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Development of novel SBA-15 templated mesoporous reduced graphitic oxide composite for high performance supercapacitors and fabrication of its device by electrospinning technique

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Supplementary Information

Electrical conductivity study

The DC conductivity of the SRG pellets was measured by a four probe technique. The pellets were made from the powder sample under a hydraulic pressure of 600 kg cm^{-2}. The thickness of each pellet was measured using a peacock thickness gauge (Ozaki MFG. Co. Ltd, Model G, Japan). The measurements were done at different positions and the average value was taken for calculation. The conductivity of the sample was calculated as follows:

In case of thin slice and non-conducting bottom surface, the resistivity was computed from the Eq. 1:

$$\rho = \frac{\rho_0}{G7\left(\frac{w}{s}\right)} \qquad (1)$$

The function $G7\left(\frac{w}{s}\right)$ was calculated from the Eq. 2:

$$G7\left(\frac{w}{s}\right) = \left(\frac{2s}{w}\right)\ln 2 \qquad (2)$$

where, s is the spacing between the point probes (meter), w is the thickness of the sample, $\rho_\circ$ is the resistivity.

The resistivity $\rho_\circ$ was computed from the Eq. 3:

$$\rho = \left(\frac{V}{I}\right) \times 2\pi s \qquad (3)$$

where, V is the floating potential difference between the inner probes (volt) and I is the current passed through the outer pair of probes (ampere).

The electrical conductivity was calculated from the Eq. 4.

$$\rho = \left(\frac{1}{\rho_{\circ}}\right) \quad (4)$$

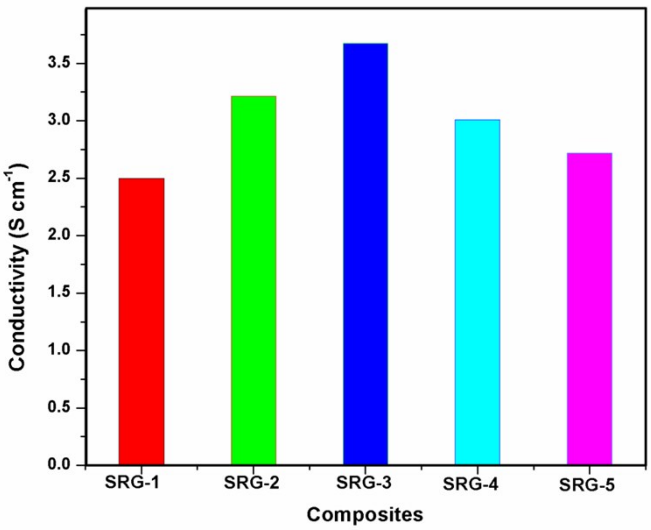

Fig. S1. *Variation of conductivity for a series of SRG composites.*

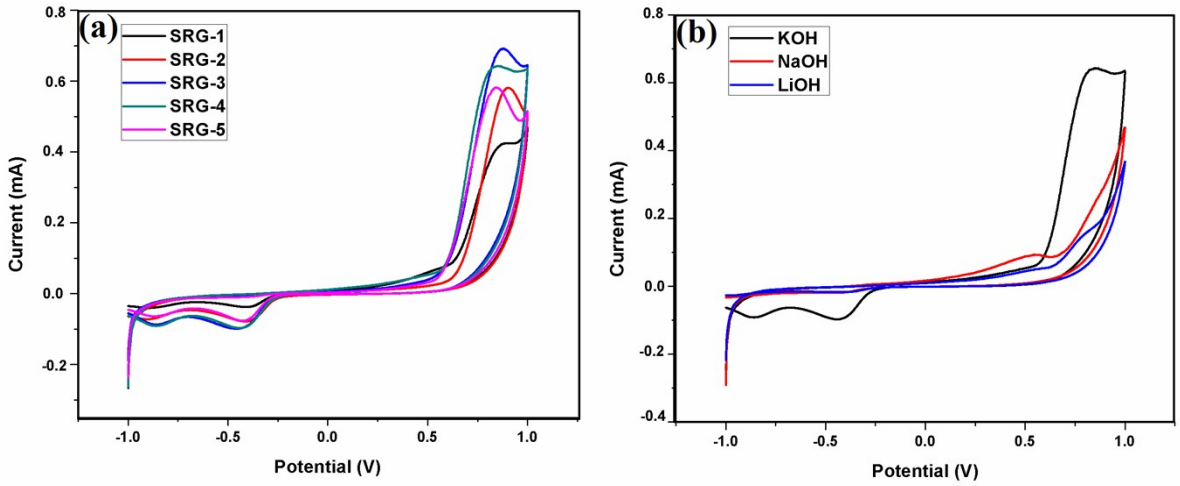

Fig. S2 (a) *Cyclic voltammograms of SRG composites measured at 2 mV s^{-1} in 1M KOH electrolyte, (b) Cyclic voltammograms of SRG-3 composites measured at 2 mV s^{-1} in 1M of KOH, LiOH and NaOH electrolytes.*

Table S1. The specific capacitance values of SRG-1, SRG2, SRG-3, SRG-4 and SRG-5 nanocomposites obtained from cyclic voltammetry (CV) measurements at 2 mV s^{-1}.

Composite	SRG-1	SRG-2	SRG-3	SRG-4	SRG-5
Specific capacitance at 2 mV s^{-1} (F g^{-1})	161.0	172.1	305.0	283.1	231.9

Table S2. The specific capacitance values of SRG-3 nanocomposite obtained from cyclic voltammetry (CV) measurements at different scan rates from 2 mV s^{-1} to 100 mV s^{-1}.

Scan rate (mV s^{-1})	2	5	10	20	30	40	50	60	80	100
Specific capacitance (F g^{-1})	305.0	164.1	36.4	26.05	22.0	19.65	17.8	16.9	15.3	14.0

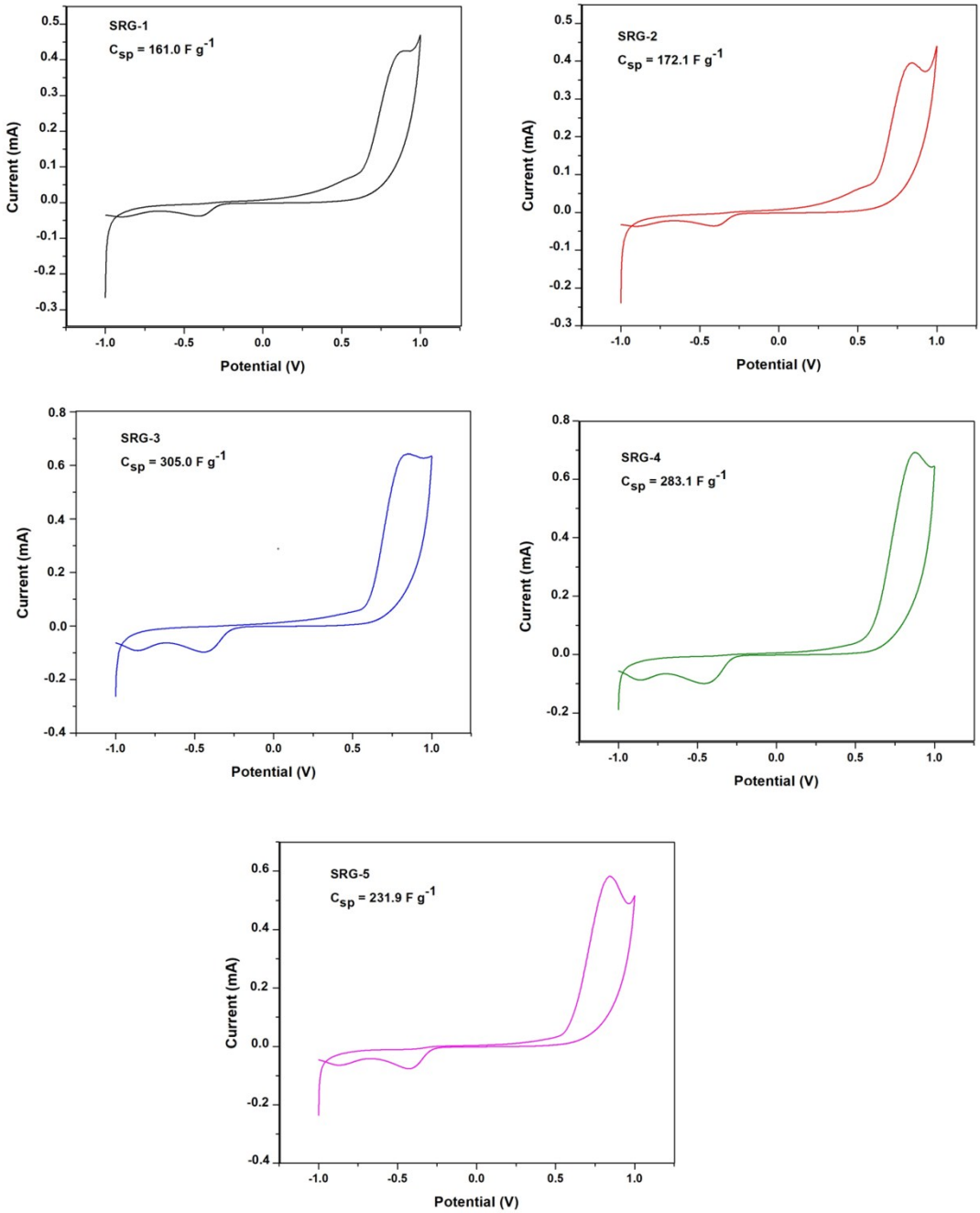

Fig. S3. The Cyclic voltammograms of SRG-1, SRG-2, SRG-3, SRG-4 and SRG-5 obtained at 2 mV s^{-1}.

Table S3. The specific capacitance values of SRG-3 nanocomposites obtained from galvanostatic charge-discharge (GCD) measurements.

Current Density (mA g^{-1})	0.5	0.8	1.0	2.0
Specific Capacitance (F g^{-1})	833.3	666.6	533.3	266.7

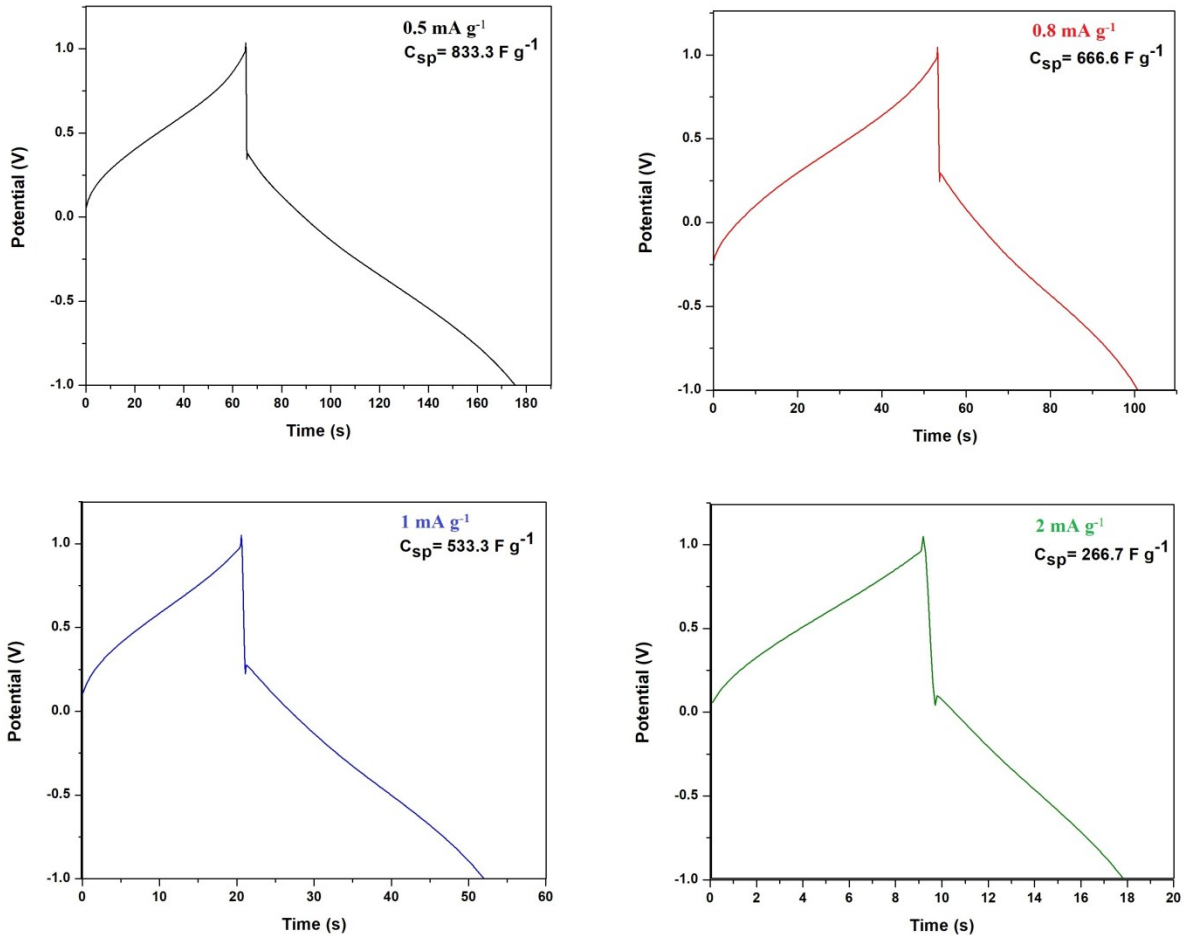

Fig. S4. The Galvanostatic Charge-Discharge curves of SRG-3 composite obtained at different current densities.

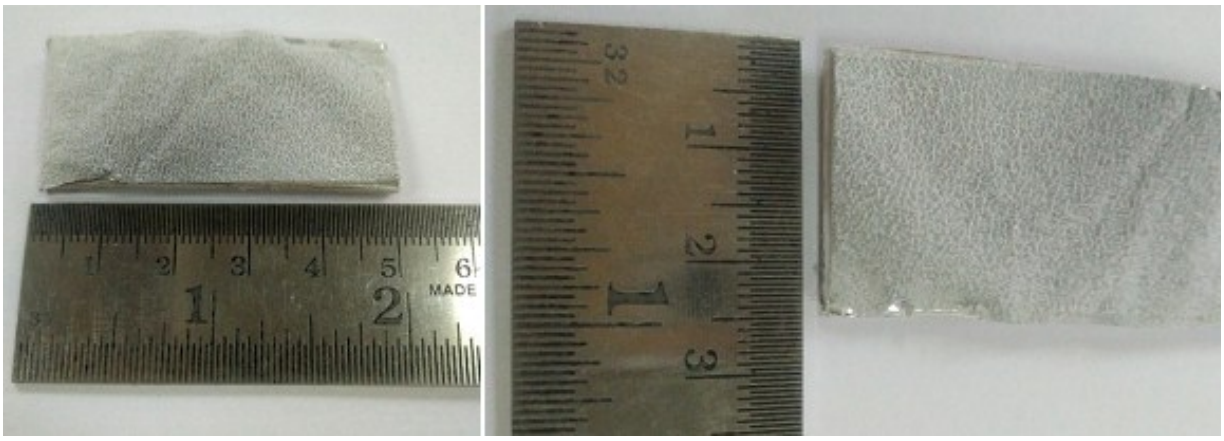

Fig. S5. *Illustration of the dimensions of electrospunned electrode material employed for the fabrication of device.*

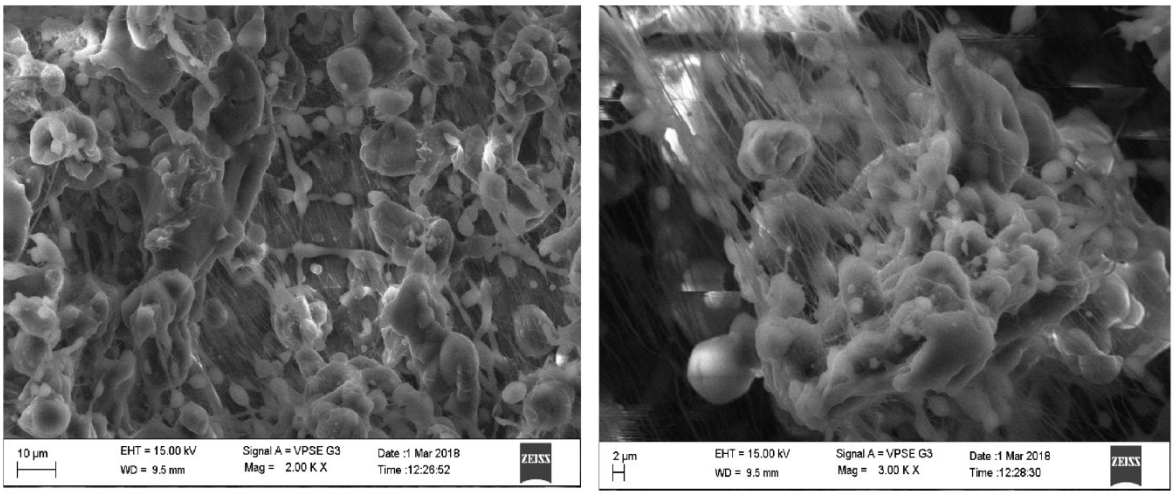

Fig. S6. *The SEM images of the electrospunned electrode material with different magnifications.*