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Electronic Supplementary Information (ESI)

Sulfur-impregnated MWCNT microball cathode for Li-S batteries

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BET analysis. The pore size distribution of the MMS and the presence of porosity were determined by adsorption-desorption isotherms of nitrogen gas. The asymmetric shape of the hysteresis loop is considered an indication of the occurrence of a percolation process during the emptying of the pore site (Fig. S1a). In Fig. S1b, the pore size distribution curves of the MMS are composed of two main peaks, which correspond to the inner-core (2 ~ 5 nm) and the outer-surface (10 ~ 100 nm) pore sites of the MWCNTs in the MMS.

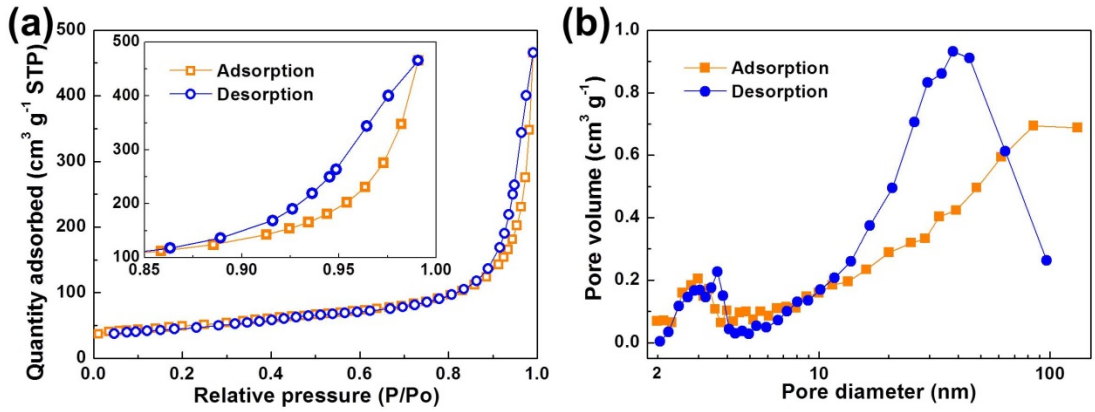


Fig. S1 (a) Isothermal adsorption/desorption plot and (b) pore volume distribution of the self-aggregated MMS (Inset in Fig. S1a is a different magnification of the plot).

TGA/DTG measurement. TGA shows that approximately 70 % and 80 % sulfur have been incorporated in the sulfur/MMS composites, which are in good agreement with the amount of sulfur loading (Fig. S2a). From the DTG curve of the sulfur/MMS composite, the first sharp endothermic peak observed in range from 155 °C to 265 °C can be seen to be related to the evaporation of sulfur; the small second peak, in the range of 550 °C to 640 °C, indicates the decomposition of MWCNTs (Fig, S2b).

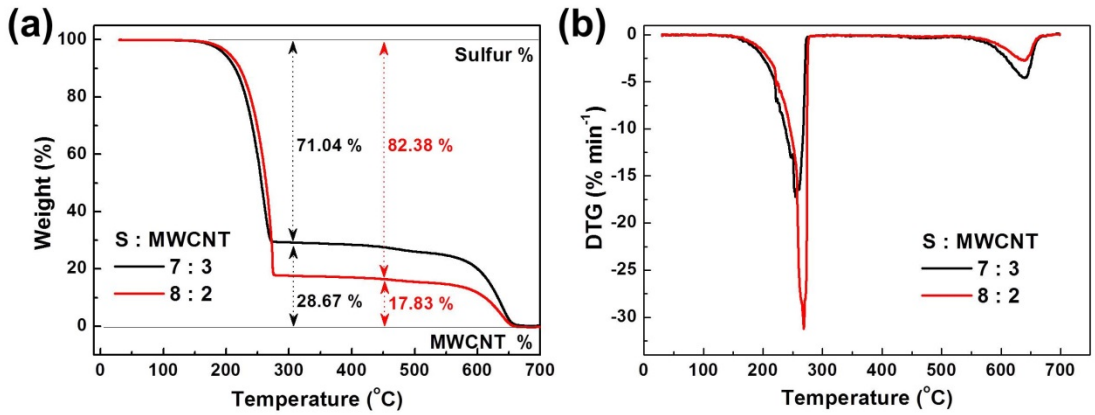


Fig. S2 (a) TGA and (b) DTG results of the sulfur/MMS composite samples.

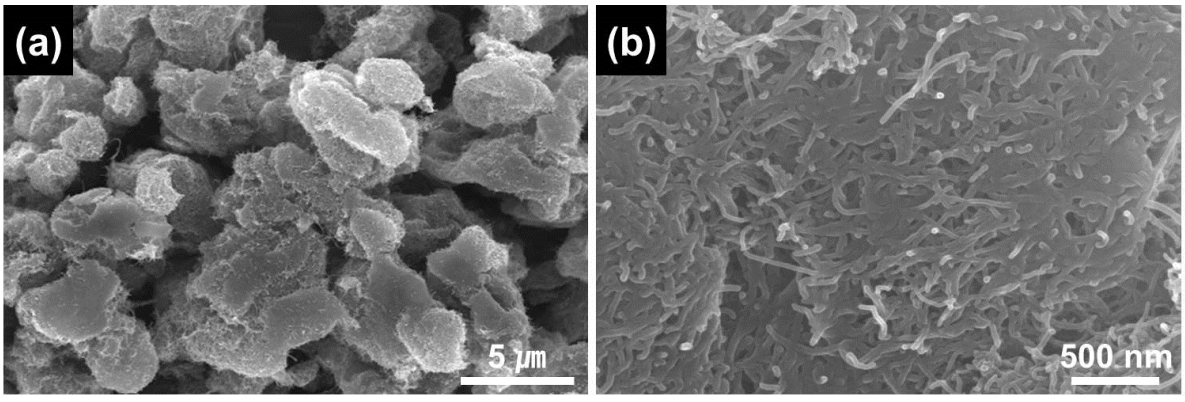
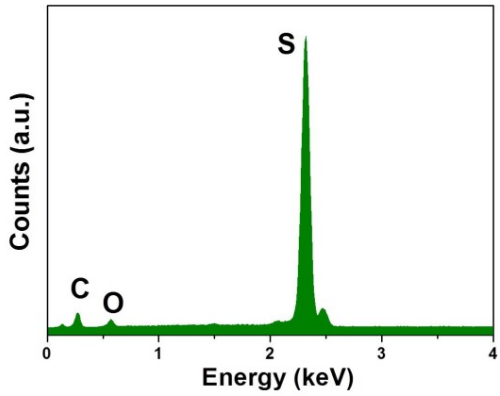


Fig. S3 (a) SEM image of the sulfur/MMS composite with a weight ratio of 8 : 2 (sulfur : MWCNTs) and (b) magnified image.



Element	Wt %	At %	K-Ratio	Z	A	F
C K	30.88	54.4	0.0173	1.1196	0.0501	1
S K	69.12	45.6	0.6627	0.9542	1.0048	1

Fig. S4 EDS spectrum of the sulfur/MMS composite captured for the region shown in Fig. 1f.

Table S1. Quantitative elemental information (carbon and sulfur) of the EDS spectrum.

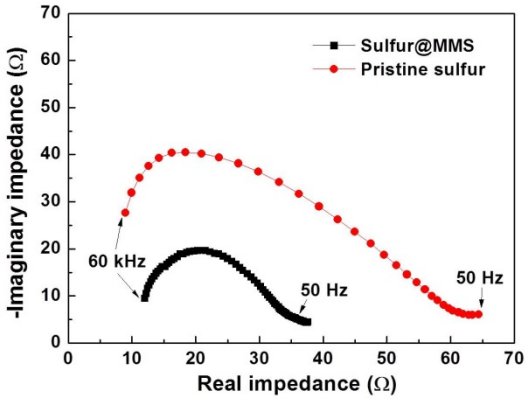


Fig. S5 Nyquist plots of pristine sulfur and sulfur/MMS composite electrodes before cycling.

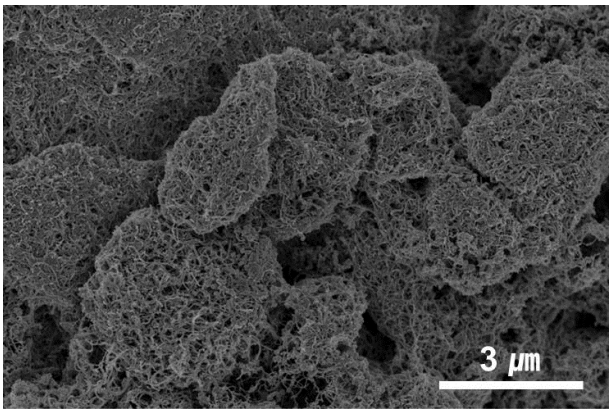


Fig. S6 SEM image of the slurry-casted sulfur/MMS composite electrode.