Supplementary Information for

Hierarchical urchin-like Co_9S_8@$Ni(OH)_2$ heterostructures with superior electrochemical performance for hybrid supercapacitor

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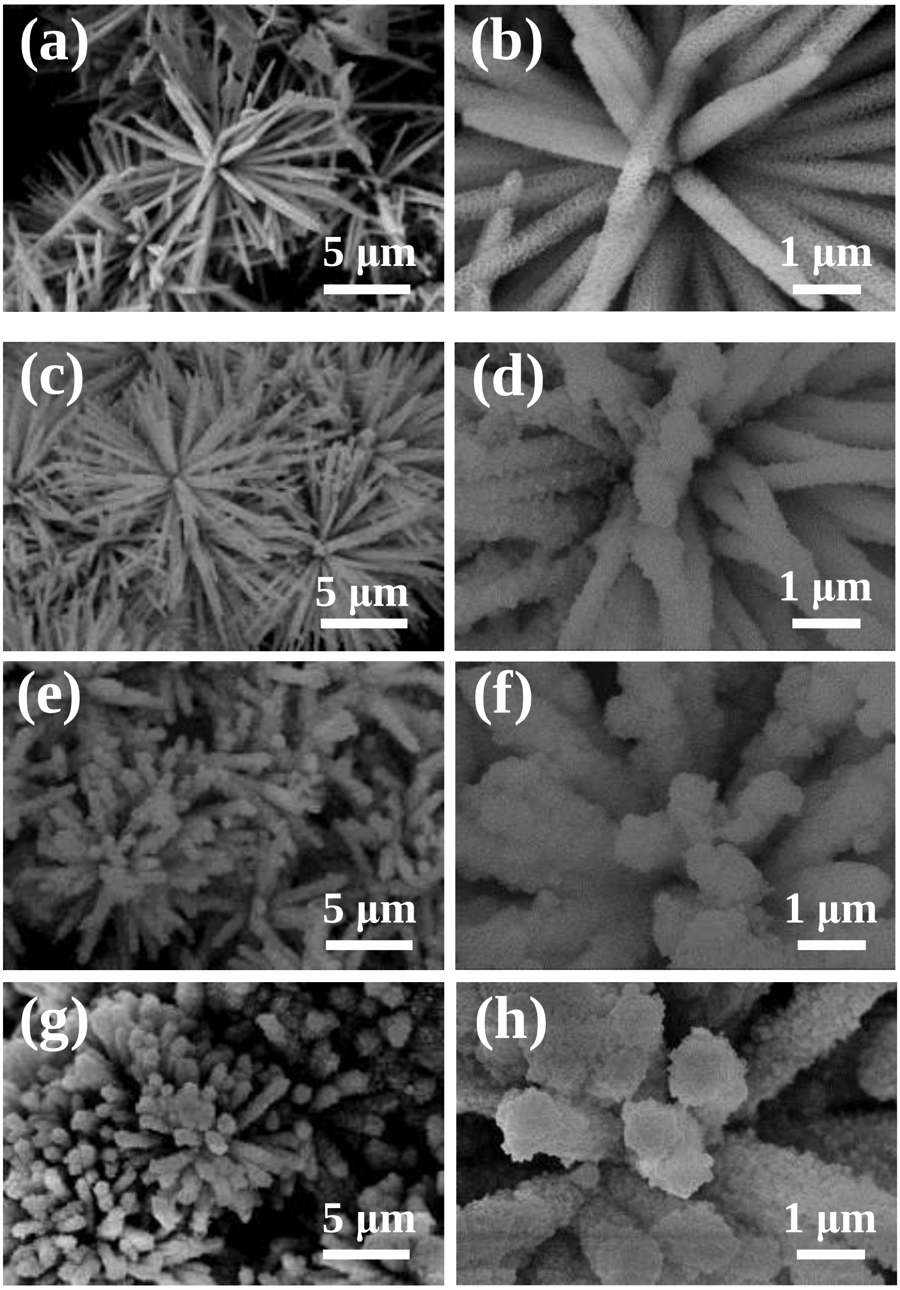

Fig. S1 SEM images of (a,b) Co_9S_8@$Ni(OH)_2$-100S, (c,d) Co_9S_8@$Ni(OH)_2$-200S, (e,f) Co_9S_8@$Ni(OH)_2$-600S, and (g,h) Co_9S_8@$Ni(OH)_2$-800S.

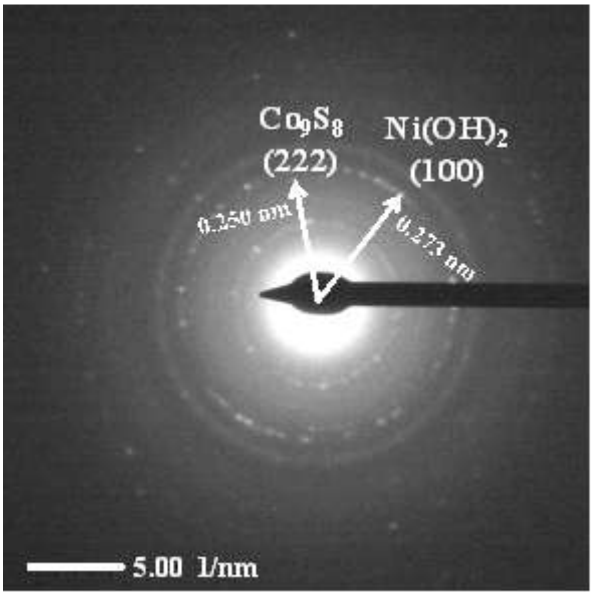

Fig. S2 Selected area electron diffraction pattern (SAED) of the $Co_9S_8@Ni(OH)_2$-400S sample.

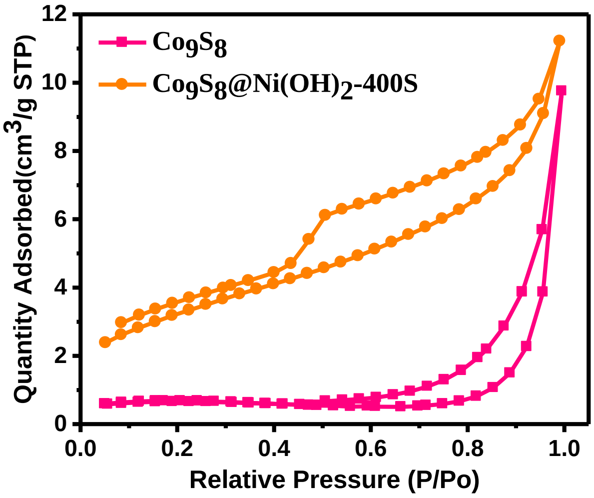

Fig. S3 Nitrogen absorption-desorption isotherms of Co_9S_8 and $Co_9S_8@Ni(OH)_2$-400S.

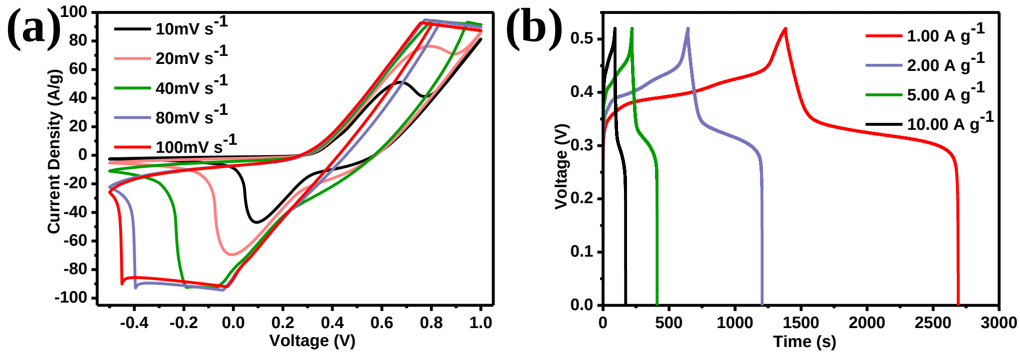

Fig. S4 (a) CV curves of the Co_9S_8-$Ni(OH)_2$-400S at various scan rates; (b) charge and discharge curves of the Co_9S_8-$Ni(OH)_2$-400S at different current densities.

Table S1 Comparison studies for metal sulfide, hydroxide and their SC performances.

Electrocatalysts	Electrolyte (KOH)	Mass loading (mg cm^{-2})	Power density (W kg^{-1})	Energy density (W h kg^{-1})	Reference
Co_9S_8	3M	1.9	800	15	***New J. Chem.*** 2017, 41, 1142-1148
$NiCo_2S_4$/Co_9S_8	3M	3.5	800	42	***Appl. Surf. Sci.*** 2018, 434, 861-870
Co_9S_8/α-MnS @N-C@MoS_2	2M	/	729	64	***Small***, 2018, 1800291.
Co_9S_8-NSA/NF	1M	2.8	828	20	***Nanoscale***, 2018, 10, 2735
$CoMoO_4$/Co_9S_8	3M	4.5	800	38	***Electrochim. Acta***, 2017, 252, 470–481
Co_9S_8@$Ni(OH)_2$/CF	6M	2	253	31	***J. Mater. Chem. A***, 2017, 5, 22782
Ni_3S_2@CoS	2M	13	800	16	***J. Name.*** 2013, 00, 1-3
$NiCo_2S_4$@$Ni(OH)_2$	2M	2.8	6420	32	***Electrochim. Acta***, 2016, 193, 116-127
Co_3O_4@$Ni(OH)_2$	3M	4.5	347	40	***Chem. Eng. J*, 2017, 315, 35-45**
$NiCo_2S_4$@$Ni(OH)_2$ @PPy	2M	3.2	800	16	***J. Mater. Chem. A***, 2018,6,2482
$Ni(OH)_2$/3D-Ni	1M	/	500	40	***Nano Energy*** 2017, 39, 639-646
Co_9S_8-$Ni(OH)_2$/NF	2M	4.5	800	48	**This work**