Supplementary Information

Multi-shelled hollow carbon nanospheres for lithium-sulfur batteries cathode with superior performances

Shuangqiang Chen, Xiaodan Huang, Bing Sun, Jinqiang Zhang, Hao Liu, Guoxiu Wang*

Centre for Clean Energy Technology, School of Chemistry and Forensic Science, University of Technology, Sydney, NSW, 2007, Australia.

Email: Guoxiu.wang@uts.edu.au



Supplementary Figure S1. Specific surface areas and pore size distributions of multi-shelled hollow carbon nanospheres-SiO₂, multi-shelled hollow carbon nanospheres, and multi-shelled hollow carbon nanospheres-sulfur composites. (a_1 and a_2) Specific surface area and pore size distribution of multi-shelled hollow carbon nanospheres-SiO₂. (b_1 and b_2) Specific surface area and pore size distribution of multi-shelled hollow nanocarbon spheres. (c_1 and c_2) Specific surface area and pore size distribution of multi-shelled hollow carbon of multi-shelled hollow carbon nanospheres. (c_1 and c_2) Specific surface area and pore size distribution of multi-shelled hollow carbon nanospheres-sulfur composite.



Supplementary Figure S2. Morphology of pure sulfur. (a-b) Different magnification views of pure sulfur.



Supplementary Figure S3. Elemental distribution and energy dispersive X-ray spectrum of MHCS composites. (a) FESEM image of MCs-S. (b-c) Elemental distributions of sulfur and carbon in MHCS composites. (d) Energy dispersive X-ray spectrum of MHCS composites.



Supplementary Figure S4. (a) TEM image of MHCS compsites. (b-d) Elemental mapping of MHCS composites: green, red and blue in the three images are carbon, sulfur and oxygen in MHCS composites.



Supplementary Figure S5. Phase characterization of MHCS composites. XRD patterns of pure sulfur, MHC and MHCS composites. (b) Raman spectra of MHC, pure sulfur and MHCS composites.



Supplementary Figure S6 (a) The charge/discharge profiles of pure sulfur at the 1st and 200th cycles (b) The charge/discharge profiles of MHCS composites at different current rates at the 200th cycle. (c) The cycling performance of MHCS without PVP coating at 1C rate.



Supplementary Figure S7. Elemental distribution and energy dispersive X-ray spectrum of MHCS electrode after cycling. (a-c) Elemental distributions of sulfur and carbon in MHCS electrode after cycling. (d) Energy dispersive X-ray spectrum of MHCS electrode after cycling.