Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Supporting Information

Fabrication of functionalized polysulfides reservoirs from large graphene sheets to improve the electrochemical performance of lithium-sulfur batteries

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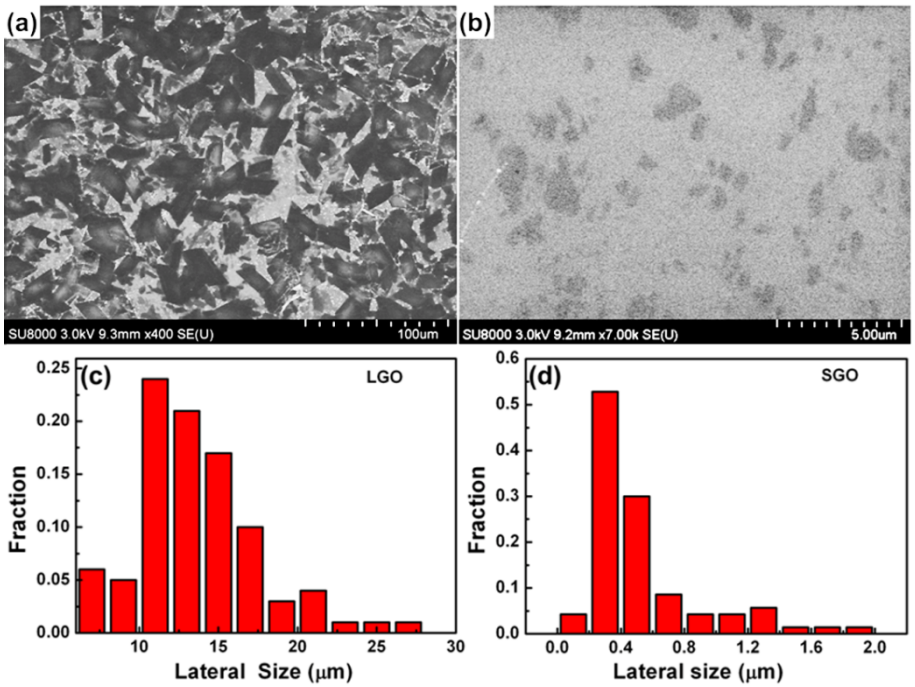

Fig. S1 FESEM images and histograms of the lateral size distribution of LGO (a, c) and SGO (b, d).

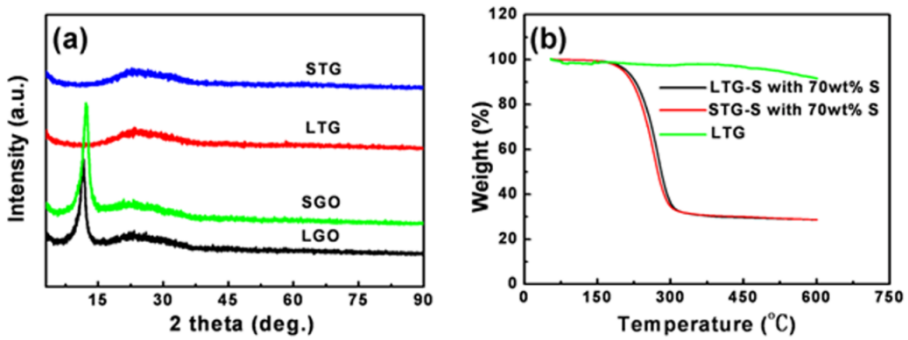

Fig. S2 (a) XRD patterns of LGO, SGO, LTG, STG. (b) TGA curves of the LTG, STG-S and LTG-S composites.

We can observe from the TGA results that the weight loss of the LTG-S and STG-S composites with increasing temperature start from about 150 ºC to around 350 ºC, while the LTG and STG have almost no mass loss in the temperature range, reflected by green line (STG is not shown in Fig. S2b). The range is consistent with evaporation temperature of pristine sulfur.

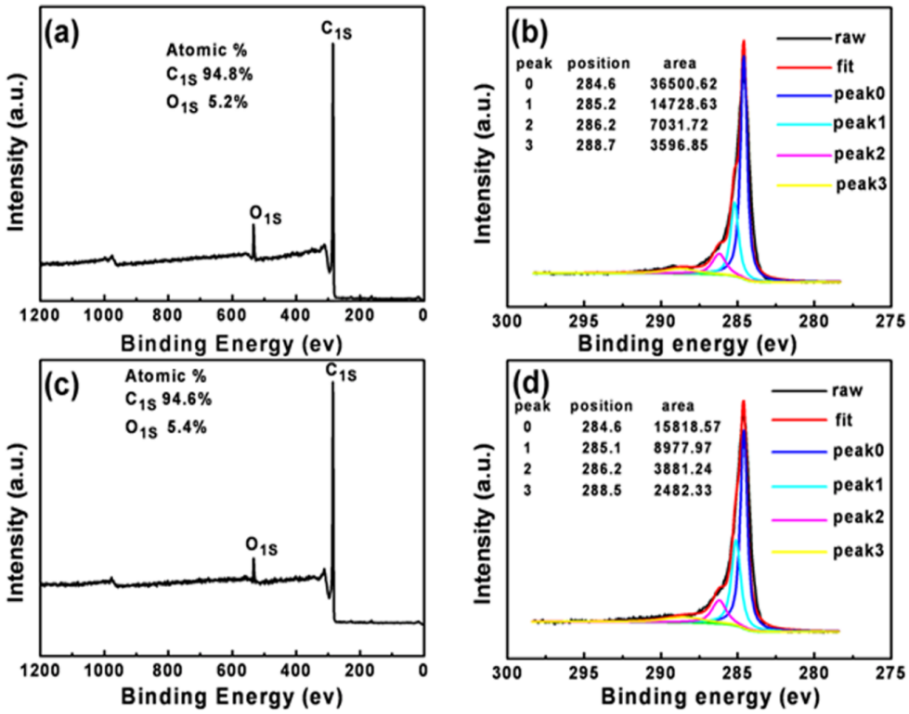

Fig. S3 (a) XPS survey spectrum and (b) C 1s spectrum of LTG. (c) XPS survey spectrum and (d) C 1s spectrum of STG.

The peaks centered at about 285.0 eV and 533.0 eV in survey spectra analyzed by XPS correspond to the C 1s and O 1s, respectively. The C 1s spectra of LTG and STG can be deconvoluted into four peaks: the binding energies of 284.6 and 285.2 eV are attributed to the C=C and C-C bonds, respectively. Another two weak broad peaks located at 286.2 and 288.5 eV can be attributed to the C-O and O=C-O functional groups.[1]

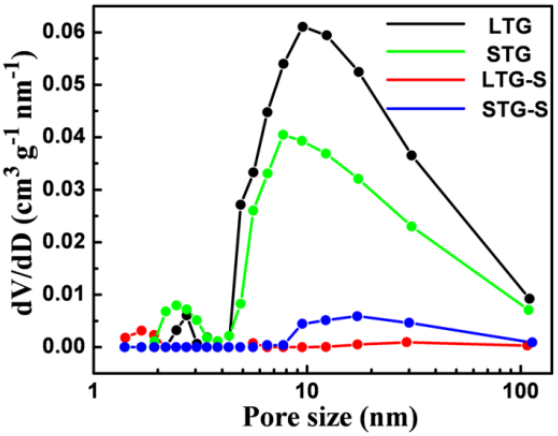

Fig. S4 The pore size distribution curves of LTG, STG, LTG-S, STG-S.

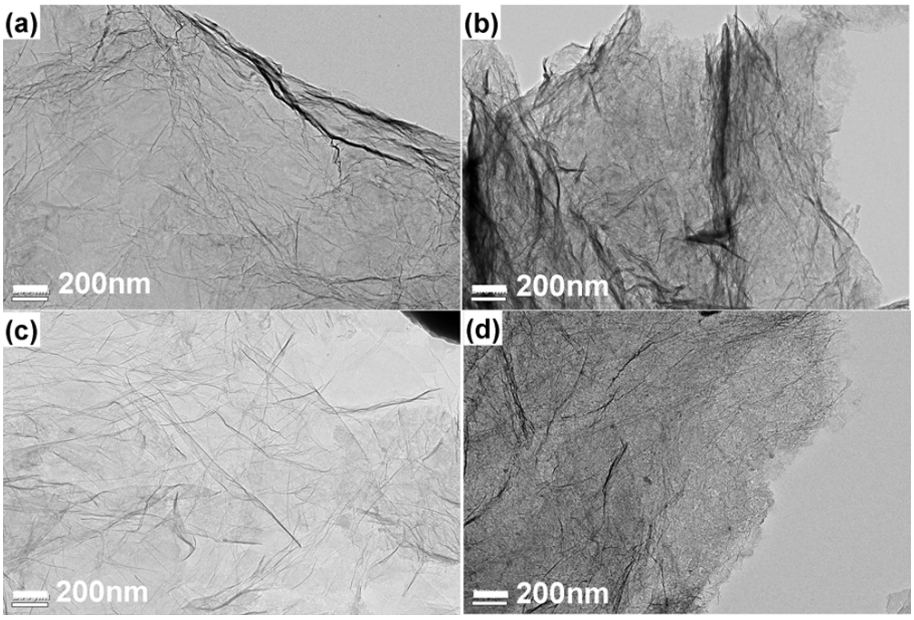

Fig. S5 TEM images of (a) LTG, (b) LTG-S, (c) STG and (d) STG-S.

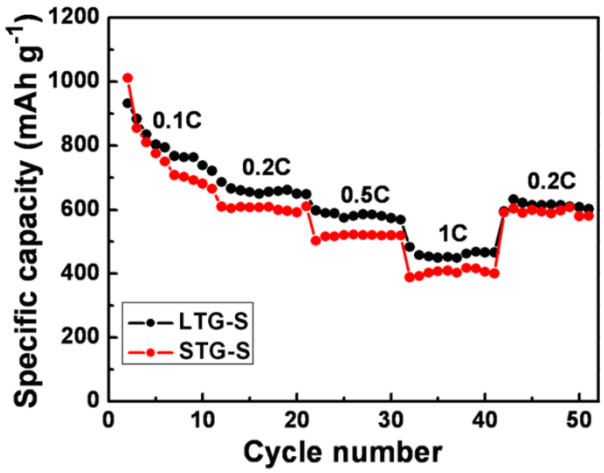

Fig. S6 The rate capability at rate varied from 0.1 C to 1 C of LTG-S and STG-S composites.

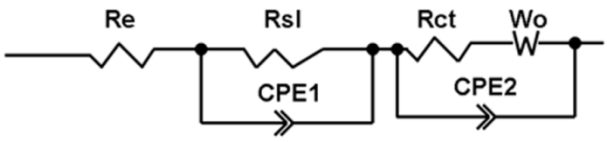

Fig. S7 Equivalent circuit of impedance fitting for LTG-S (with and without RCF) and STG-S electrode before and after 100 cycles.

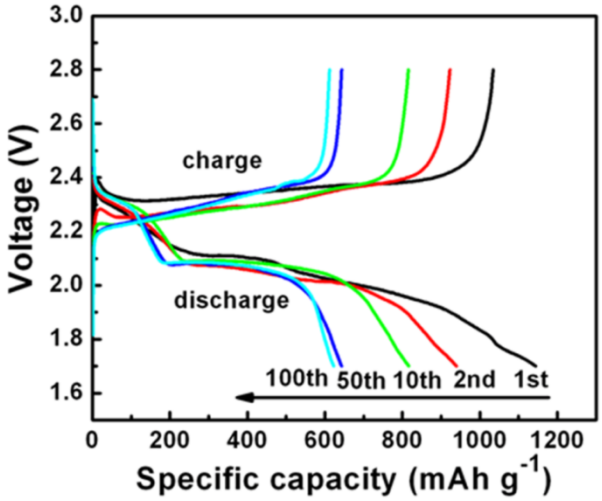

Fig. S8 Discharge/charge voltage profiles of the LTG-S with RCF at 0.1 C.

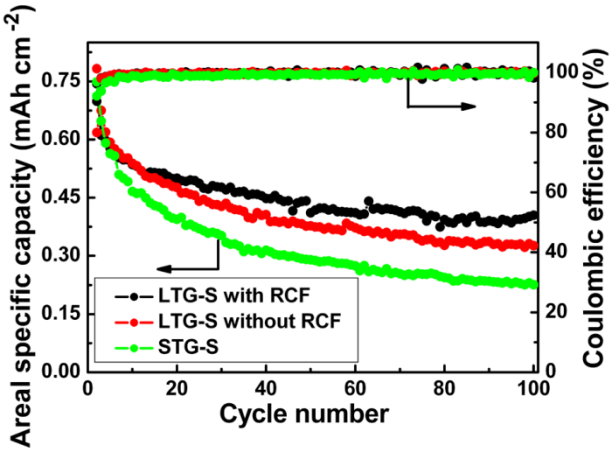

Fig. S9 The areal specific capacity of LTG-S with and without RCF, STG-S at 0.1 C for 100 cycles.

1 C. Zhang, W. Lv, W. Zhang, X. Zheng, M. B. Wu, W. Wei, Y. Tao, Z. Li, Q. H. Yang, *Adv. Energy Mater*., 2014, **4**, 1301565.