

Supporting information

Designing graphene-wrapped NiCo_2Se_4 microspheres with petal like FeS_2 toward flexible asymmetric all-solid-state supercapacitors

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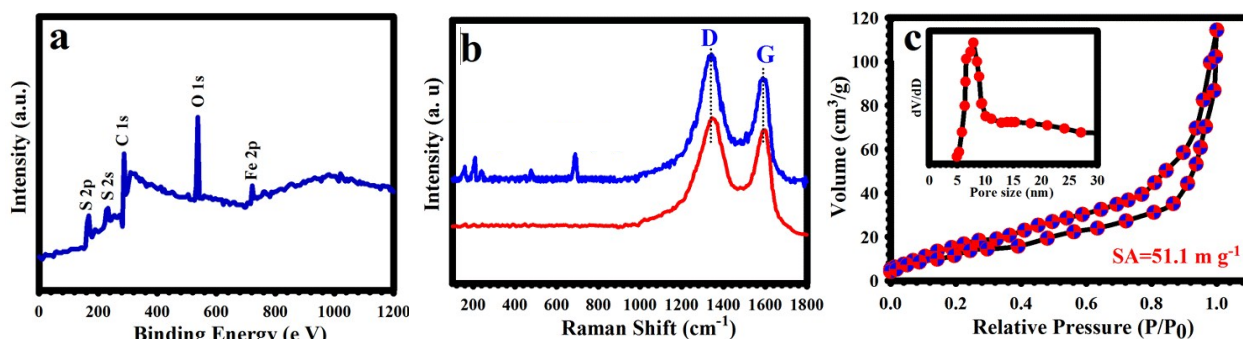


Fig. S1. (a) Survey XPS FeS_2 . (b) Raman spectra of the graphene (red) and graphene-wrapped NiCo_2Se_4 microspheres (blue) samples. (c) BET plots of the NiCo_2Se_4 microspheres sample, and its corresponding BJH pore size distribution plot(inset).

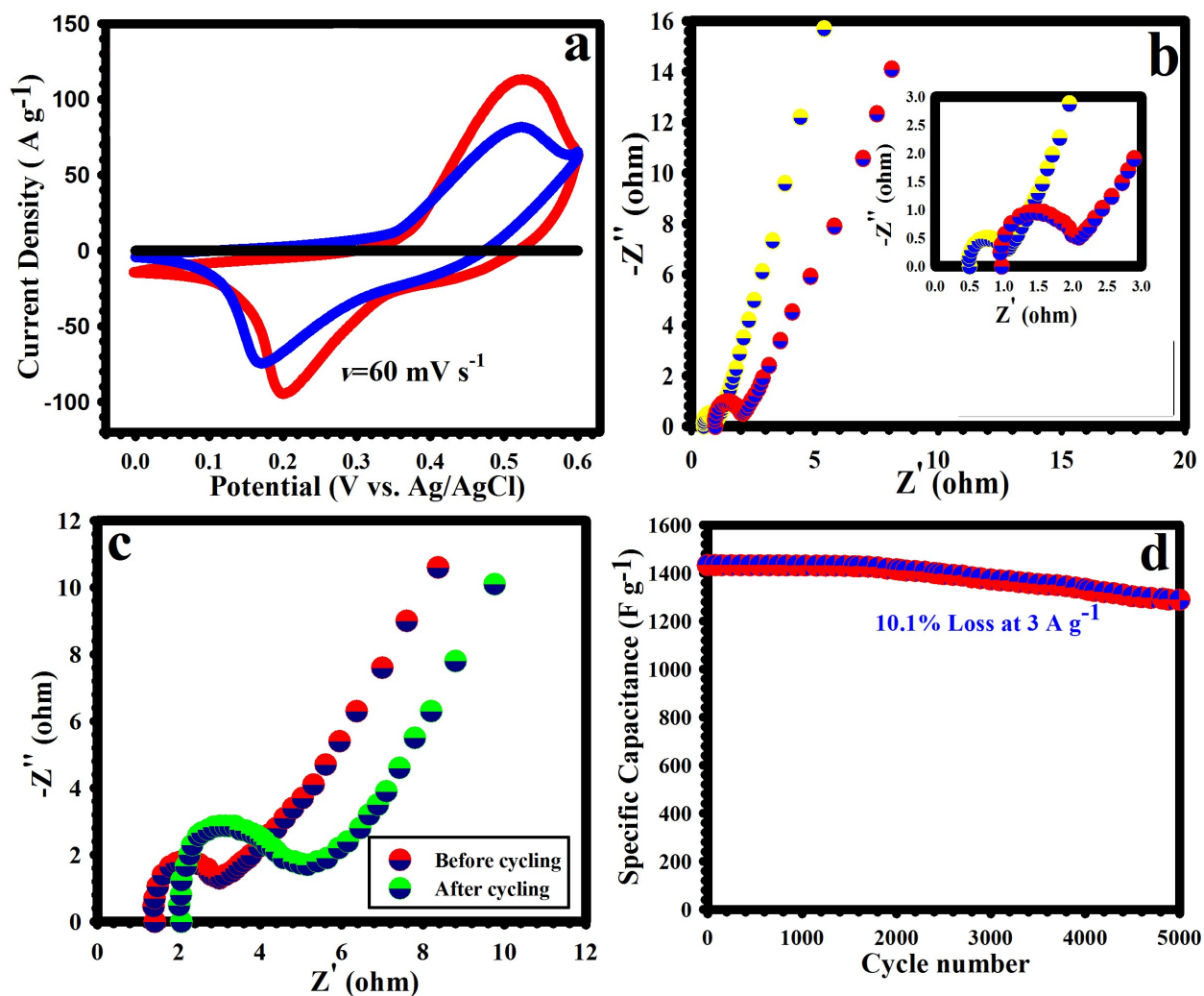


Fig. S2. (a) CV curves of the nickel foam substrate (black curve), NiCo₂Se₄ microspheres on nickel foam (blue curve) and graphene-wrapped NiCo₂Se₄ microspheres on nickel foam electrode (red curve) at scan rate 60 mV s⁻¹. (b) Nyquist plots of the NiCo₂Se₄ microspheres on nickel foam (red plot) and graphene-wrapped NiCo₂Se₄ microspheres on nickel foam electrode (yellow plot). (c) Nyquist plots of the FeS₂ on nickel foam electrode after and before 5000 cycling. (d) Durability of the NiCo₂Se₄ microspheres on nickel foam electrode at current density of 3 A g⁻¹.

Composition	Capacitance 3 and 2 electrodes (F g ⁻¹)	Cycles, retention 2 and 3 electrode	ED (W h kg ⁻¹) 2 Electrode	Reference
<i>Nickel-cobalt sulfide</i>	<i>1036 440 (3 E)</i> <i>119.1 (2 E)</i>	<i>2000, 87% (3 E)</i> <i>10000, 87.6% (2 E)</i>	<i>42.3</i>	<i>1</i>

CuCo₂O₄@MnO₂NSCs	416 (3 E) 78 (2 E)	4200, 92.1% (3 E)	43.3	2
CeO₂@MnO₂	225 (3 E) 49.5 (2 E)	3000, 90.1 (3 E)	25.7	3
H-CuO@GC	677 (3 E) 108.70 (2 E)	8000, 86.70 % (3 E) 10000, 90.20 (2 E)	38.60	4
0.1Co/Cu-MOF/Cu₂₊₁O	518.58 (3 E) 82.14 (2 E)	5000, 97.26 (3 E) 5000, 88.23 (2 E)	25.67	5
ZnO/Co₃O₄	1983 (3 E) 198 (2 E)	5000, 84.5 (3 E) 5000, 86.5	70.4	6
ZnS NWs/Cu₇S₄ NPs/rGO	1114 (3 E) 207 (2 E)	5000, 88 (3 E) 5000, 77 (2 E)	22	7
ZnCo₂O₄	542.5 (3 E) 80.71 (2 E)	2000, 95.5% (3 E) 1000, 76.68% (2 E)	21.97	8
NCS-HL	1682 (3 E) 190 (2 E)	3000, 90.1 (3 E) 5000, 82.88% (2 E)	49.38	9
Co₃O₄@PPy@MnO₂	629 (3 E) 96.5 (2 E)	10000, 100% (2 E)	34.3	10
PCs/NiCo₂S₄	605.2 (3 E) 190 (2 E)	5000, 91.3% (3 E) 5000, 92.7% (2 E)	23.3	11
NiCo₂O₄@NiMoO₄	1067 (3 E)	5000, 84% (3 E) 5000, 87% (2 E)		12
NiS@ZnS	1533 (3 E)	3000, 97.9% (3 E)		13

<i>Our work</i>	<i>2112.30 (3 E)</i>	<i>5000, 93.20 (3 E)</i>	<i>78.68</i>	<i>This work</i>
	<i>221.30 (2 E)</i>	<i>5000, 90.8 (2 E)</i>		

Table S1. Comparison of the electrochemical performance of graphene-wrapped NiCo₂Se₄ microspheres on nickel foam electrode in three and two electrode systems with other previously reported electrodes.

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