Supporting information

Enhanced Li-S Batteries Using Amine-Functionalized Carbon Nanotubes in the Cathode

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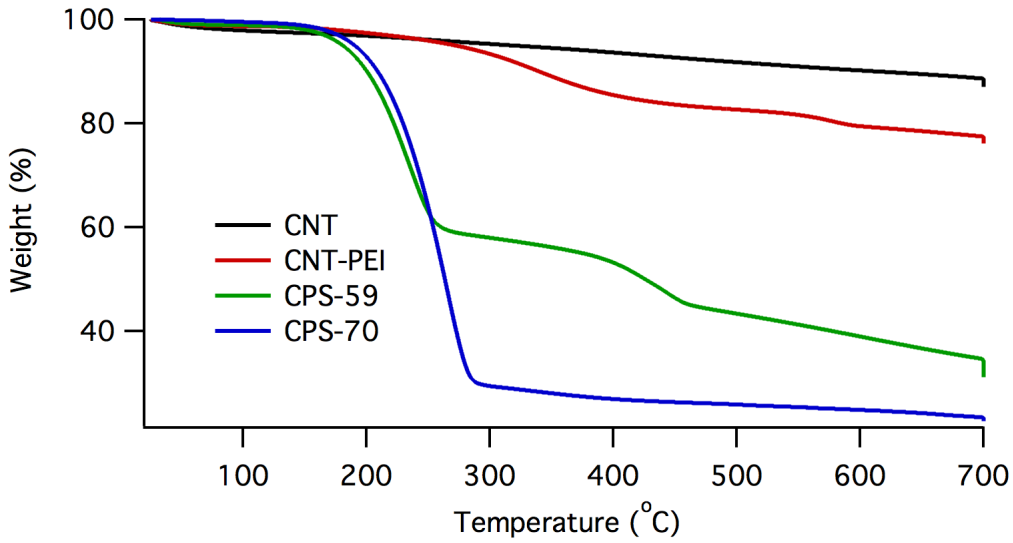


Figure S1. Thermogravimetric analysis of CNT-PEI and CNT-PEI/S composite with different sulfur loadings.

Method to determine sulfur content in different composite.

Take CPS-59 as an example. $W_s = 1 - W_{PEI} - W_{CNT}$
$W_{CNT} = 0.31$
From TGA of CNT-PEI, $W_{PEI} / W_{CNT} = (1-0.76)/0.76 = 0.32$

$W_s = 1 - W_{PEI} - W_{CNT} = 1 - 0.32*0.31 - 0.31 = 0.59$

	BET total surface area (m^2/g)	Pore volume (cm^3/g)	Micropore surface area (m^2/g)	BJH pore size (nm)
CNT	348.2	3.2	16.1	16.0
CNT-PEI	280.6	2.5	11.2	15.6
CPS-59	68.7	0.53	6.9	3.2
CPS-70	39.7	0.09	4.3	2.5

Table S1. Physical characterization by BET (Brunauer–Emmett–Teller) analysis.

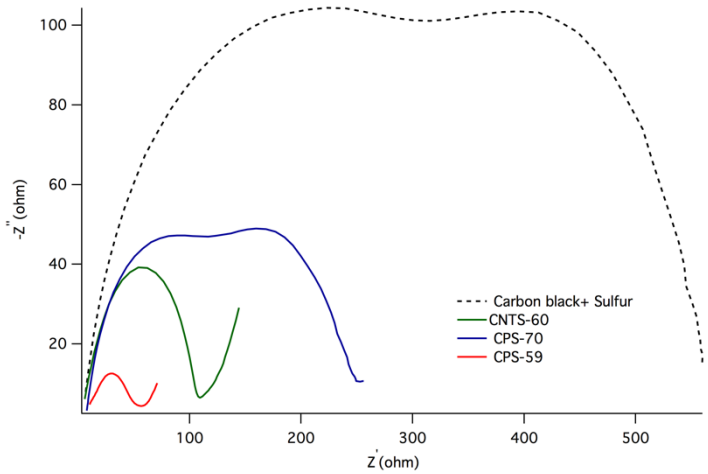
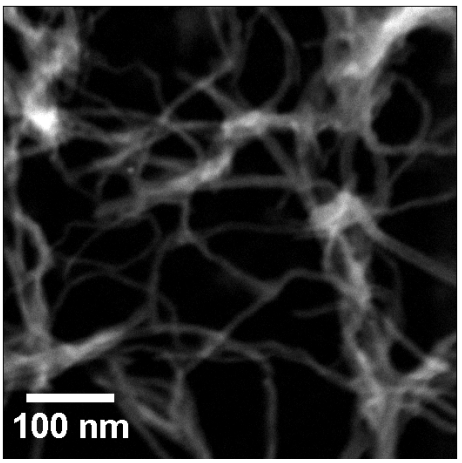
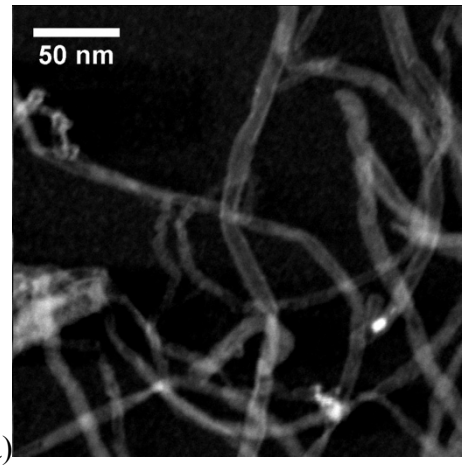


Figure S2. Impedance of electrode with sulfur loaded onto different carbon matrix. (Sulfur content is 70 wt% in physical mixing of carbon black and sulfur).



(a)



(b)

Figure S3. TEM of CNT-PEI/S composite (CPS-59).

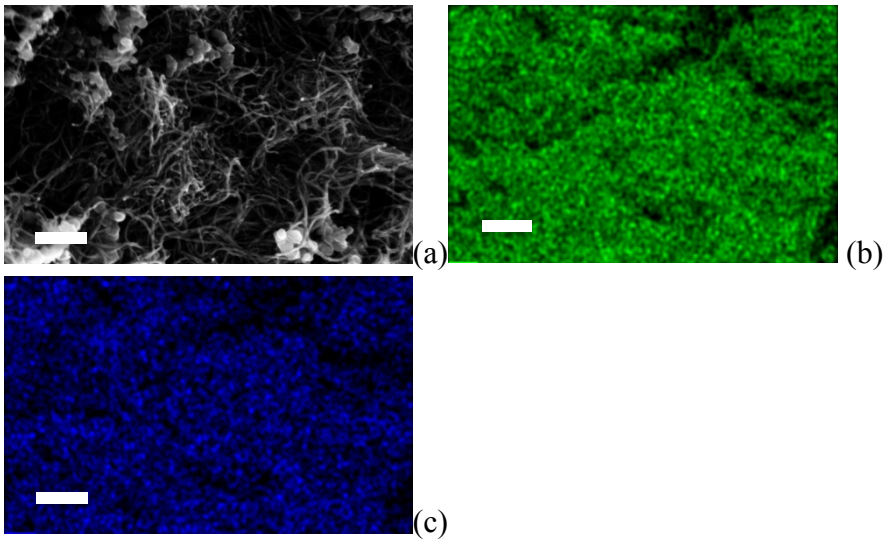


Figure S4. Elemental mapping of the distribution of carbon (b) and sulfur (c) in CPS-59 of the selected area (a). Scale bar=200nm.

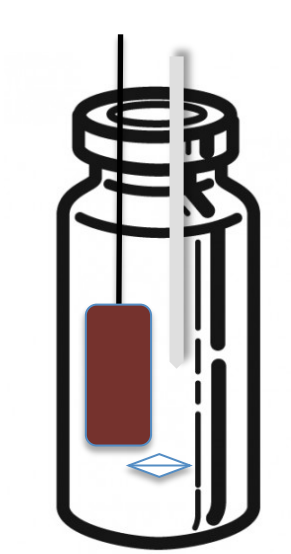


Figure S5. Equipment for the kinetic study of LiPS dissolution.

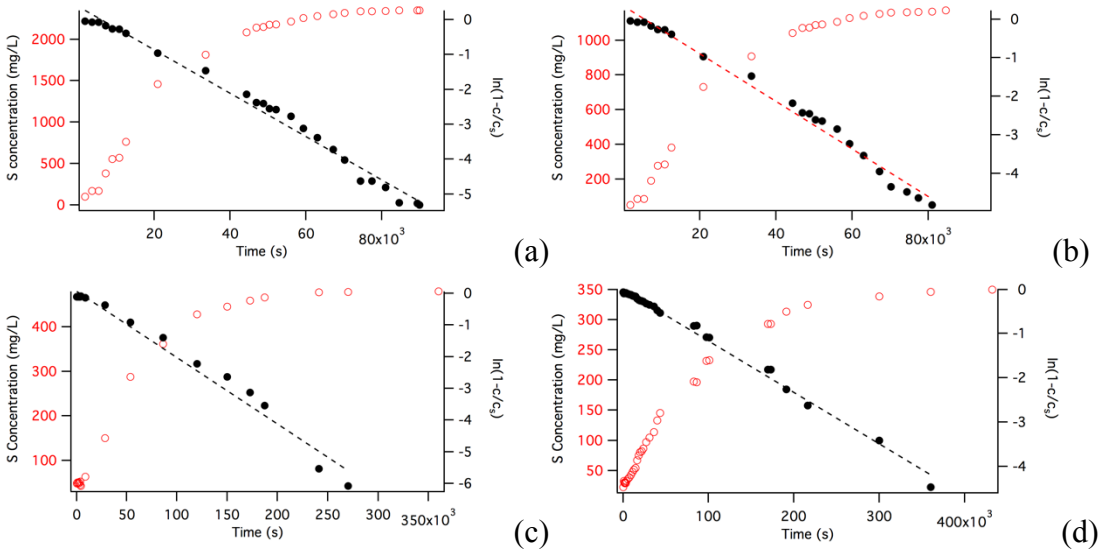


Figure S6. Sulfur concentration vs. time in (a)Li_2S_9 electrode with unmodified CNT; (b) Li_2S_4 electrode with unmodified CNT; (c) Li_2S_9 electrode with CNT-PEI composite; (d) Li_2S_4 electrode with CNT-PEI composite.