Supporting Information

Micropores of Pure Nanographite Spheres for Long-Cycle and High-Rate Lithium-sulfur Batteries

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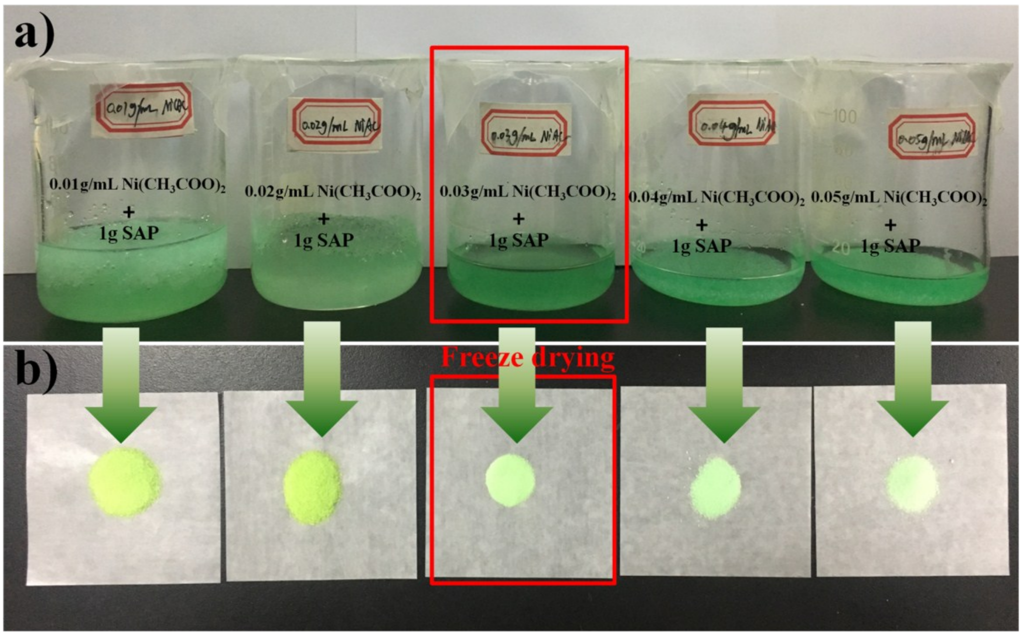

Figure S1. a) Photos of the hydrogels formed by adding nickel acetate solution of different concentration to SAP, b) photos of the freeze drying hydrogels before pyrolysis.

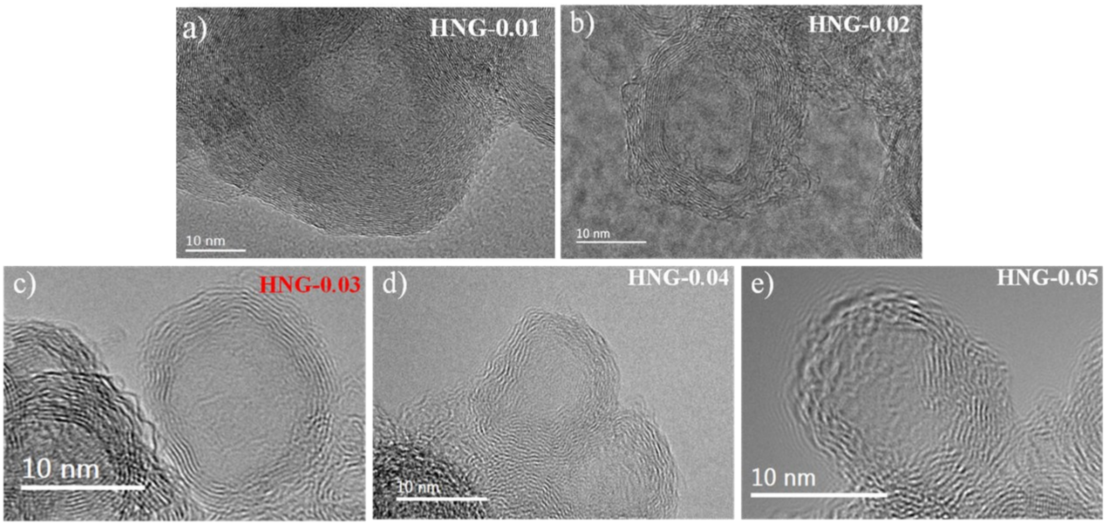

Figure S2. TEM images of HNG with different number of micropore. According to concentration of Ni in the precursor, a) HNG-0.01, HNG-0.02, HNG-0.03, HNG-0.04 and HNG-0.05.

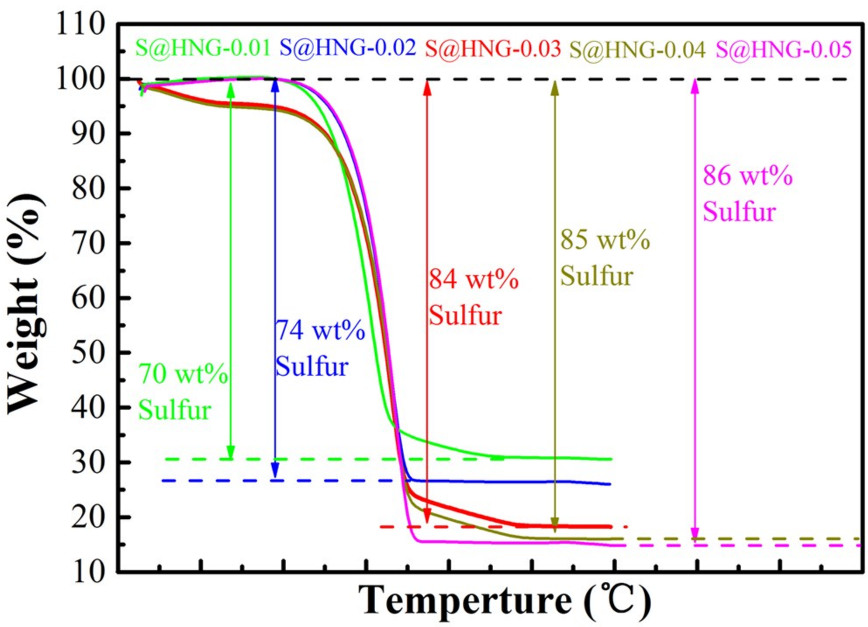

Figure S3. TG curves of S@HNG-0.01, S@HNG-0.02, S@HNG-0.03, S@HNG-0.04 and S@HNG-0.05

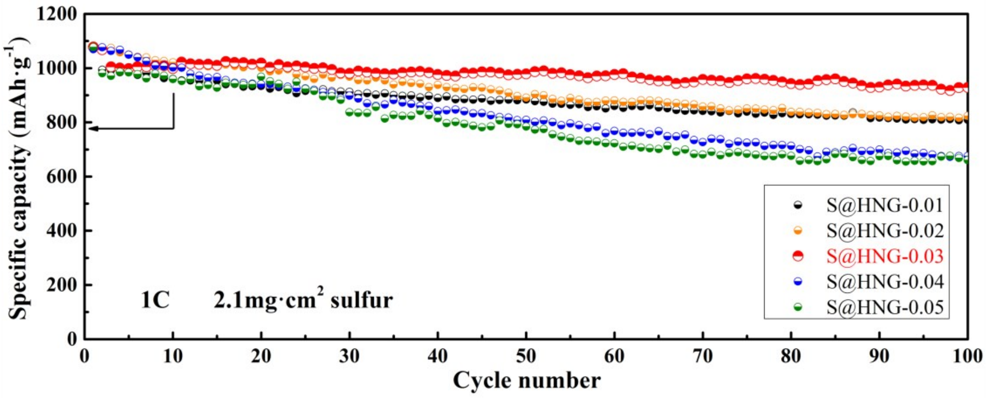

Figure S4. Cycling performance of S@HNG-0.01, S@HNG-0.02, S@HNG-0.03, S@HNG-0.04 and S@HNG-0.05 electrode at 1C over 100 cycles with 2.1mg cm^{-2} sulfur loading.

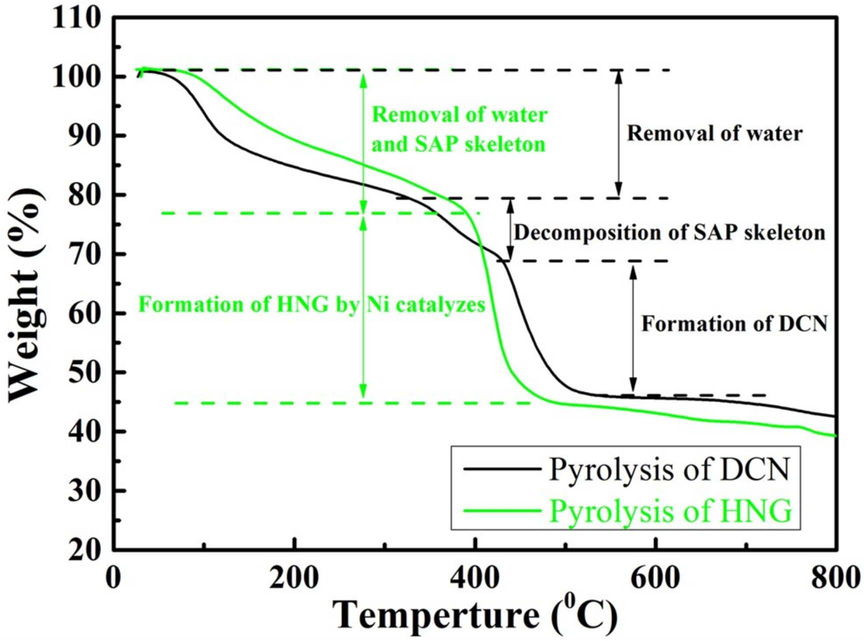

Figure S5. TG curves of the pyrolysis of DCN and HNG.

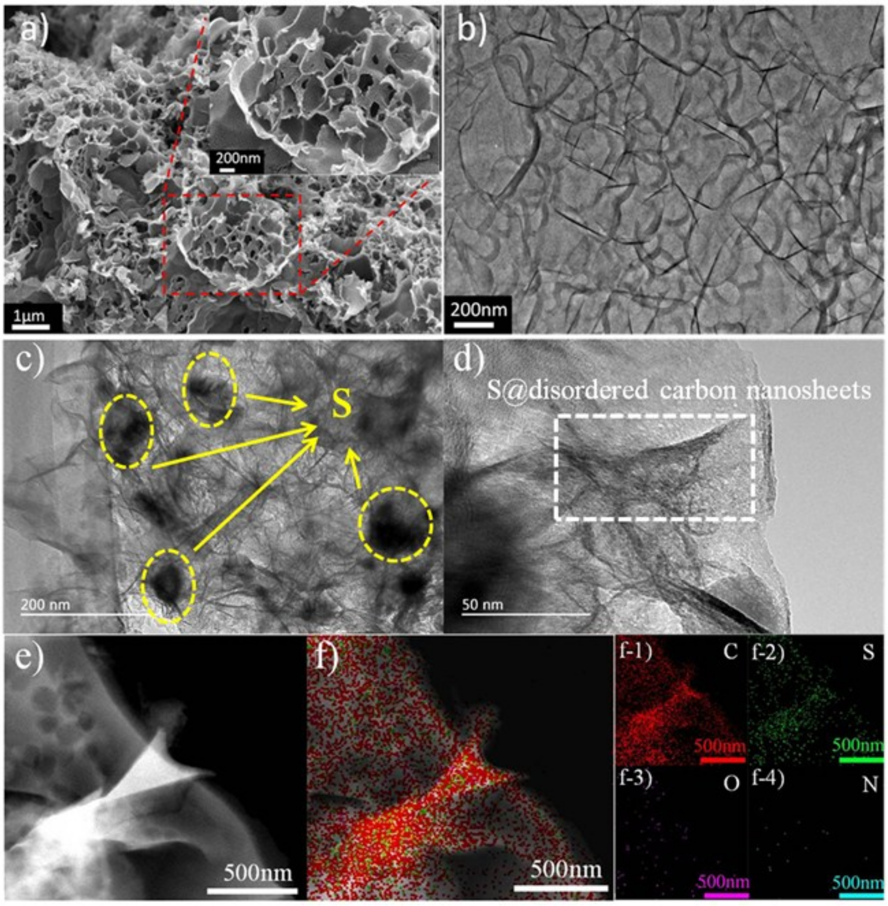

Figure S6. a) SEM image of DCN, b) TEM image of DCN, c) and d) TEM images of S@DCN, e) STEM image of S@DCN and f) corresponding EDS elemental mapping images of C, S, O and N.

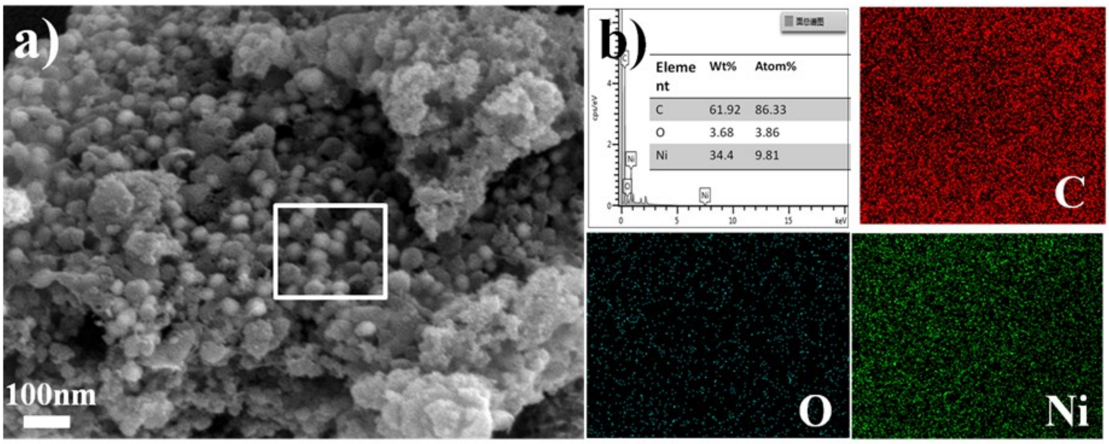

Figure S7. SEM images of Ni@HNG and the energy dispersive X-ray spectroscopy (EDS) corresponding the proportion of elements as well as elemental mapping images for C, O and Ni

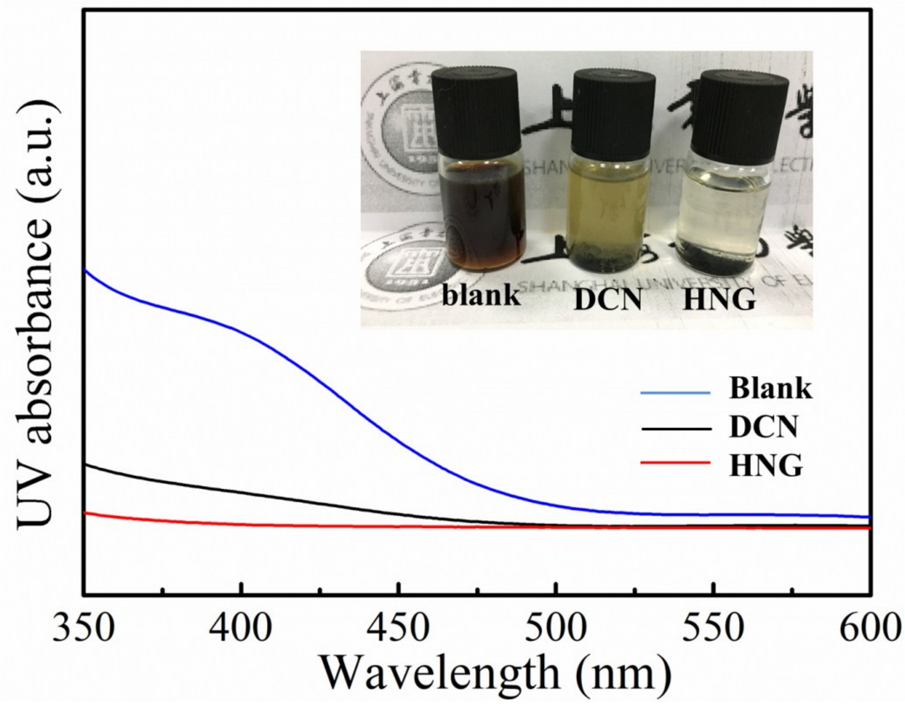

Figure S8. UV-vis absorption spectra of Li2S4 solution before and after adding DCN or HNG and inset is polysulfide entrapment by the DCN and HNG.

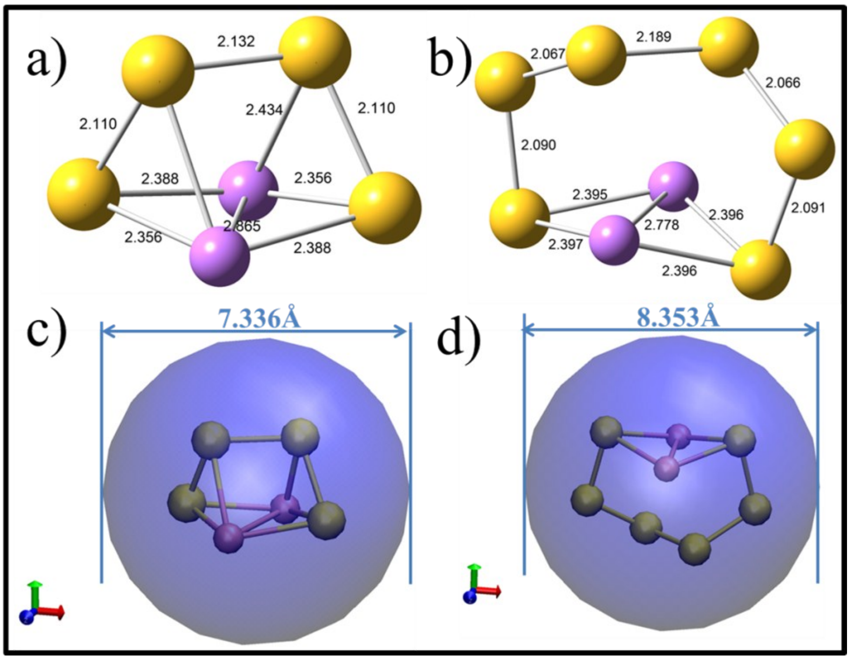

Figure S9. a) and b) the bond length of molecules of Li_2S_4 and Li_2S_6, c) and d) the vander waals radius of molecules of Li_2S_4 and Li_2S_6

Table S1. Molar volume, farthest distance and diameter of Li_2S_4 and Li_2S_6.

Molecule	**Li_2S_4**	**Li_2S_6**
Molar volume (Å/mol)	111.9	221.0
Farthest distance (Å)	3.736	4.753
Diameter of system (Å)	7.336	8.353

Table S2, Electrochemical performance comparison of S@HNG with the representative pure carbon sulfur host in literatures

Sulfur hosts	Sulfur content / wt%	Sulfur loading /mg cm^{-2}	Rate performance		Cycling performance		Ref.
			Rate /C	Capacity /mAh g^{-1}	Cycle No.	Capacity /mAh g^{-1}	
HNG	**84.2**	**2.1~5.0**	**10C** **5C**	**450** **626**	**1000**	**658**	**This work**
N-doped carbon sheets with additional cathodic coating	60	2.0	3	615	1000	472	S1
Microporous carbon sheets	70	0.7~1.0	4	652	500	612	S2
Honeycomb-like carbon sheets	70	0.7~0.84	2	580	500	505	S3
Graphene-backboned carbon sheets	64	0.4~0.6	4	430	400	650	S4
Amino-functionalized rGO	60	-	4	480	350	650	S5
Carbon nanocages	79.8	1.0~1.5	-	-	300	810	S6
N-doped hollow carbon nanospheres	85	0.5~0.7	2	250	-	-	S7
3D grapheme nanosheet@carbon nanotube	70	1.1~1.5	2	458	500	364	S8
MWNTs into hollow porous carbon nanotubes	71	-	3	550	200	647	S9
Activated porous carbon nanotube	75	2.2	5	857	-	-	S10

Supporting Reference

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