N, S-doped Graphene as Conductive Agent and Chemosorbent For

High Stability Performance Lithium-Sulfur Batteries

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Fig. S1 TEM images of the as-prepared GOTF.



Fig. S2 XPS spectra of the N, S-doped graphene.



Fig. S3 TEM images of the as-prepared MnO_2 nanowires.



Fig. S4 a, b) SEM and c, d) TEM images of the as-prepared CNTs.







Fig. S6 TEM image of the CNTs-S composites.



Fig. S7 a, b) SEM images of the Li-S cells with the N, S-doped graphene.



Fig. S8 Discharge-charge capacities and Coulombic efficiencies over 100 cycles at



Figure S9 a, b) EDS spectrum of the cycled lithium-metal in the cells with the the N, S-doped graphene and super P.



Fig. S10 N₂ adsorption-desorption isotherms of KB.



Fig. S11 SEM images of the KB electrodes with the N, S-doped graphene.

Table S1. The physical parameters of the N, S-doped graphene from different ratios of TF/GO.

Samples	C (wt%)	O (wt%)	N (wt%)	S (wt%)	I_D/I_G
TF/GO=2.5:1	95.0	2.4	1.8	0.8	1.32
TF/GO=5:1	93.3	2.8	2.5	1.4	1.44
TF/GO=10:1	93.1	3.0	2.4	1.5	1.45

Table S2 Compasion of electrochemical performances of the cells with the N, S-doped graphene with previously reported doped carbon/S electrodes.

Electrode materials	Cycling stability	Fade rate	Ref.
	$(A/B/n)^b$		
Nitrogen-Doped Graphene/S	560/1/700	0.068 %	S1
Nitrogen-Doped Graphene/S	920/0.3/500	0.08 %	S2
N, S-Doped Graphene/S	550/0.5/500	0.078 %	S3

N, S-Doped Graphene/S	650/0.5/350	0.057 %	S4
N, S-Doped carbon/S	365/2/1100	0.052 %	S5
S-NCNF	363/5/500	0.084 %	S 6
N, P-Doped Graphene/S	638/1/500	0.09 %	S 7
N, S-Doped carbon/S	780/0.2/600	0.056 %	S 8
the cells with the N, S-doped	622/1/500	0.049 %	This
graphene			work

a Weight ratio of the active material, carbon and binder. PVDF was used as binder if not mentioned. Other values used were specified.

b A/B/n means the capacity of A (mAh g⁻¹) remained after n cycles at the certain currentdensity of B (C).

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