Supporting Information

Designing 2D nickle hydroxide@graphene nanosheets composites to efficiently confine sulfur for highly stable lithium-sulfur batteries

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1. Figures

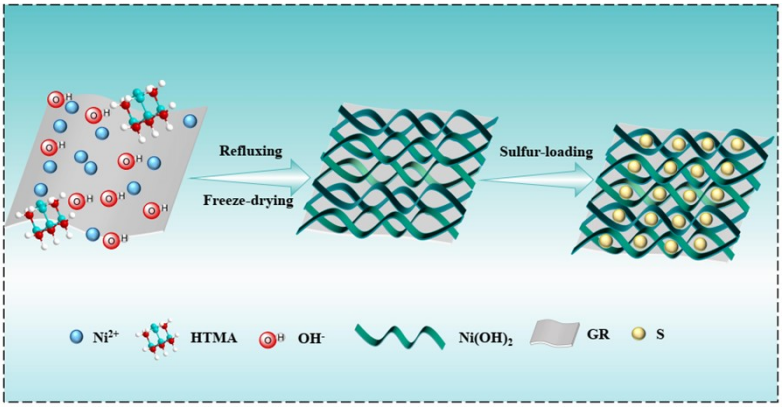

Fig. S1. Schematic illustration of the synthesis of $Ni(OH)_2$@GR.

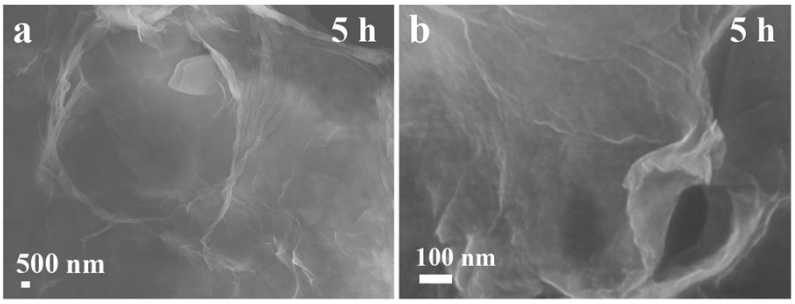

Fig. S2. FESEM images of $Ni(OH)_2$@GR at 5 h refluxing times.

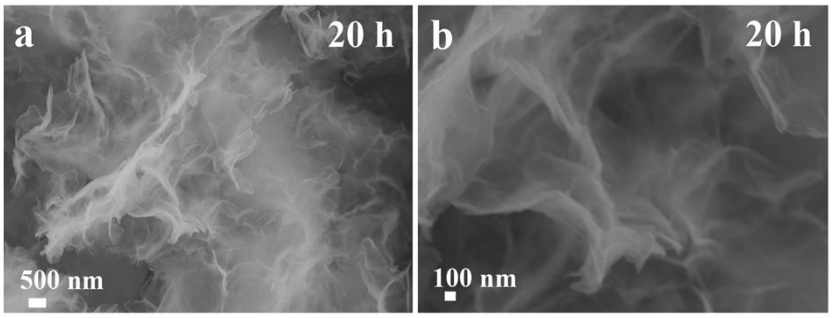

Fig. S3. FESEM images of $Ni(OH)_2$@GR at 20 h refluxing times.

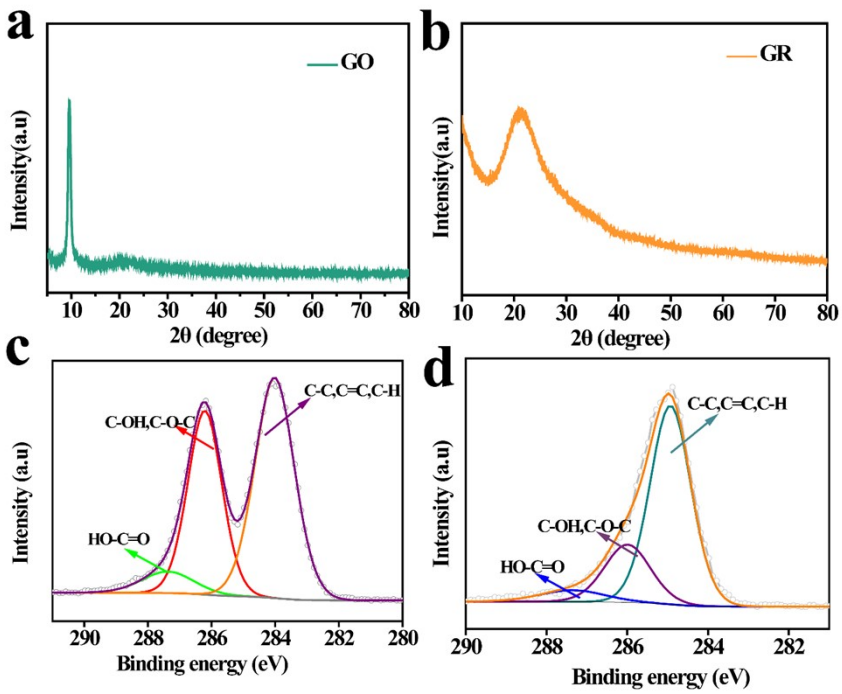

Fig. S4. (a-b) XRD patten of GO and GR; (c-d) XPS spectra of C 1S for GO and GR.

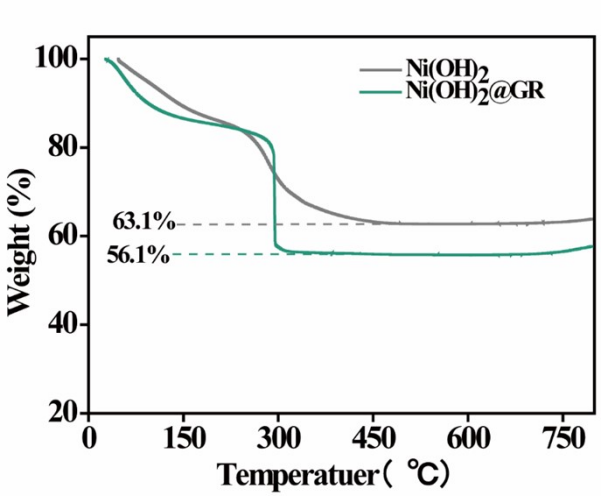

Fig. S5. Thermogravimetric (TG) analysis of pristine $Ni(OH)_2$ and $Ni(OH)_2$@GR.

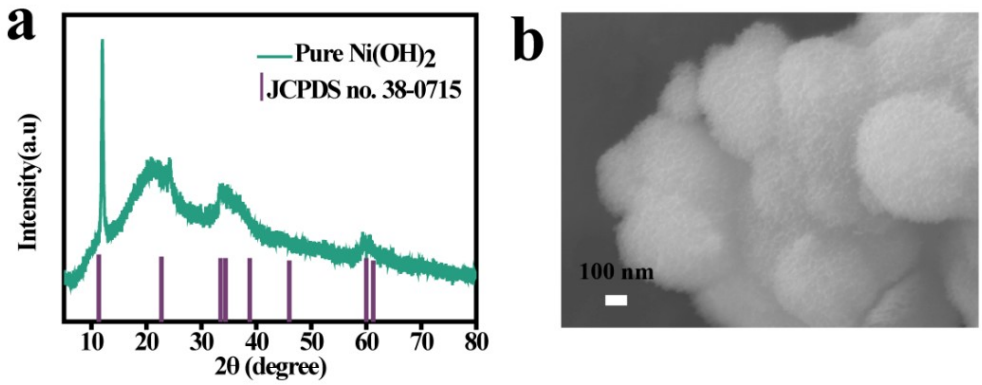

Fig. S6. (a) XRD patten of pristine $Ni(OH)_2$, (b) FESEM image XRD patten of pristine $Ni(OH)_2$.

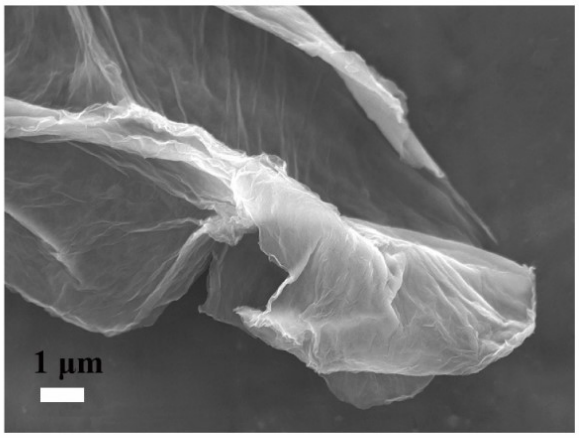

Fig. S7. FESEM image of GR.

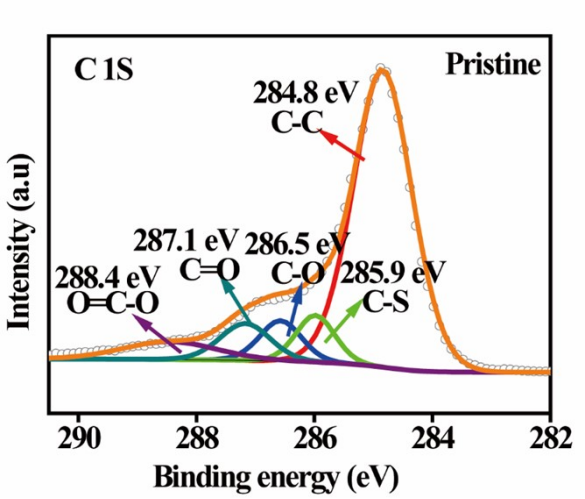

Fig. S8. XPS spectra of C 1S of $Ni(OH)_2$@GR@S.

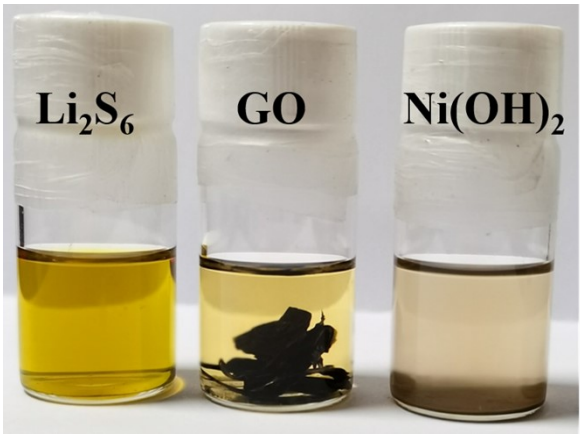

Fig. S9. Static adsorption experiments of Li_2S_6 with pristine $Ni(OH)_2$ and GR.

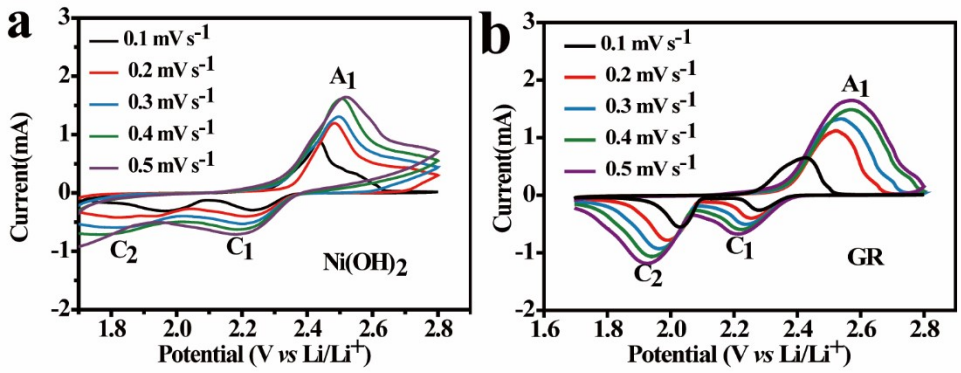

Fig. S10. (a-b) CV curves of Ni(OH)@S and GR@Swith different scan rates.

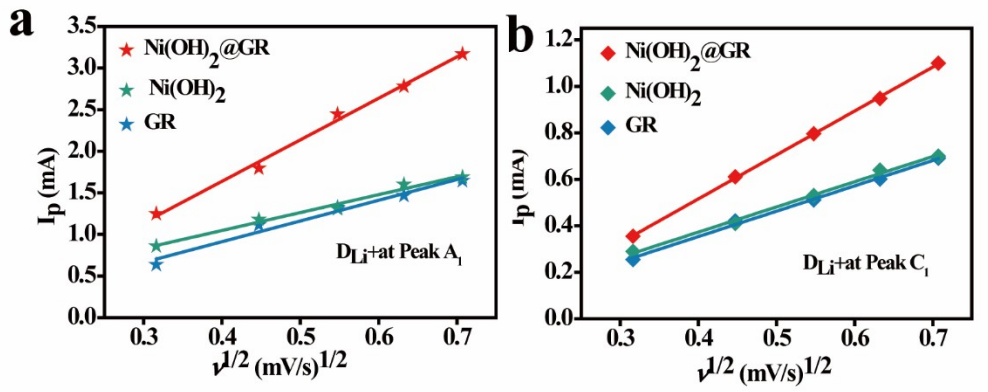

Fig. S11. (a-b) the relationship between Ip and $v^{1/2}$ with the different cathode composites.

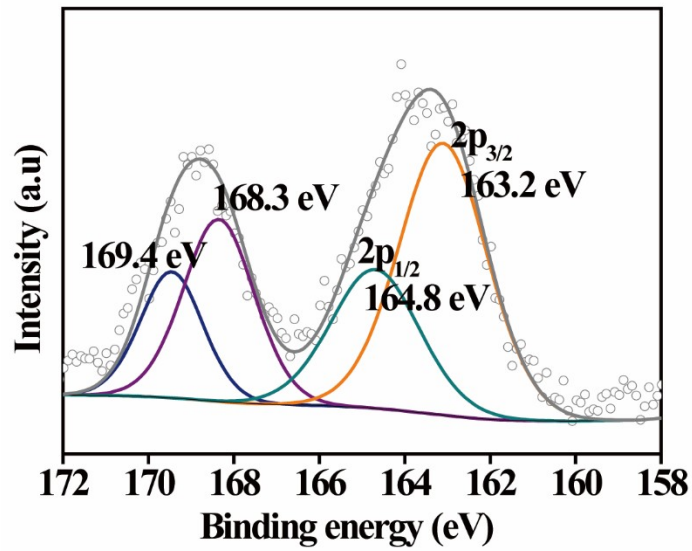

Fig. S12. XPS spectra of 2p of $Ni(OH)_2$@GR@S before cycling.

Table S1. The slope and $D(Li^+)$ of $Ni(OH)_2$GR@S, pure $Ni(OH)_2$@S, GR@S.

Electrode	Slope A_1	A_1 $D(Li^+)$ (cm s^{-1})	SlopeC_1	C_1 $D(Li^+)$ (cm s^{-1})
$Ni(OH)_2$@GR@S	4.98	1.71×10^{-10}	1.88	2.46×10^{-11}
Pure $Ni(OH)_2$@S	2.15	3.19×10^{-11}	1.08	8.05×10^{-12}
GR@S	2.49	4.28×10^{-12}	1.09	8.20×10^{-12}