Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

In situ preparation of SAC-RGO@Ni electrode by electrochemical functionalization of reduced graphene oxide using sulfanilic acid azocromotrop and its application in Asymmetric supercapacitor

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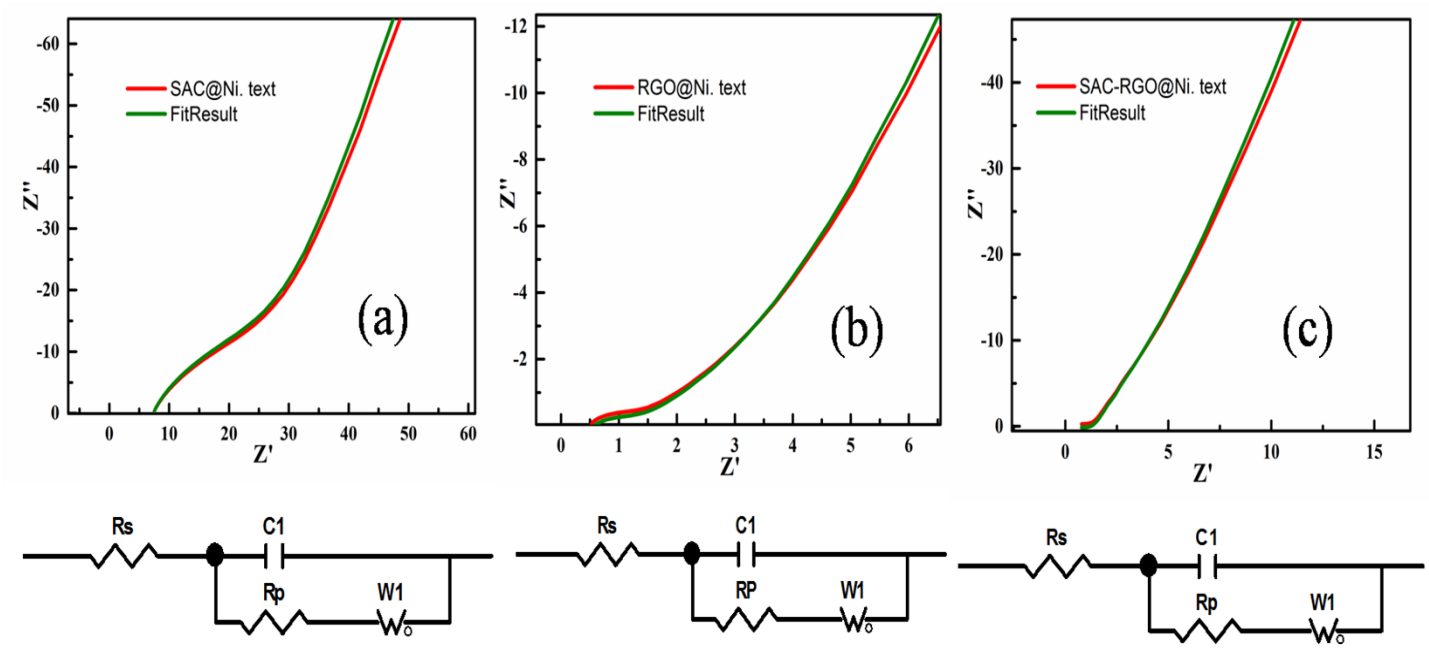
Sample preparation for characterization

Small pieces of deposited nickel foam (SAC-RGO@Ni) were directly used for the FE-SEM analysis. Deposited nickel foam was scratched to collect the powder. The collected powder (SAC-RGO) was used for XRD, XPS and FT-IR analysis. Very thin pellet was formed with the collected powder for the conductivity measurement by fourth probe method. The collected powder was dispersed in ethanol by 30 min ultra sonication and the dispersion was drop casted onto a fresh lacey carbon copper grid for the TEM analysis.

The deposited nickel foam was directly used for the electrochemical measurement. The three electrode measurement was carried out by 3 cm × 0.5 cm deposited nickel foam and for the two electrode measurement the deposited nickel foam was shaped in a circle with a diameter of 1 cm.



Element	Freedom	Value
Rs	Free(+)	8.921
C1	Free(+)	0.00020559
Rp	Free(+)	5.35
W1-R	Free(+)	48
W1-T	Free(+)	0.12481
W1-P	Free(+)	0.38557

Element	Freedom	Value
Rs	Free(+)	0.51947
C1	Free(+)	0.0014069
RP	Free(+)	0.21926
W1-R	Free(+)	2.458
W1-T	Free(+)	0.2883
W1-P	Free(+)	0.3175

Element	Freedom	Value
Rs	Free(+)	0.6
C1	Free(+)	1.551
Rp	Free(+)	0.51
W1-R	Free(+)	2.12
W1-T	Free(+)	0.021
W1-P	Free(+)	0.31574

Fig. S1 The Zview fitting of EIS, equivalent circuit and corresponding results of (a) SAC@Ni, (b) RGO@Ni and (c) SAC-RGONi. Rs is the solution resistanec, Rp is the charge transfer resistance, (W–R) is the Warburg resistance, (W–T) is the diffusion time constant and (W-P) is the Warburg exponent.

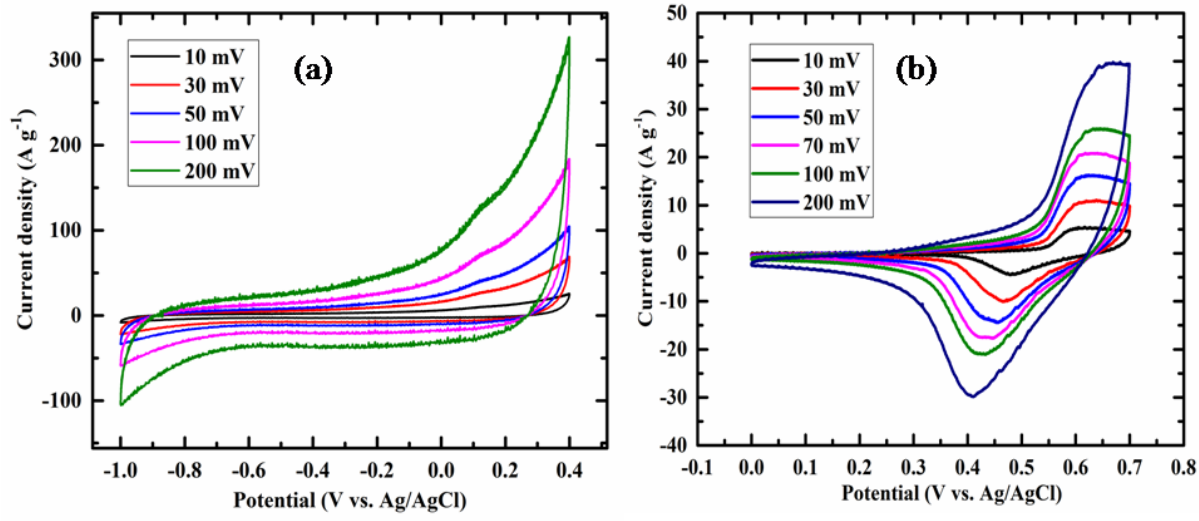


Fig. S2 Specific capacitance with scan rate of (a) RGO@Ni and (b) SAC@Ni.

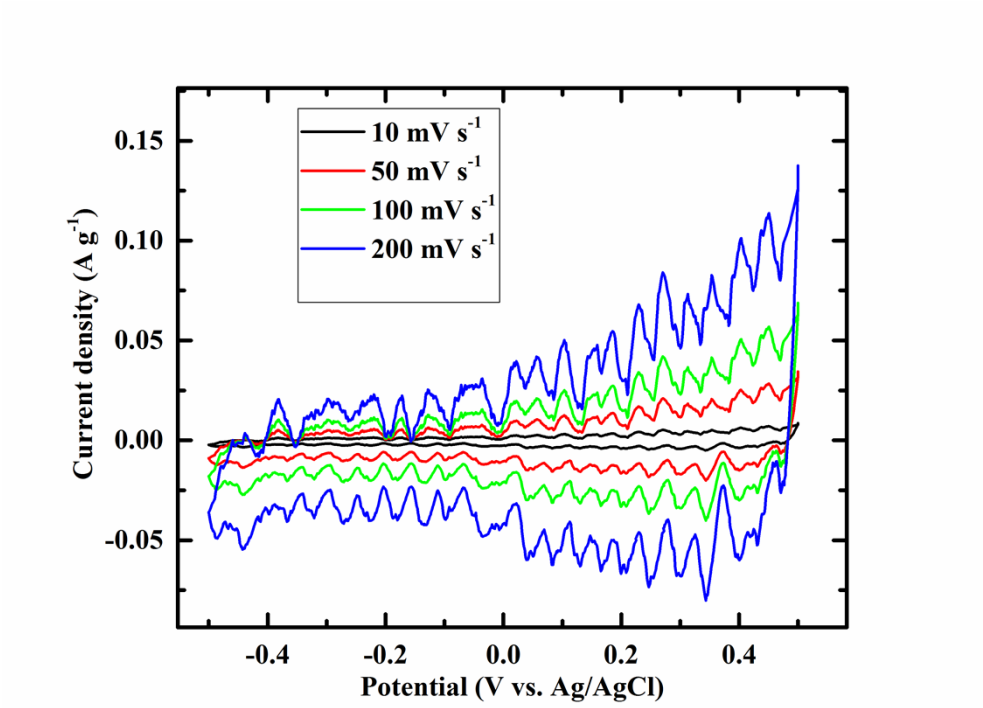


Fig. S3 CV plots of bare nickel foam at different scan rates.

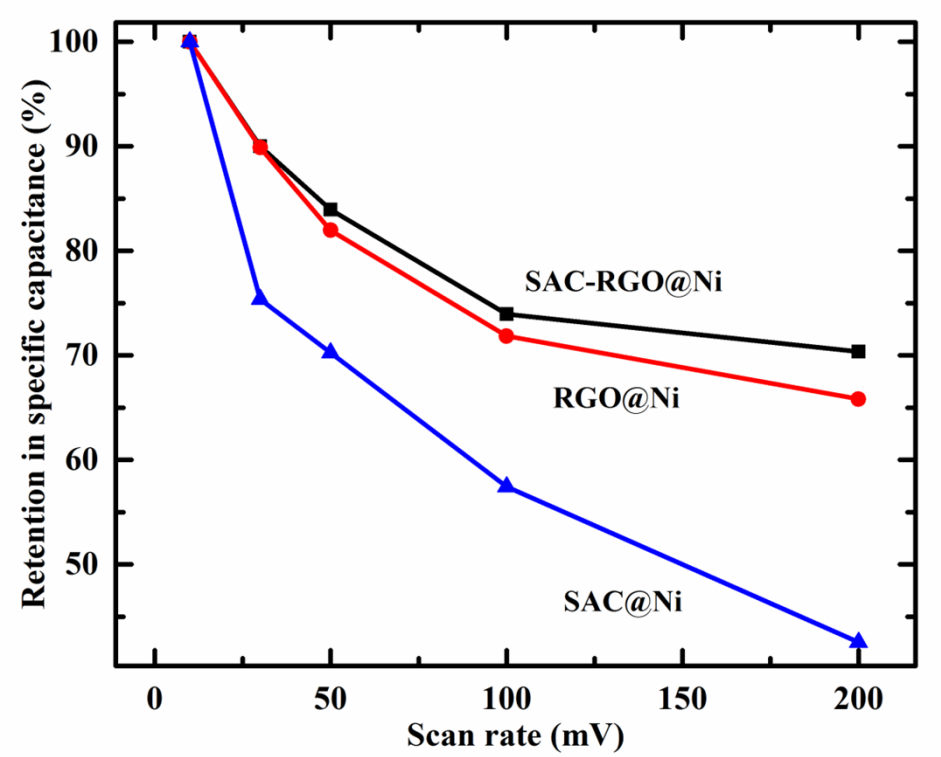


Fig. S4 Retention of specific capacitance with scan rates for (a) SAC@Ni, (b) RGO@Ni and (c) SAC-RGO@Ni.

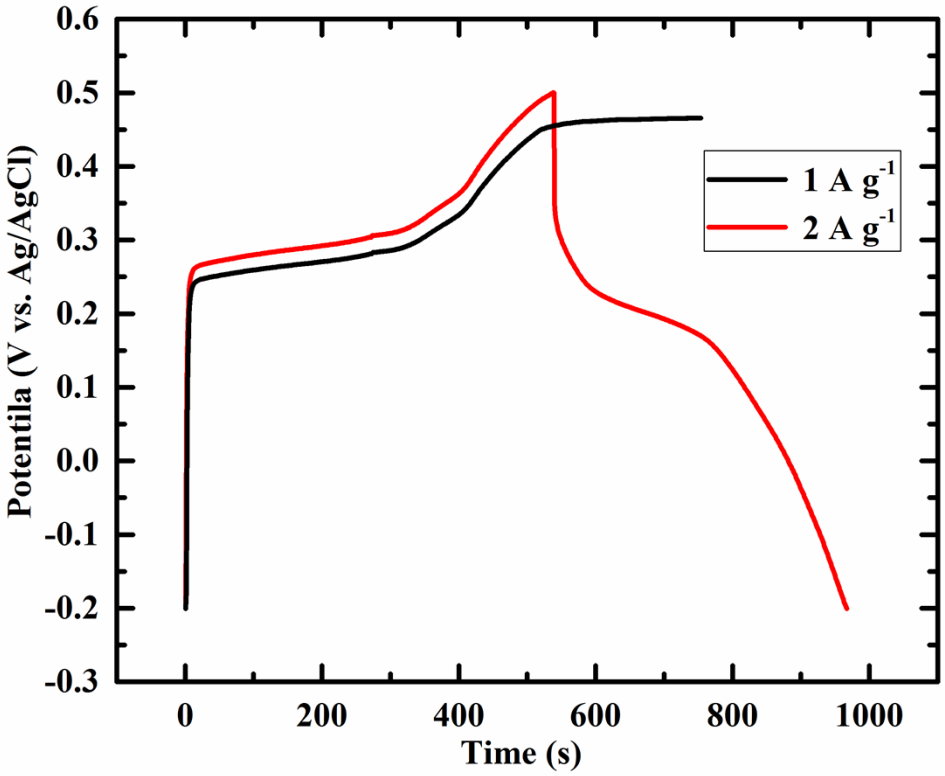


Fig. S5 CD of SAC-RGO@Ni at low current density

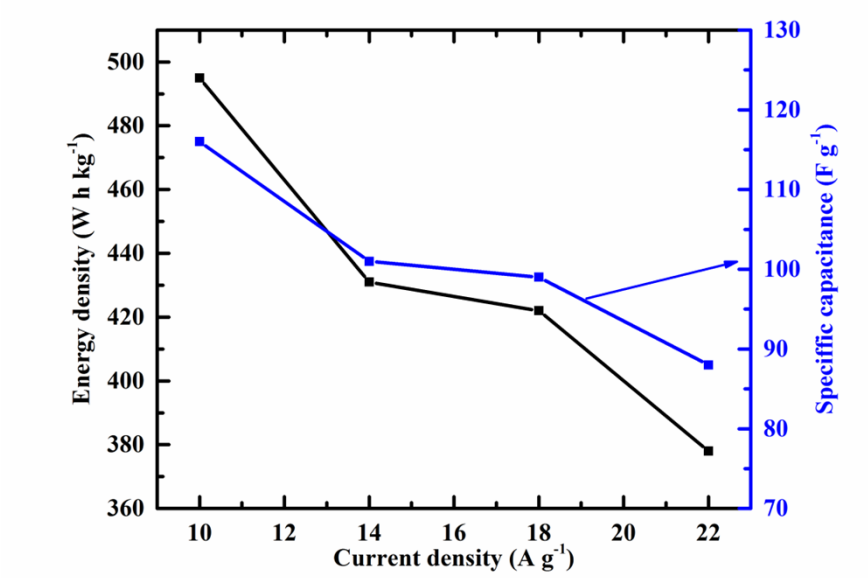


Fig. S6 Variation of effective specific capacitance and energy density of ASC with different current density.

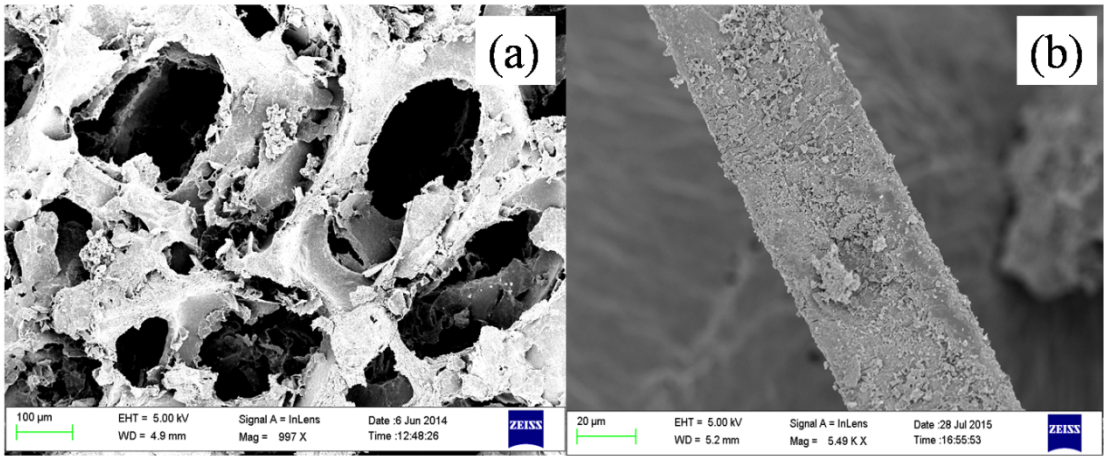


Fig. S7 (a) Low magnification and (b) high magnification FE-SEM images of SAC-RGO@Ni after 10,000 CD cycles