

Porous-sheet-assembled Ni(OH)₂/NiS arrays with vertical in-plane edge structure for supercapacitor with high stability

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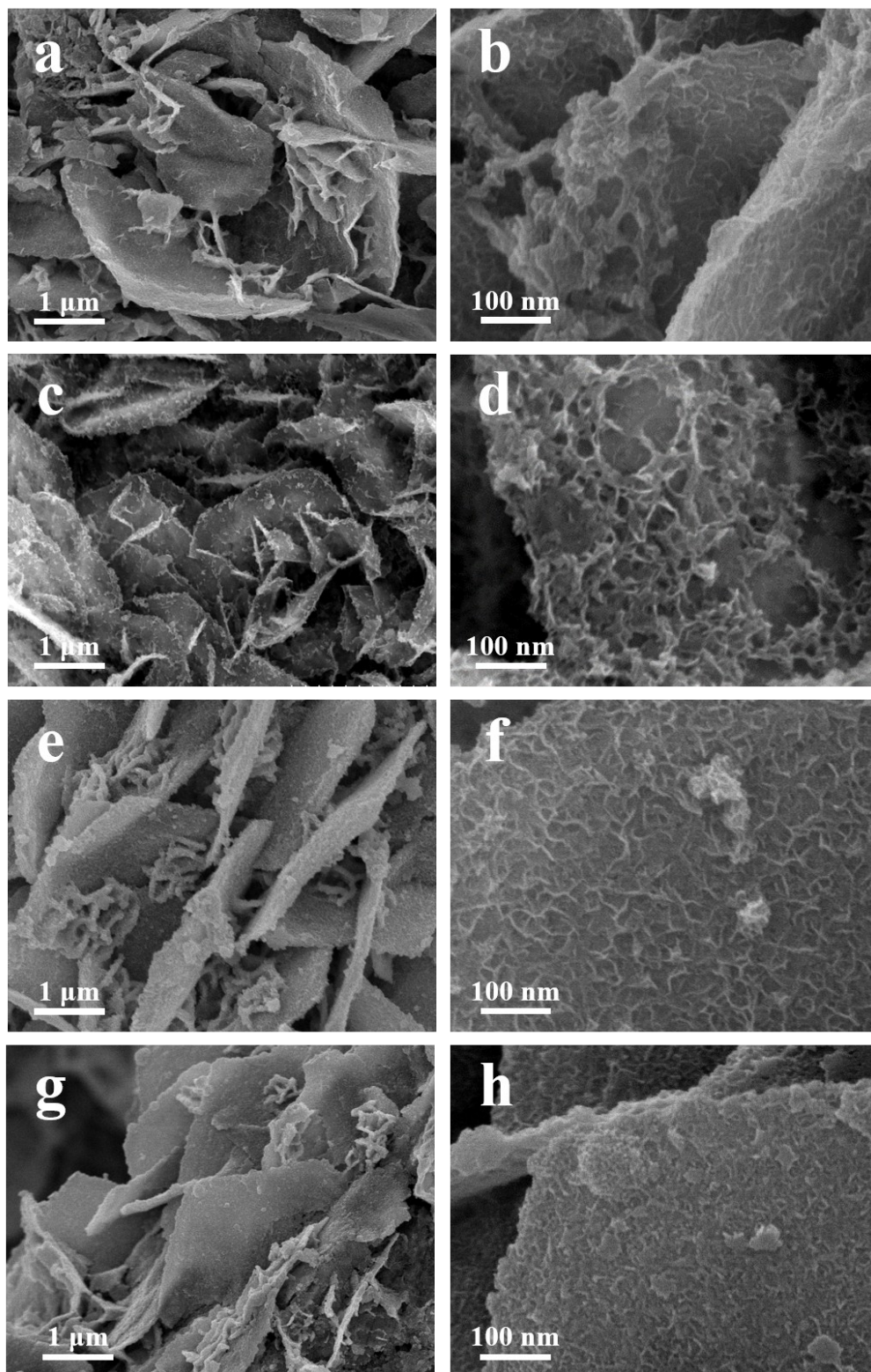


Figure S1. High and low magnification SEM images of Ni(OH)₂/NiS/CC with electroplating time of 200 s (a, b), 600s (c, d), 1200s (e, f), and 2000s (g, h).

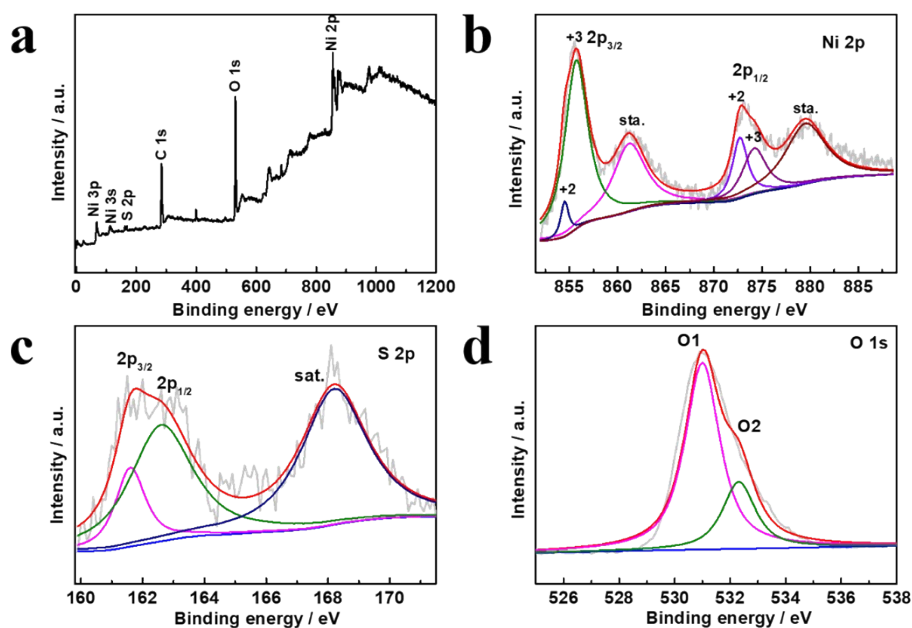


Figure S2. (a) Survey XPS spectrum of Ni(OH)₂/NiS/CC (0.10 g of NH₄F); its corresponding high-resolution XPS curves of Ni 2p (b), S 2p (c) and O 1s (d).

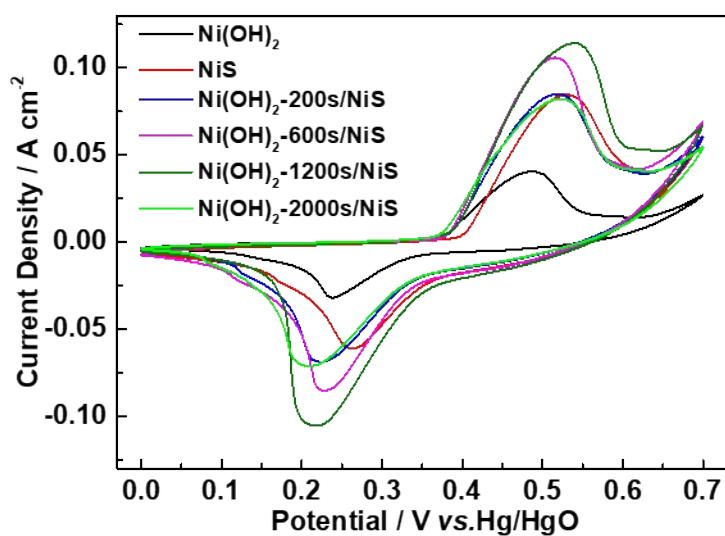


Figure S3. (a) CV curves of Ni(OH)₂-1200s, NiS, and Ni(OH)₂/NiS/CC with various of electroplating times (200s, 600s, 1200s, 2000s) measured at 5 mV s⁻¹.

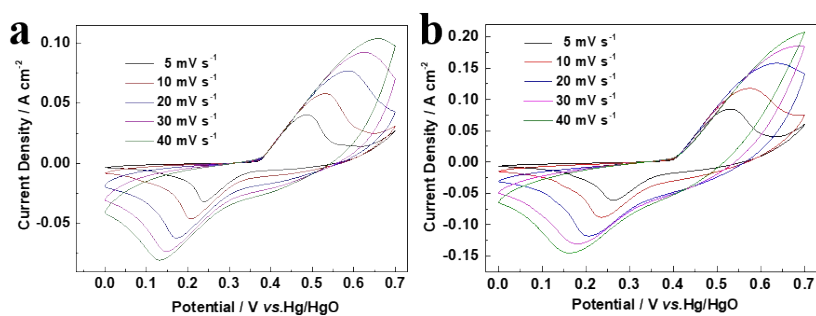


Figure S4. CV curves of Ni(OH)₂/CC (a), NiS/CC (b) measured at different scan

rate.

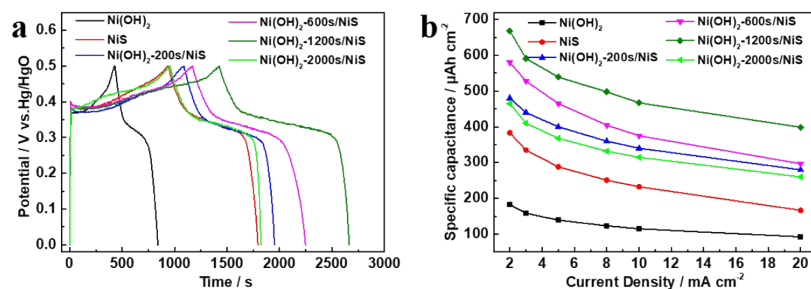


Figure S5. (a) Galvanostatic charge-discharge (GCD) curves of Ni(OH)₂-1200s, NiS, and Ni(OH)₂/NiS/CC with various of electroplating times (200s, 600s, 1200s, 2000s) measured at 2 mA cm⁻²; (b) Areal capacity values of the as-prepared electrodes measured at different current densities.

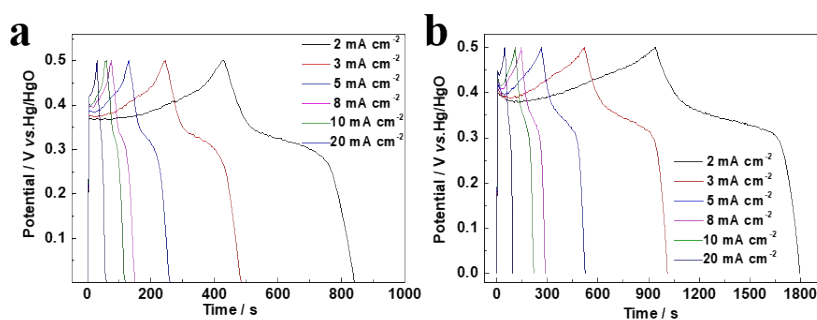


Figure S6. Galvanostatic charge-discharge (GCD) curves of (a) NiS/CC and (b) Ni(OH)₂/Ni₂/CC samples at different current densities.

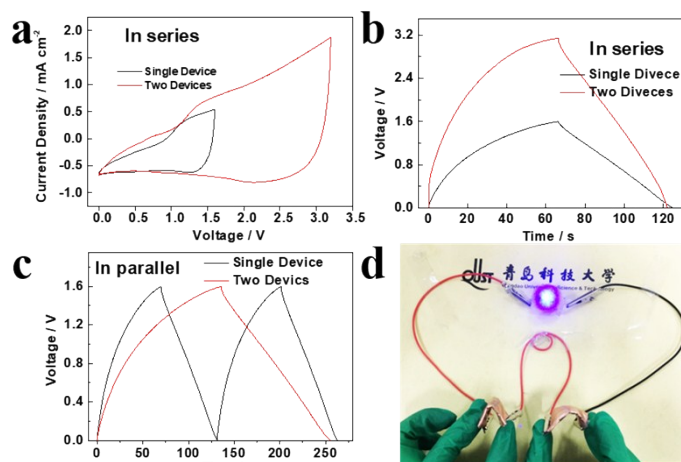


Figure S7. (a) CV curves of two SASCs connected in series. (b) GCD curve of two

SASCs connected in series. (c) GCD curves of ASCs connected in parallel over same voltage range. (d) picture of LED powered by two SASCs connected in series.

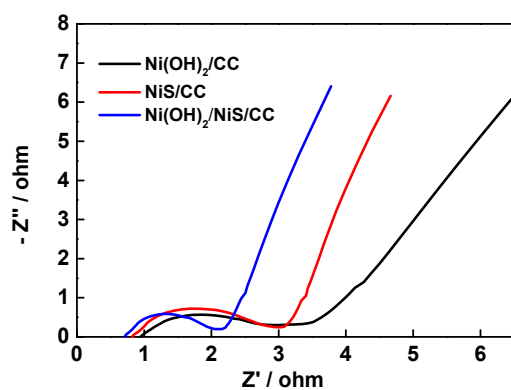
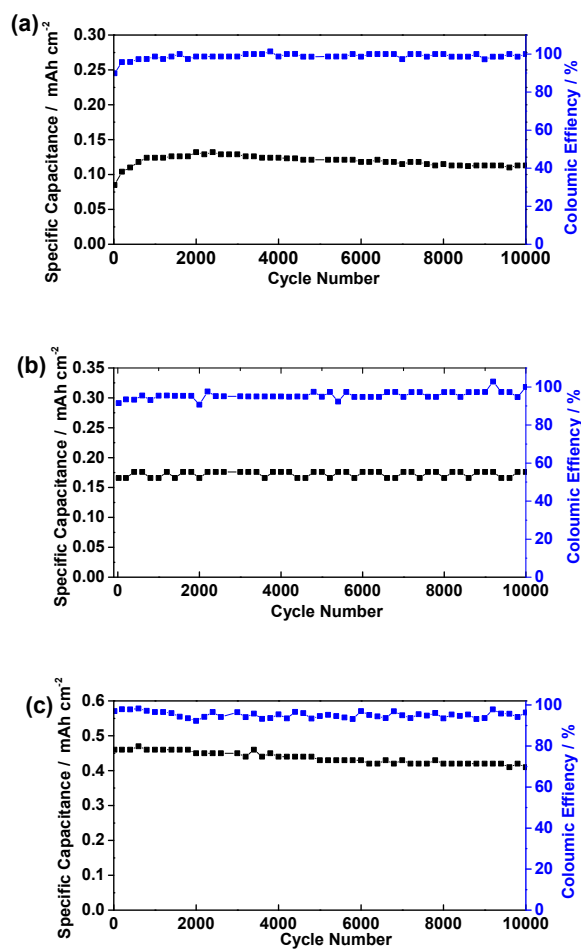


Figure S8. EIS curves of $\text{Ni(OH)}_2/\text{CC}$, NiS/CC , $\text{Ni(OH)}_2/\text{NiS}/\text{CC}$ samples.



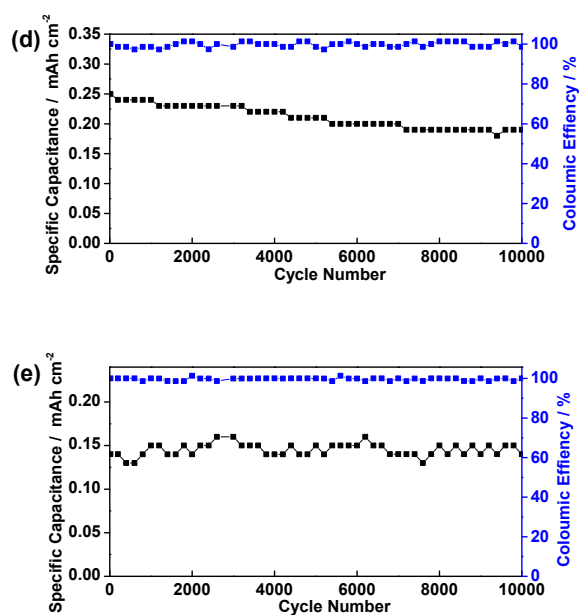


Figure S9. (a) Long-term stability curves of Ni(OH)₂/CC//AC tested at 10 mA cm⁻² (b) Long-term stability curves of NiS/CC//AC tested at 10 mA cm⁻². (c) Long-term stability curves of Ni(OH)₂/NiS/CC tested at 10 mA cm⁻². (d) Long-term stability curves of NiS/CC tested at 10 mA cm⁻². (e) Long-term stability curves of Ni(OH)₂/CC tested at 10 mA cm⁻².

Table S1. Comparison of the capacitor performance of as-prepared Ni(OH)₂/Ni₃S₂/CC electrode with other reported nickel sulfide compound-based electrodes

Electrode materials	Specific Capacitance (F cm ⁻²)	Energy density (Wh kg ⁻¹)	Power density (W kg ⁻¹)	Cycle number	Percentage	Reference
Ni(OH) ₂ /NiS/CC	6.357	100.95	18.17	10000	97 %	This work
NiS@Ni(OH) ₂	3.85			2000	99.1 %	Energy & Environmental Science, 2013, 6(7): 2216-2221.
3D NiS nanosheet	2.74	35	2.62	6500	91.4 %	Journal of Materials Chemistry A, 2014, 2(36): 15111-15117.
NiS nanosheet	3.6	55	3.55	5000	89.3 %	NPG Asia Materials, 2016, 8(8): e300.
NiS ₂ nanosheets	1.34			3000	93.6 %	RSC Advances, 2015, 5(32): 25446-25449.

Flower-Like Ni ₃ S ₂	5.32	37.19	7.99	5000	85.6 %	Electrochimica Acta, 2016, 191: 705-715.
Hierarchical NiS	6.09	25.5	10.8	1000	69 %	Chemical Engineering Journal, 2014, 251: 116- 122.
Ni ₃ S ₂ nanoarrays	2.47	82.98	9.63	2000	86.7 %	Chemical Engineering Journal, 2017, 322: 498- 509.
NiS@CdS/NF	3.15	127.5	0.995	4000	130 %	Journal of Materials Chemistry A, 2017,5(15): 7165-7172.
Ni(OH) ₂ /ZnO	4.35	51.5	9.0	1000	85 %	Journal of Power Sources, 2016, 308: 29-36.
Ni(OH) ₂	2.71			1000	82 %	Chemical Communications, 2015, 51(15): 3053-3056.
Ni(OH) ₂ nanosheets	3.21	36.2	21	1000	92 %	Journal of Power Sources, 2014, 246: 371-376.
Ni(OH) ₂ nanosheet	4.15	75	20	5000	80 %	Electrochimica Acta, 2016, 211: 44-51.
α-Ni(OH) ₂	3.12	25	1	5000	84 %	Electrochimica Acta, 2019, 297: 173-187.