Supplementary Information

Formation of nickel-cobalt sulphide@graphene composites with enhanced electrochemical capacitive properties

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Table S1. electrochemical performance parameters for Ni-Co-S@G//AC supercapacitor

Current density (A g^{-1})	**Specific capacitance** (F g^{-1})	**Energy density** (W h Kg^{-1})	**Power density** (W Kg^{-1})
1	217.8	51.0	650.3
2	205.0	48.1	1340.5
3	190.5	44.7	1945.4
4	178.9	41.9	2610.8
5	168.2	39.4	3270.2
6	152.5	35.7	3956
7	139.8	32.8	4598
8	120.2	28.2	5235
9	109.7	25.7	5850
10	101.6	23.9	6521
11	90.6	21.1	7099
12	84.0	19.7	7800
13	76.0	17.8	8450
14	70.0	16.4	9100
15	65.7	15.4	9750
16	61.5	14.4	10393
17	57.5	13.5	11050
18	54.3	12.7	11700

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Table S2. Performance comparison of Ni-Co-S based electrode materials for supercapacitors

materials	Specific capacitance Fg^{-1} (conditions)	Capacitance retention (circles)	Energy density (Wh kg^{-1})	Power density (W kg^{-1})	electrolyte	reference
$NiCo_2S_4$@Graphene	1432.5 (1 A g^{-1})	83.4% （5000）	43.4	254.3	2M KOH	1
Ni-Co sulfide nanowires	1176 (30 mA cm^{-2})	78.5% （3000）	25	447	1M KOH	2
$NiCo_2S_4$@MnO_2	1337.8 (2 A g^{-1})	82% (2000)	None	None	6M KOH	3
Carbon@$NiCo_2S_4$	1455 (1 A g^{-1})	83% (2000)	None	None	6M KOH	4
$NiCo_2S_4$ ball in ball spheres	1036 (1 A g^{-1})	87% (2000)	42.3	476	6M KOH	5
Onion-like $NiCo_2S_4$ particles	1016 (2 A g^{-1})	87% (10000)	42.7	1583	6M KOH	6
$NiCo_2S_4$ nanostructured arrays	1154 (1 A g^{-1})	92.8 (8000)	17.3	200	2M KOH	7
$NiCo_2S_4$ nanosheets/ carbon foams	1231 (2 A g^{-1})	90.4% (2000)	45.5	512	6M KOH	8
Porous $Ni_{1.5}Co_{1.5}S_4$	1093 (1 A g^{-1})	108% (2000)	37.6	775	6MKOH	9
Mesoporous $NiCo_2S_4$ nanoparticles	1440 (3 A g^{-1})	91.7% (5000)	28.3	245	2M KOH	10
$NiCo_2S_4$ urchin-like nanostructures	1149 (1 A g^{-1})	91.4% (5000)	None	None	6M KOH	11
$NiCo_2S_4$ hollow spheres	1263 (2 Ag $^{-1}$)	87% (20000)	None	None	1M KOH	12
$Co_{1.5}Ni_{1.5}S_4$ dendrite/quasi spherical	1321.9 (1 A g^{-1})	88.8% (2000)	32.4	103.4	2M KOH	13
Ni-Co-S/graphene	1492 (1 A g^{-1})	None	43.3	800	6M KOH	14
Ni-Co-S/NF	1406.9 （0.5 A g^{-1}）	88.6% （1000）	24.8	849.5	1M KOH	15
CNTs@Ni-Co-S nanosheets	222 mAh g^{-1} (4 A g^{-1})	90.6% (2000)	46.5	800	6M KOH	16
Ni-Co-S	1377.5 (1 A g^{-1})	93.7% (3000)	36.9	1066.42	3M KOH	17
$NiCo_2S_4$ nanosheet	1490.3	93.2%	35.17	555.6	2M KOH	18

	(30 mA cm^{-2})	(5000)				
$NiCo_2S_4$ nano-petals	2036.5	94.3%	35.6	819.5	1 M KOH	19
	(1 A g^{-1})	(5000)				
$NiCo_2S_4$ nanotube	14.39 F cm^{-2}	92%	16.6	2348.5	6 M KOH	20
	(5 mA cm^{-2})	(5000)				
Core-shell $NiCo_2S_4$	1948	94%	10.6	2470	6 M KOH	21
	(1 A g^{-1})	(5000)				
Hollow $NiCo_2S_4$	1279	92%	21	4725	6 M KOH	22
nanotube	(1 A g^{-1})	(2000)				
$NiCo_2S_4$ nanosheets	744	93.4 %	10.8	8000	3 M KOH	23
	(1 A g^{-1})	(1500)				
Ni-Co-S@graphene	1463	87.4%	51.0	650.3	6M KOH	This
	(1 A g^{-1})	（1000）				work

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