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Supporting Information

Extraordinary supercapacitor performance exhibited by heavily nitrogenated graphene oxide obtained by microwave synthesis

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Sample Characterization:

Elemental analysis of the nitrogen-doped RGO samples were measured using a Perkin-Elmer 2400 CHN analyzer. X-ray photoelectron spectra (XPS) of the nitrogen doped samples were recorded with an Omicron nanotechnology spectrometer. BET surface areas were measured with a Quanta Chrome Autosorb-1 instrument. Transmission electron microscope (TEM) images were recorded with a JEOL JEM 3010 instrument fitted with a Gatan CCD camera operating at an accelerating voltage of 80 kV. Raman spectra were recorded at different locations of the sample using Jobin Yvon LabRam HR spectrometer with 632 nm He-Ne laser. Atomic force microscope (AFM) measurements were performed using an Innova atomic force microscope.

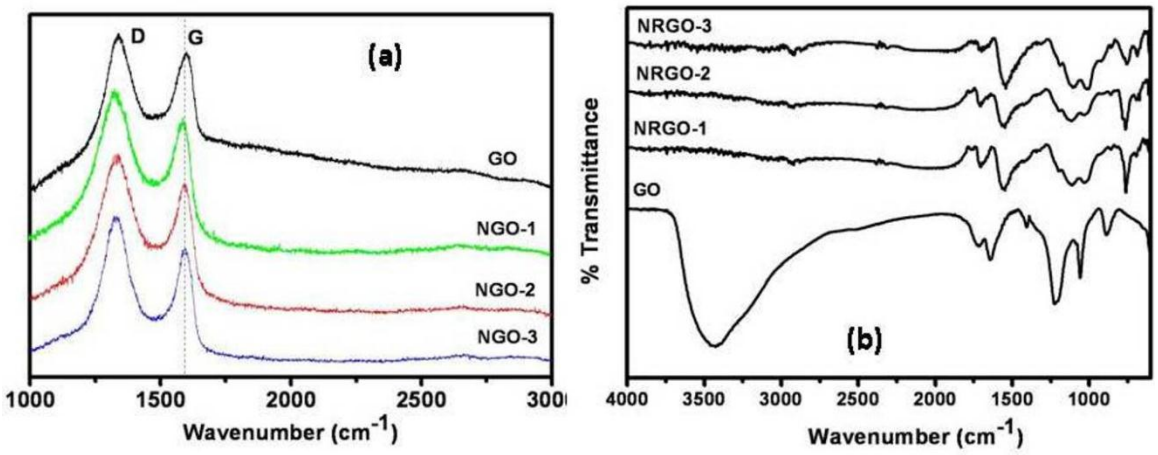

Fig. S1 (a) Raman spectra (b) Infrared spectra of GO and nitrogen doped graphene oxide.

Sample	Reaction time (sec)	Weight Ratio (G:U)	$S_{(BET)}$ (m^2/g)	N_{CHN} (wt. %)	N_{XPS} (at. %)	$N_{Pyridinic}$ (at. %)	$N_{Pyrrolic}$ (at. %)	$N_{Graphitic}$ (at. %)
NRGO-1	30	1:0.5	195	14.7	13.2	2.3	7.1	3.8
NRGO-2	30	1:1	210	18.2	15.6	2.6	9.3	3.7
NRGO-3	30	1:2	235	17.5	15.3	2.6	7.2	5.5

Table 1 XPS and Elemental analysis of nitrogen doped graphene oxide.

Electrochemical measurements:

The electrochemical performance of the nitrogen-doped graphene oxide (NGO) electrodes were investigated by means of cyclic voltametry (CV), galvanostatic charge–discharge curves and electrochemical impedance spectroscopy (EIS) in 6 M KOH aqueous electrolyte without any binder or carbon additive. The supercapacitor electrodes were fabricated

following Conway[1] and measured using PG262A potentiostat/galovanostat (Technoscience Ltd., Bangalore, India). The mass of each electrode was 2 mg and the specific capacitance (C_{sp}) was calculated using the following formula from CV,

$$C_{sp} = \quad 2(i_+ - i_-)/(m \text{ x scan rate})$$

where i_+ and i_- are the maximum values of current in the positive scan and negative scan respectively and m is the mass of the single electrode.

Specific capacitance was calculated from galvanostatic charge-discharge curves using the formula,

$$C_{sp} = \quad 2(i)/(m \text{ x } s)$$

where i is the discharge current and s is the slope of the discharge curve.

Energy densities (E) and power densities (P) were calculated using the formulas,

$$E=1/2CV^2$$

$$P = E/t$$

where C is the specific capacitance, V is the operational potential window (0-1 V) and t is the discharge time.

Electrochemical impedance measurements were carried out at a DC bias of 0 V over a frequency range of 100 kHz to 10 mHz by applying an AC voltage with 10 mV perturbation using Solartron analytical 1400 cell test instrument.

[1]B. E. Conway, Electrochemical supercapacitors: scientific fundamentals and technological applications, Springer, New York, 1999.