Electronic Supplementary Information

Sulfur-hydrazine hydrate-based chemical synthesis of Sulfur@graphene composite for Lithium-sulfur batteries

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Fig. S1 Digital graph of (left) hydrazine hydrate and (right) the solution of sulfur-hydrazine hydrate.



Fig. S2 (A,B) FESEM and (C,D) TEM images of S/N-rGO composite. Scale bars: (A-D) 1 μ m.



Fig. S3 (A) FESEM image of S/N-rGO composite and (B) the corresponding elemental mapping images collected from the rectangular area marked in panel A. Scale bars: (A) 350 nm, (B) 200 nm.



Fig. S4 EDX spectrum of S@N-rGO composite.



Fig. S5 The galvanostatic charge–discharge profiles of the S@N-rGO (A) and S/N-rGO (B) cathodes between 1.7-2.8 V versus Li^+/Li at different rate densities.



Fig. S6 EIS results of S@N-rGO before and after cycling at 0.8 A g^{-1} for 15 cycles.



Fig. S7 FESEM images of S@N-rGO after 30 cycles at the current density of 0.8 A g^{-1} . (Scale bar: 200 nm for both)



Fig. S8 The digital photo of N-rGO in a polysulfide solution: (A) fresh Li_2S_4/DME , (B) Li_2S_4/DME after stirring with N-rGO for 2 h.



Fig. S9 (A) TGA curve of S@N-rGO with 63%S, (B) Cycling performance of S@N-rGO with 63%S and 76%S for 170 cycles at a current rate of 1C.