Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

A Facile One-Step Hydrothermal Approach to Synthesize Hierarchically Core-Shell $NiFe_2O_4$@$NiFe_2O_4$ Nanosheet Arrays on Ni Foam with Large Specific Capacitance for Supercapacitors

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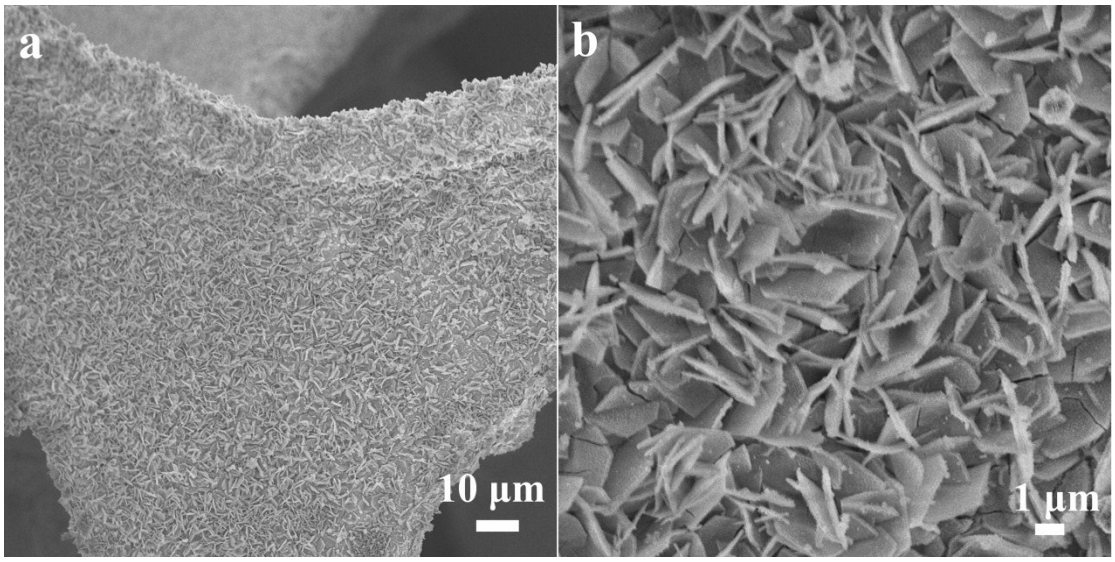

Figure S1. Low magnification SEM images.

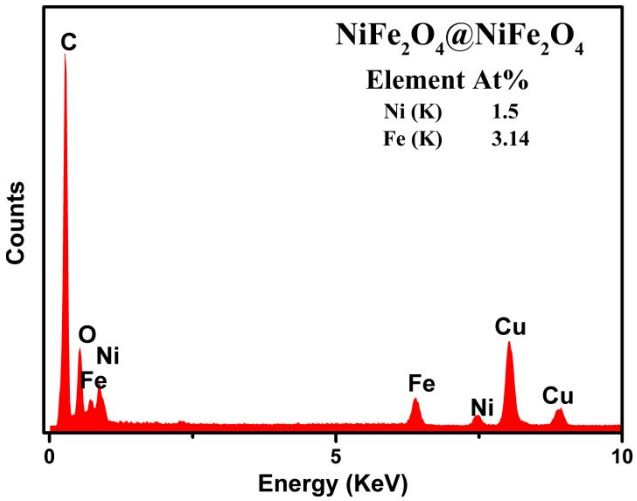

Figure S2. EDS spectra of $NiFe_2O_4$@ $NiFe_2O_4$ core-shell NSAs.

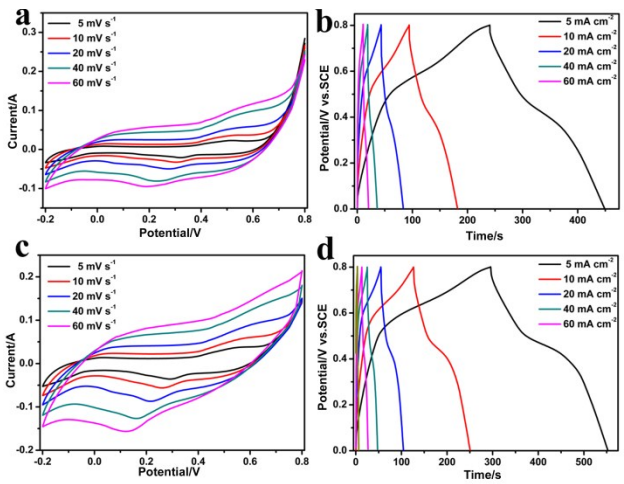

Figure S3. CV curves of (a) NFNF-2, (c) NFNF-6 electrode at various scan rates ranging from 5 to 60 mV s^{-1}; CD curves of (b) NFNF-2, (d) NFNF-6 electrode at different current densities.

Nyquist plots of NFNF-2, NFNF-4 and NFNF-6 NSAs were taken in the frequency range from 0.01 Hz to 100 kHz under open circuit potential (OCP) were shown in Figure S4. The EIS plot consisted of a quasi-small semicircle in the high frequency region, representing the charge transfer process. A straight line with a slope towards the low frequency domain, represented the Warburg resistances (W_o) for three electrode materials were almost the same. In the high frequency domain, the bulk resistance (R_s) values of NFNF-2, NFNF-4 and NFNF-6 NSAs were found to be 1.02 Ω, 0.97 Ω and 1.01 Ω, respectively. As discussed above, the NFNF-4 NSAs possessed highest electronic conductivity and lowest equivalent series resistance (ESR) among the three electrodes.

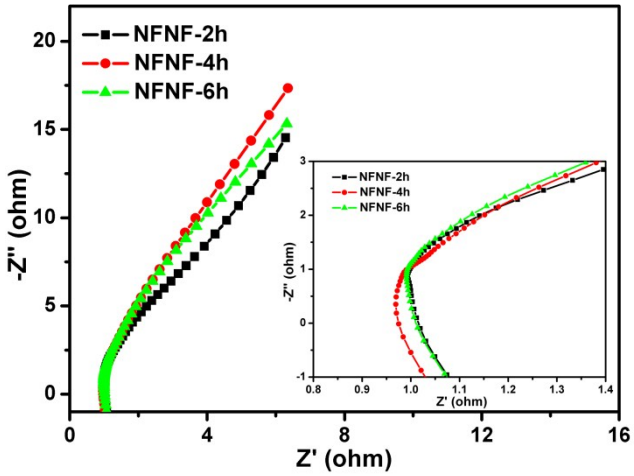

Figure S4 Nyquist plots of NFNF-2, NFNF-4 and NFNF-6 NSAs.

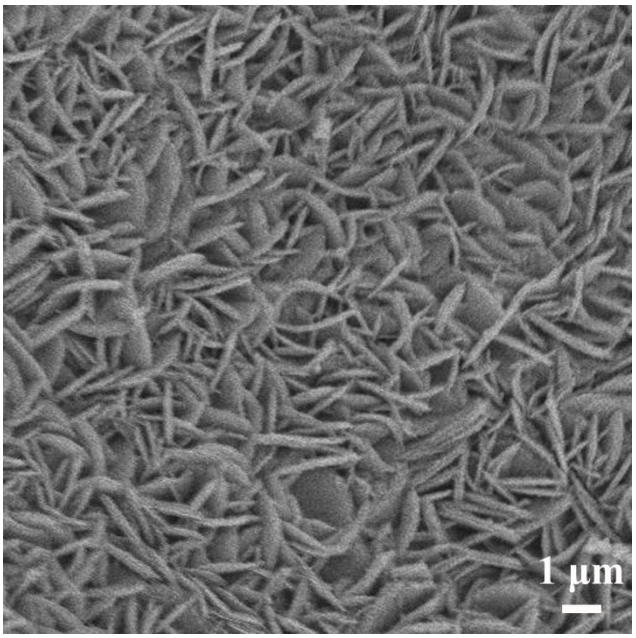

Figure S5 SEM of $NiFe_2O_4$@$NiFe_2O_4$ core-shell NSAs after 5000 cycling tests.

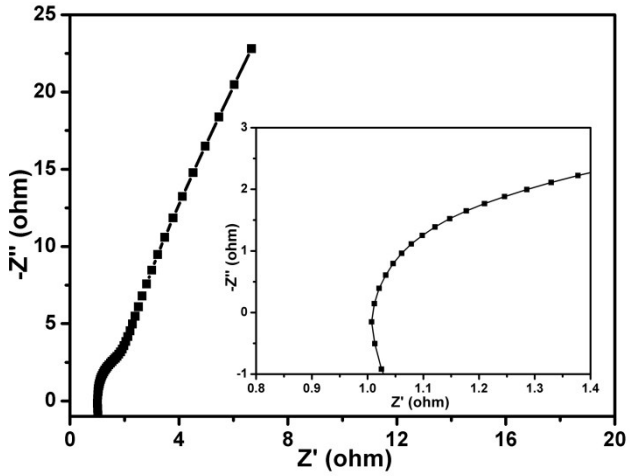

Figure S6 Nyquist plots of $NiFe_2O_4$@$NiFe_2O_4$ core-shell NSAs after 5000 cycling tests.

Table S1 The comparison results of electrochemical performance for NFNF-2, NFNF-4 and NFNF-6 composite electrodes.

Samples	Mass loading (mg cm^{-2})	*C*a (F cm^{-2})	*C*s (F g^{-1})	Rate capability (%)
NFNF-2	1.18	1.13	1031.6	58.7
NFNF-4	1.31	1.65	1377.4	63.6
NFNF-6	1.43	1.55	1193.1	63.5

Table S2 Comparison of energy density of our hybrid supercapacitor and other previously reported asymmetric supercapacitors.

Asymmetric Supercapacitors	**Energy density**	**Ref.**
$NiFe_2O_4$@$NiFe_2O_4$//AC	45.2 Wh kg^{-1} at 174 W kg^{-1}	This work
Co-Fe LDH@NiO-Ni//AC	22 Wh kg^{-1} at 800 W kg^{-1}	54
$NiFe_2O_4$/CNT//N-doped graphene	23 Wh kg^{-1} at 872 W kg^{-1}	55
$Ni(OH)_2$//Fe_2O_3/RGO/Fe_3O_4	4.1 Wh kg^{-1} at 661.5 W kg^{-1}	56
Ni-Fe LDH/GHA	17.6 Wh kg^{-1} at 650 W kg^{-1}	57