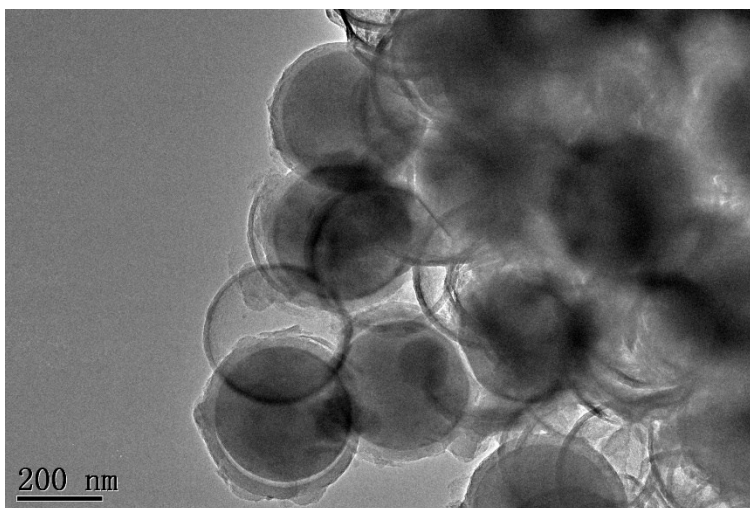


## Improving the cycling stability of lithium–sulfur batteries by hollow dual-shell coating

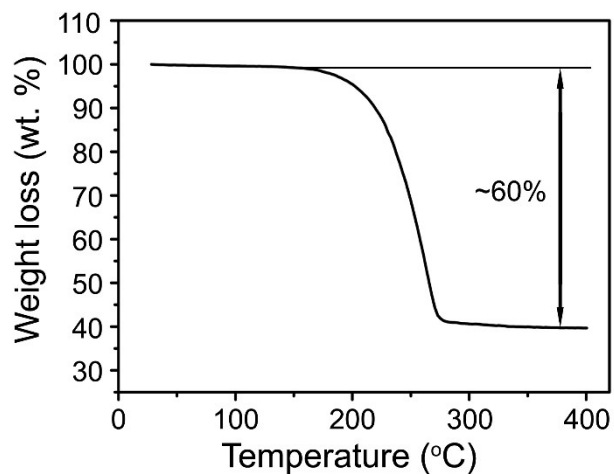
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College of Materials Science and Engineering, Donghua University, Shanghai 201620,  
China

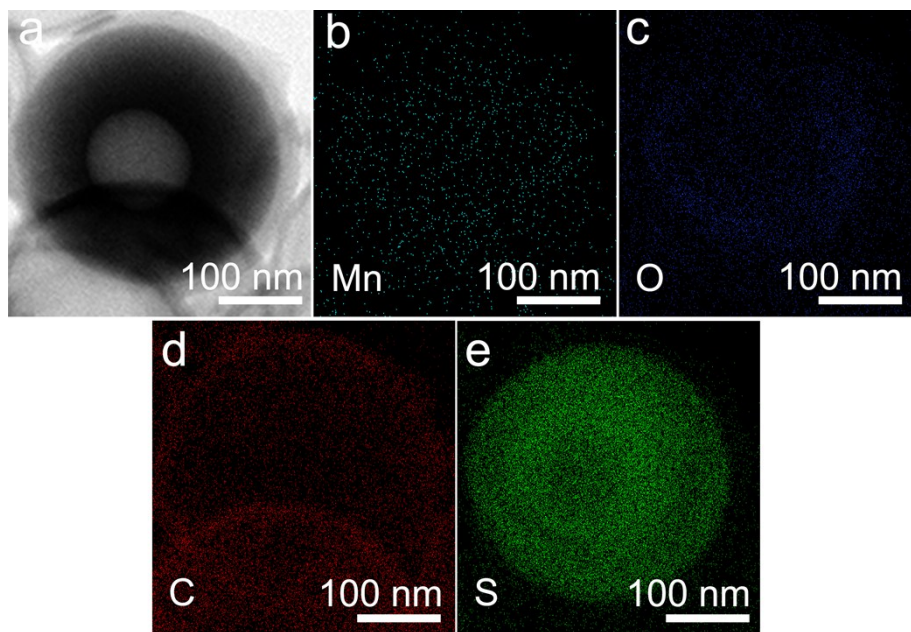
E-mail: rjzou@dhu.edu.cn; hu.junqing@dhu.edu.cn



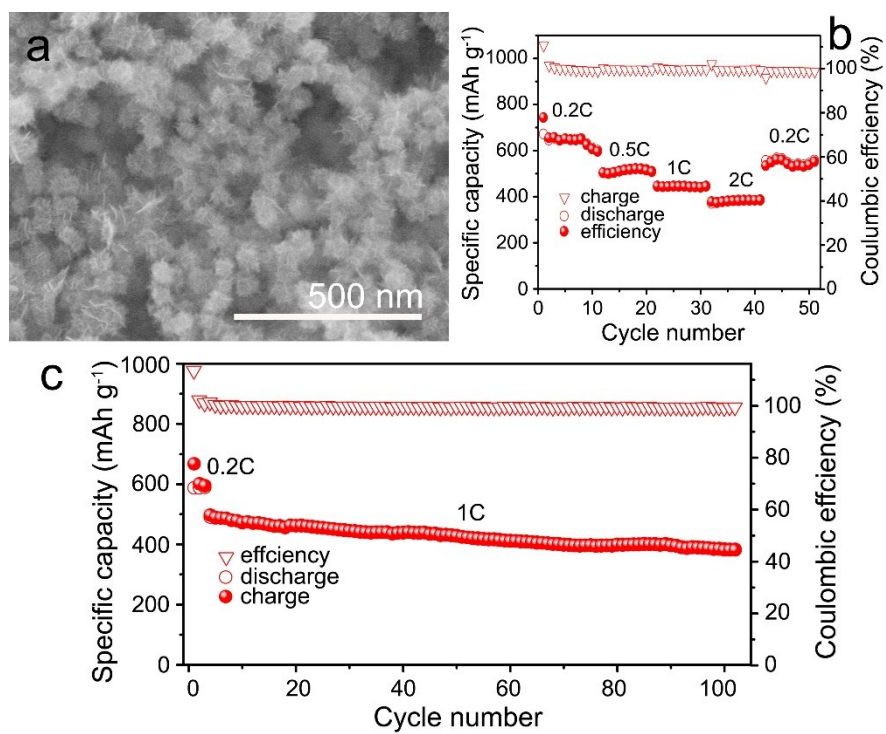
**Fig. S1** TEM image of S@MnO<sub>2</sub>@C hybrid nanospheres.



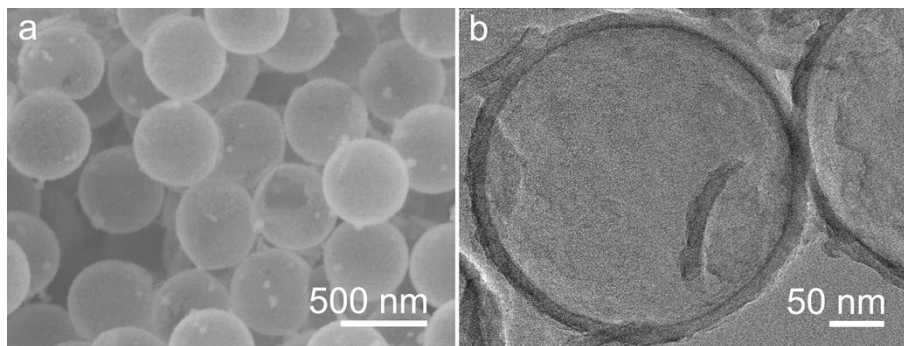
**Fig. S2** The thermogravimetric curve of S@MnO<sub>2</sub>@C hybrid nanospheres.



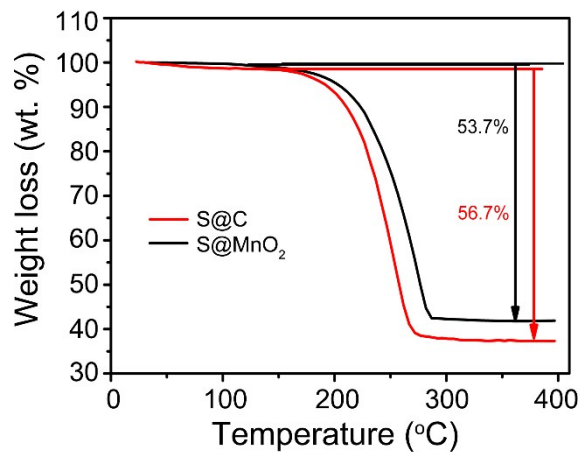
**Fig. S3** (a) TEM image of S@MnO<sub>2</sub>@C and the (b-e) corresponding EDX element mapping of Mn, O, C and S.



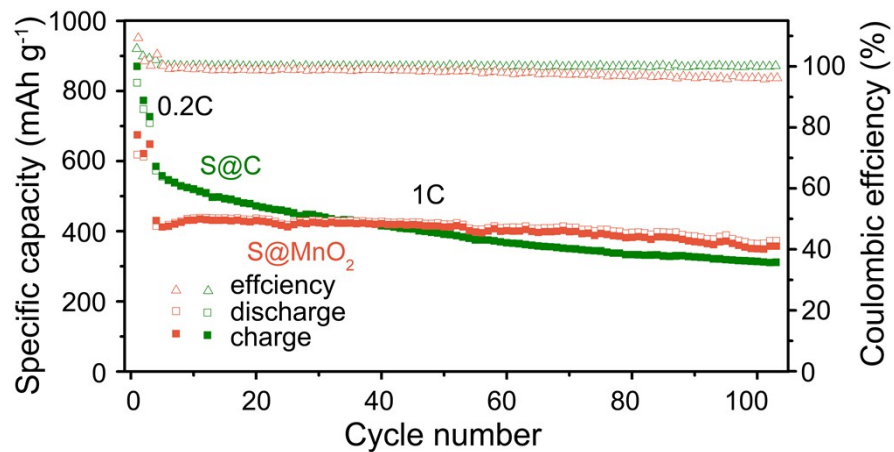
**Fig. S4** (a) SEM image of S/MnO<sub>2</sub> composite. (b) Rating performance S/MnO<sub>2</sub> composite electrode under different current rates. (c) Cycling performance of S/MnO<sub>2</sub> composite electrode under the current density of 1.0 C.



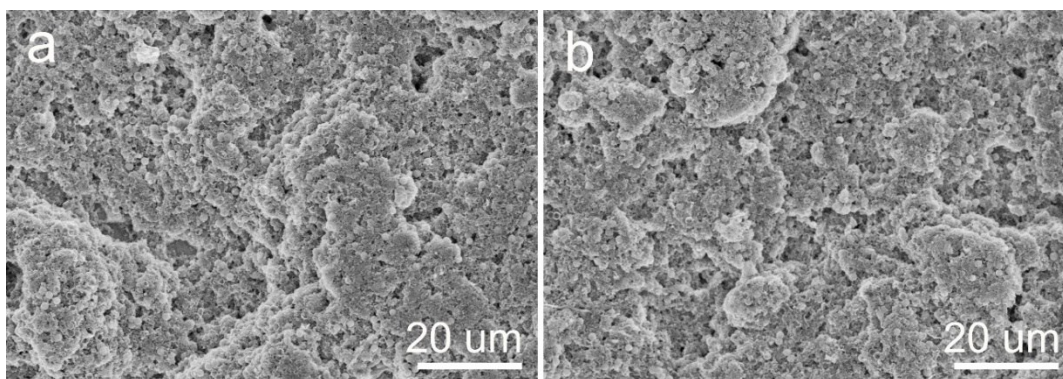
**Fig. S5** (a) SEM image of MnO<sub>2</sub> hollow sphere and (b) TEM image of carbon hollow sphere.



**Fig. S6** TG curves of S@C (red line) and S@MnO<sub>2</sub> (black line) under N<sub>2</sub> flow with a heating rate of 20 °C min<sup>-1</sup>.



**Fig. S7** Cycling performances of S@MnO<sub>2</sub> and S@C under the current density of 1.0 C.



**Fig. S8** SEM images of the electrodes of S@MnO<sub>2</sub>@C hybrid nanospheres before (a) and after 100 cycles under the current density of 2.0 C (b).