Electronic Supplementary Information

In Situ Synthesis of $NiCo_2O_4$/Carbon Nanocomposites: Play of Carbon Content and Symmetric/Asymmetric Device Configuration on Supercapacitor Performance

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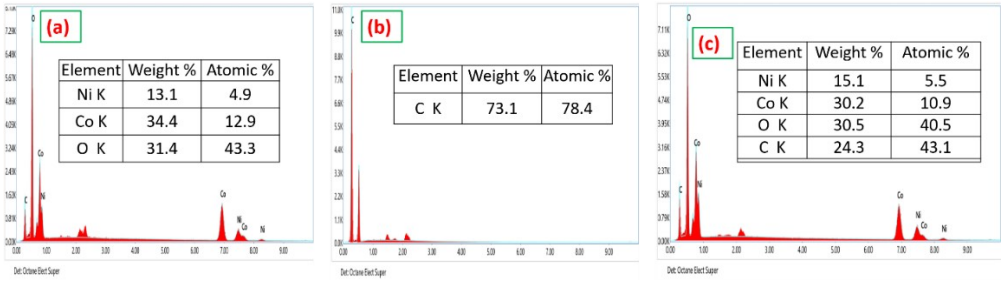

Fig. S1 EDS analysis of the elements present in nanomaterials: (a) $NiCo_2O_4$; (b) CNS and (c) $NiCo_2O_4$/C (D2).

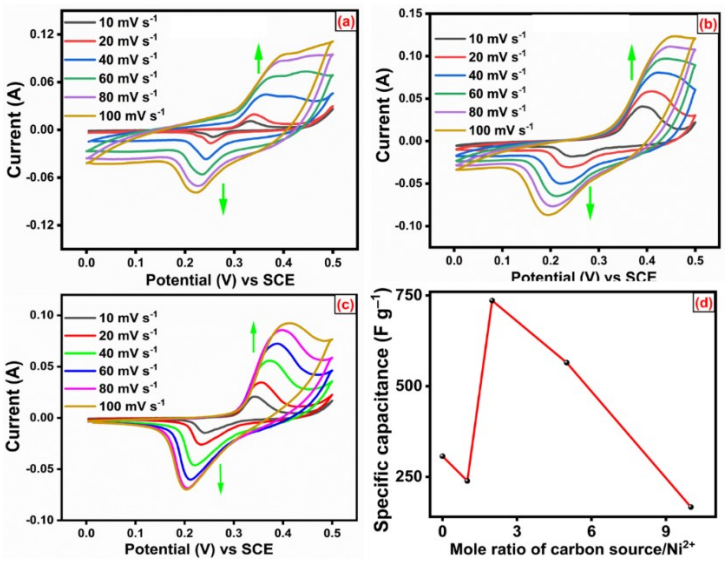

Fig. S2 CV curves at different scan rates: (a) $NiCo_2O_4$/C (D1); (b) $NiCo_2O_4$/C (D5); (c) $NiCo_2O_4$/C (D10) and (d) Impact of carbon mole ratio with respect to Ni^{2+} in $NiCo_2O_4$/C (Dx) based nanocomposites.

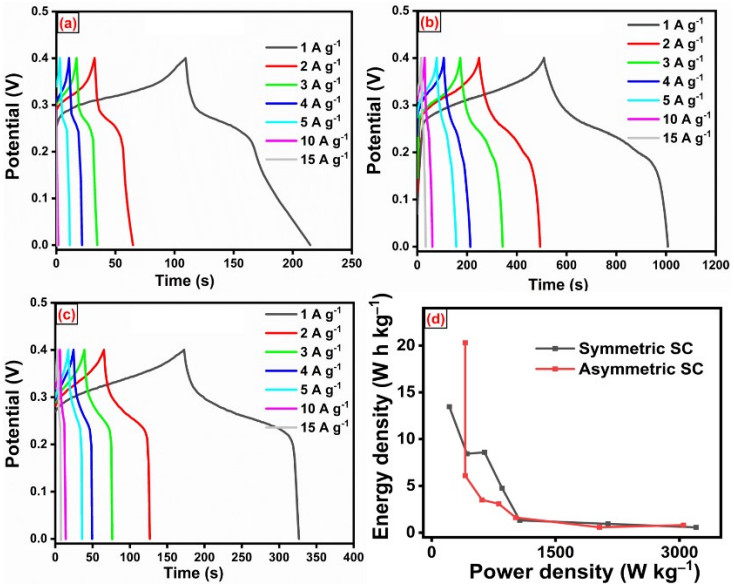

Fig. S3 GCD curves at different current densities: (a) $NiCo_2O_4$/C (D1); (b) $NiCo_2O_4$/C (D5); (c) $NiCo_2O_4$/C (D10) and (d) Ragone plot of symmetric and asymmetric SCs.

Table S1 Three electrode specific capacitance of $NiCo_2O_4$, CNS and $NiCo_2O_4$/C based nanocomposites at current density 1 A g^{-1} using 3 M KOH electrolyte.

S. No.	Electrode Materials	Specific capacitance (F g^{-1})
1	$NiCo_2O_4$	307
2	CNS	52
3	$NiCo_2O_4$/C (D1)	239
4	$NiCo_2O_4$/C (D2)	736
5	$NiCo_2O_4$/C (D5)	565
6	$NiCo_2O_4$/C (D10)	167

Table S2 Comparison of the supercapacitor performance of $NiCo_2O_4$/C (D2) nanocomposite with similar and some advanced electrode materials.

S. No.	Material	Methodology	Electrolyte	Specific capacitance (F g^{-1} or *F cm^{-2})	Cyclic stability (capacity retention %)	Ref.
1	Nitrogen-doped carbon capsules@NiO/$NiCo_2O_4$	*In situ* calcination	3 M KOH	659	93.5% after 8000 cycles	1
2	Carbon/$NiCo_2O_4$ composite	Hydrothermal	3 M KOH	204.3	90.35% after 3000 cycles	2
3	$NiCo_2O_4$/carbon-active composite	Hydrothermal	6 M KOH	273.5	96% after 3000 cycles	3
4	Carbon nanotube@ $NiCo_2O_4$	One-pot co-precipitation	6 M KOH	210	92.70% after 2500 cycles	4
5	Porous marigold micro-flower like $NiCo_2O_4$	Chemical bath deposition	6 M KOH	530	90.5% after 3000 cycles.	5
6	Submicron-sized $NiCo_2O_4$	Sol–gel method	1 M KOH	217	96.3% after 600 cycles	6
7	$NiCo_2O_4$@g-C_3N_4(C)	Hydrothermal	3 M KOH	325.7	93.6% after 2000 cycles	7
8	$NiCo_2O_4$/carbon cloth	Hydrothermal	6 M KOH	249.7	63.3% after 1000 cycles	8
9	$NiCo_2O_4$ nanospheres	Laser ablation in liquid and hydrothermal	1 M KOH	299.7	90.4% after 10,000 cycles	9
10	Polypyrrole-decorated $SrFeO_3$−δ perovskites on carbon cloth	Electrochemical deposition	6 M KOH	421	63.6% after 3000 cycles	10
11	Fe-substituted $SrCoO_3$ perovskites	Solid-state sintering	1 M NaOH	527	85.7% after 5000 cycles	11
12	Fe_3Mo_3C/Mo_2C@ carbon nanotubes	Hydrothermal	1 M KOH	202.3	73.9 % after 4000 cycles	12
13	Cobalt vanadate on CoO urchin-like microspheres	Multi-step process	3 M KOH	*7.58	84.6% after 5000 cycles	13
14	$NiCo_2O_4$/C (D2)	*In situ* hydrothermal	3 M KOH	736	84.9% after 1000 cycles	*This report*

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