS_2.

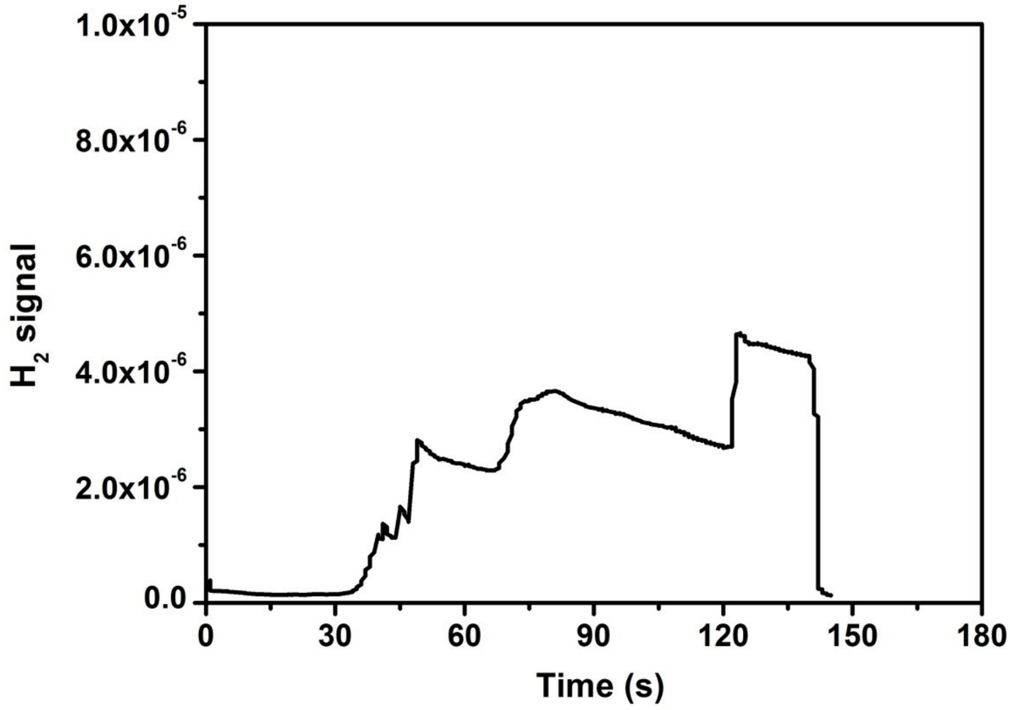

Fig. S3. Hydrogen signal of the gaseous products generated from the reaction between LiH–CNT mixture and CS_2.

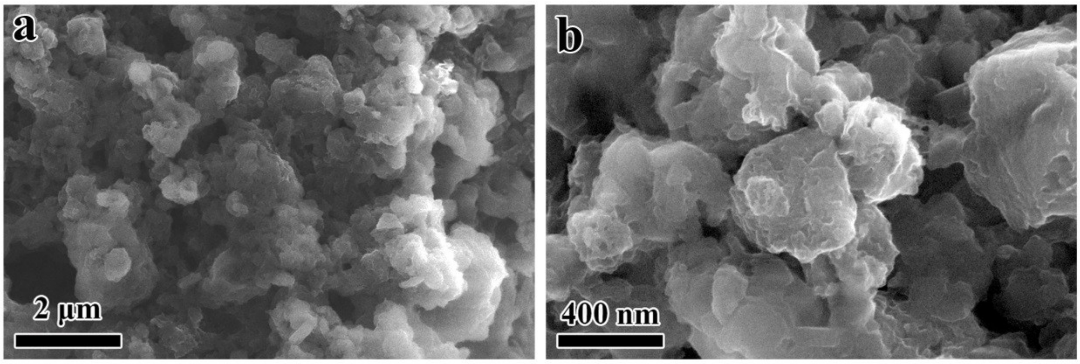

Fig. S4. FESEM images of Li_2S@PC composites. (a) low−magnification image; (b) High−magnification image.

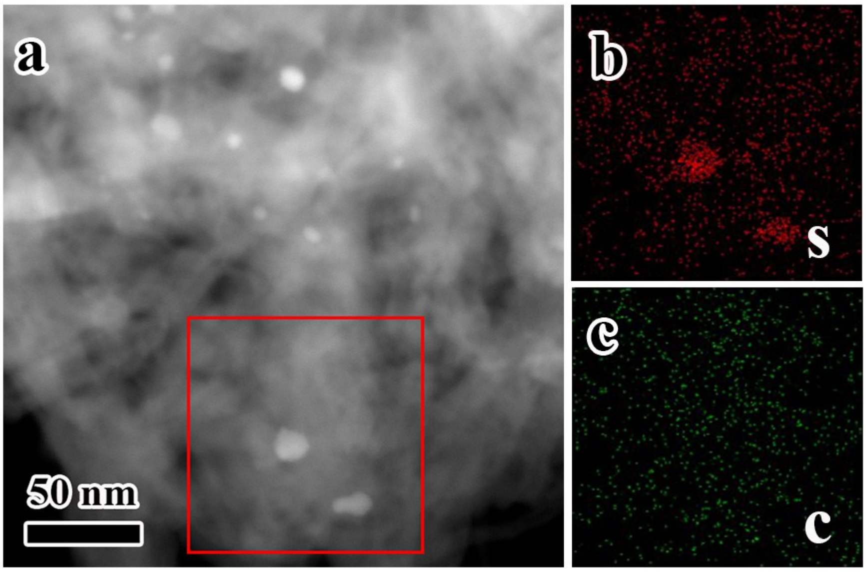

Fig. S5 (a) STEM images of Li_2S@PC–CNT. (b–c) EDS sulfur and carbon mapping of the square denoted in (a).

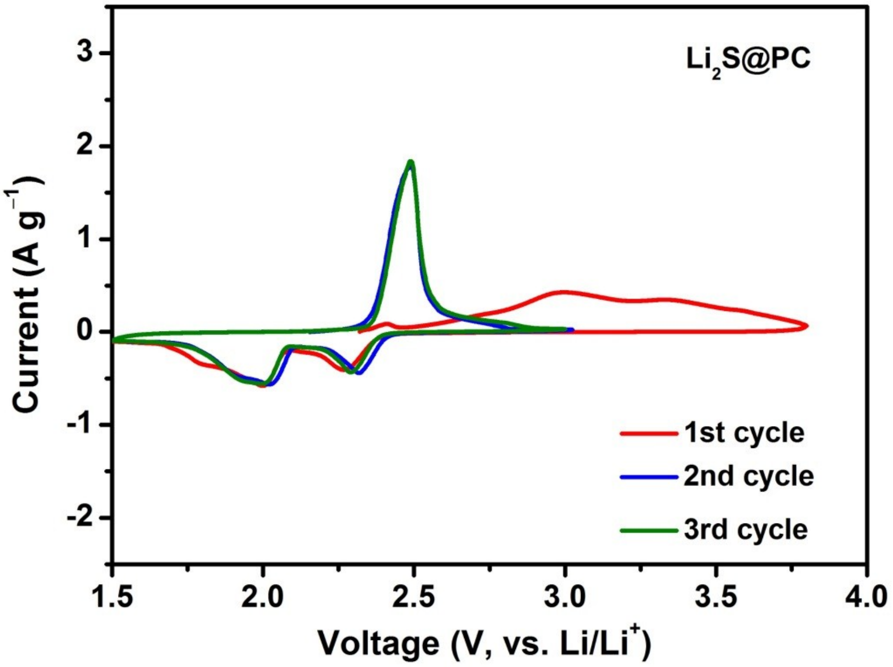

Fig. S6. CV curves of Li_2S@PC electrode.

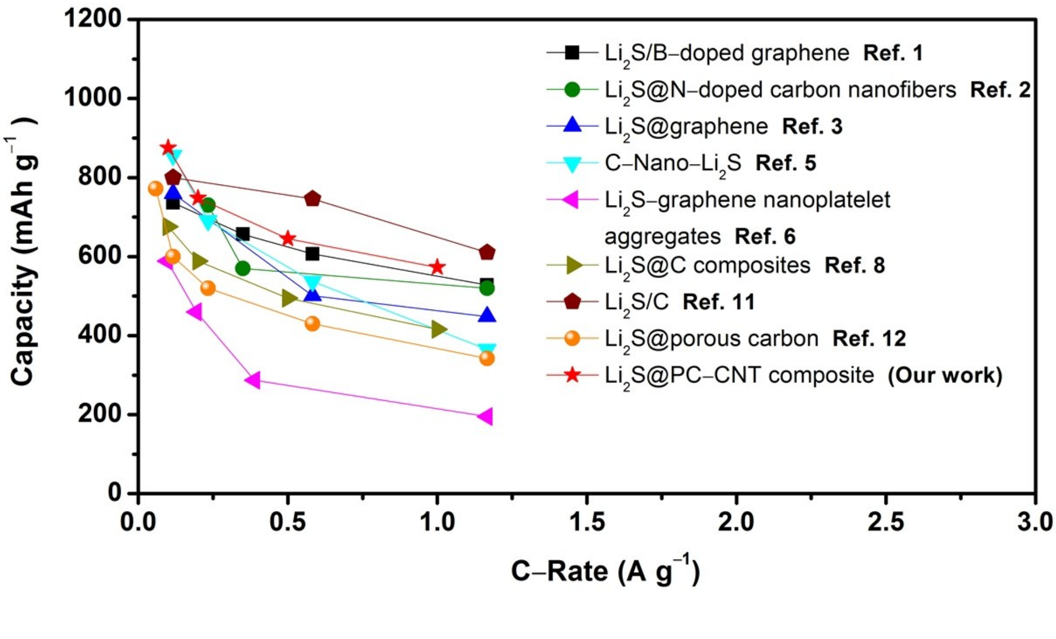

Fig. S7. Rate capability of Li_2S@PC–CNT and other Li_2S−carbon electrodes.

2. Tables

Table S1. Weight percent of elements in Li_2S, Li_2S@PC and Li_2S@PC–CNT.

Sample	C (wt.%)	H (wt.%)	S (wt.%)	Li (wt.%)
Li_2S	0.1	0.4	69.5	30.0
Li_2S@PC	11.3	0.4	61.6	26.7
Li_2S@PC−CNT	31.5	0.3	47.6	20.6

Table S2. The values of standard enthalpy of the formation for related compounds from the elements

Related compounds	LiH (s)	Li_2S (s)	CS_2 (g)	H_2	C
Standard enthalpy of formation (kJ mol^{-1})	–90.5	−441.4	116.7	0	0

Table S3. Comparison of the electrochemical performance of various Li_2S−carbon cathodes for lithium−sulfur batteries.

Li_2S−carbon electrodes	Current Density (mA g^{-1})	Capacity (mAh g^{-1}) @ cycles number	Component content on current collector (wt %)		mass loading	Ref.
			Li_2S	Total carbon		
Li_2S/N−doped graphene Li_2S/B−doped graphene	583	403@300 357@300	55−50	44.6−49.5 39.9−44.3	2 mg cm^{-2} (Li_2S)	1
Li_2S@N−doped carbon nanofibers	233.2	598@50	50.6	47	3 mg cm^{-2}	2
Li_2S@graphene Li_2S@Ni−P@ graphene Li_2S@Ni−S@ graphene Li_2S@Ni−P−S@ graphene	583	256@300 490@300 425@300 540@300	36.4	38.2	2 mg cm^{-2} (Li_2S)	3
MWCNT (20wt.%)−linked Li_2S	583	501@100	40	45	1 mg cm^{-2}	4
C−Nano−Li_2S	116.6	648@50	54.2	35.8	2.5–3 mg cm^{-2}	5
Li_2S–graphene nanoplatelet aggregates	97.2	508@40	60	30	0.5 mg cm^{-2}	6
Li_2S/GO@C	233.2	683@50	60	35	0.7–0.9 mg cm^{-2} (Li_2S)	7
Li_2S@C composites	100	433@200	46.5	43.5	1 mg cm^{-2}	8
Li_2S/N,P–C	583	520@100	62	33.3	2 mg cm^{-2} (Li_2S)	9
Li_2S@graphene nanocapsules	160	530@200	80	15	2 mg cm^{-2}	10
Li_2S/C	116.6	570@200	55.5	34.5	3.3–3.5 mg cm^{-2} (Li_2S)	11
Li_2S@porous carbon	1166	252@200	56	34	1.0 mg cm^{-2} (Li_2S)	12
Li_2S@PC–CNT	500 500	502@300 504@100	58.2	31.8	1.3 mg cm^{-2} 7.5 mg cm^{-2}	our work
Li_2S@PC	500 500	320@300 358@100	80.4	14.6	1.3 mg cm^{-2}	

3. Notes and references

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