Supplementary Information

Low temperature thermally reduced graphene oxide directly on Ni – Foam using atmospheric pressure - chemical vapour deposition for high performance supercapacitor application

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The digital image displayed on Fig. S1 was taken using a Witec Raman confocal equipped with the Zeiss EC Epiplan 50× / 0.75 objective with a camera exposure of 1/25.

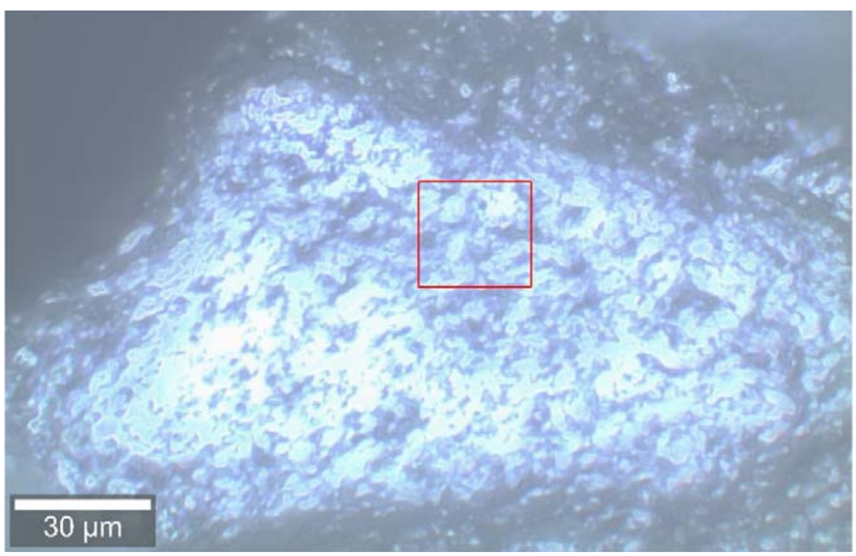

Fig. S1. Digital image of TRGO/Ni-Foam

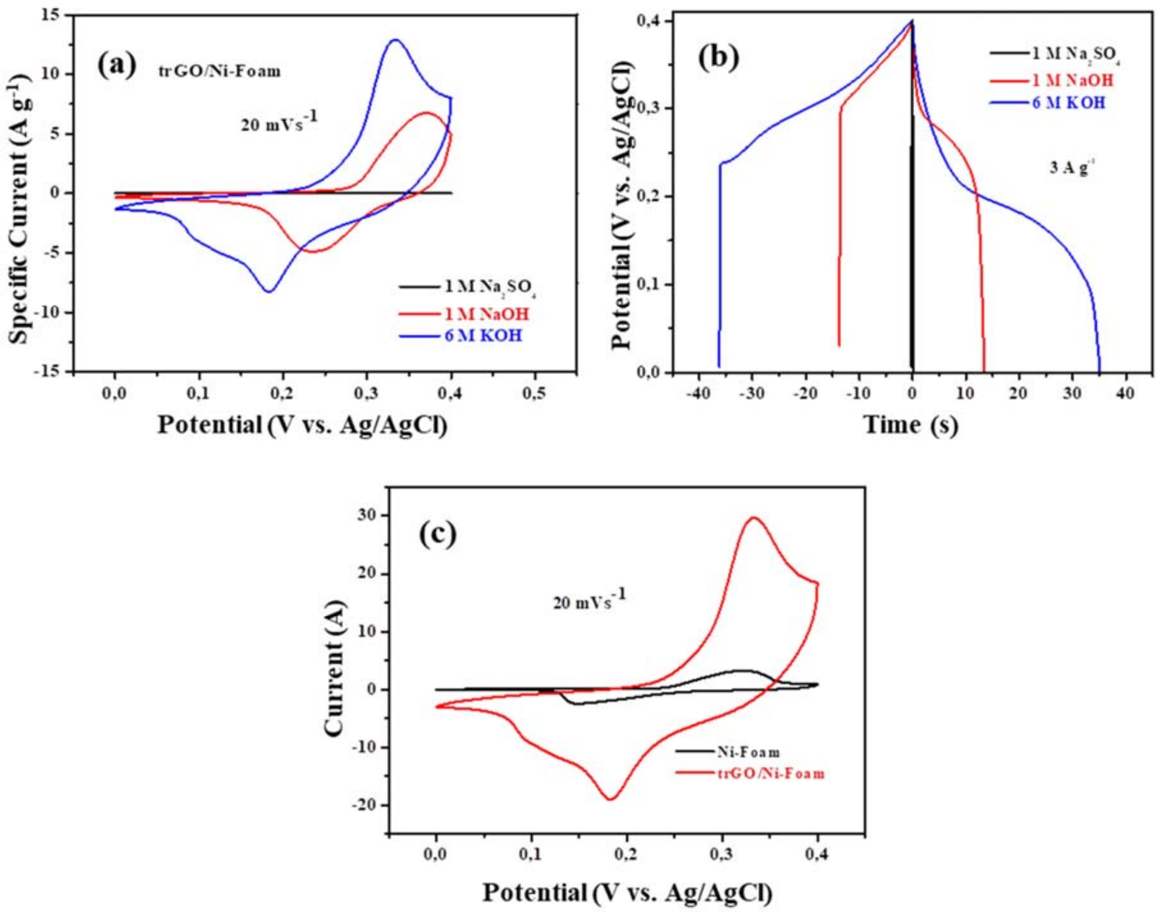

Fig. S2. (a) CV curve at 20 mVs^{-1} and (c) GCD curve at 5 Ag^{-1} for 1 M Na_2SO_4, 1 M NaOH and 6M KOH,(b) is the CV curve at 20 mVs-1 for Ni-Faom and TRGO/Ni-Foam

The 400 and 800 ℃ samples were prepared the same way as the TRGO/Ni-Foam at 200 ℃. The only difference is the desired temperatures of 400 and 800 ℃ were used. The heating rate was also set to 10 ℃/min and the material was also reduced for an hour at the respective desired temperature. After an hour the AP-CVD was moved away from quartz region with TRGO/Ni-Foam to allow it to cool down to room temperature.

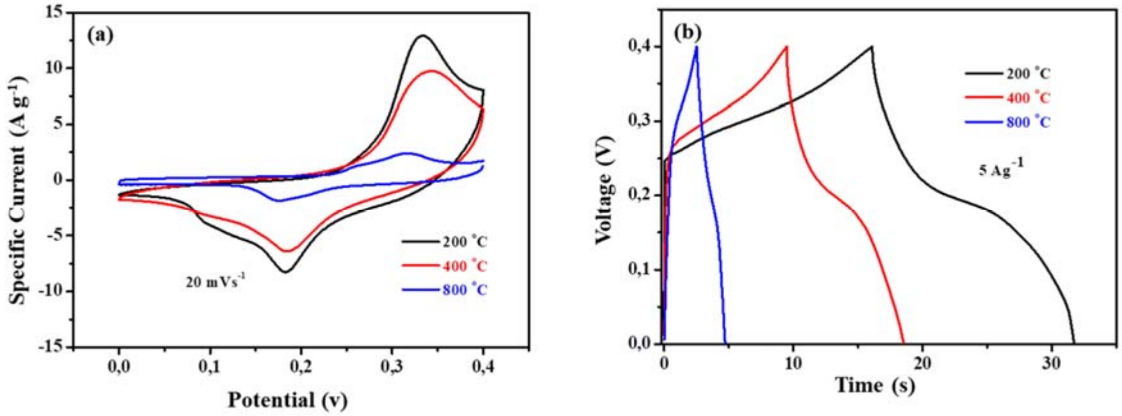

Fig. S3. (a) CV curve at 20 mVs^{-1} and (b) GCD curve at 5 Ag^{-1} for TRGO/Ni-Foam reduced at 200, 400 and 800 ℃

Charge balance, for the two-electrode evaluation where TRGO/Ni-Foam was used as a positive electrode and activated peanut shell (PAC) with an EDLC behaviour in the negative. The masses of the electrodes were determined based on the charge balancing equation below:

$$Q_+ = Q_- \quad \ldots \text{(S1)}$$

$$3.6m_+ \times Q_{s+} = m_- \times \Delta V_- \times C_{s-} \quad \ldots \text{(S2)}$$

$$\frac{m_+}{m_-} = \frac{C_{s-} \times \Delta V_-}{3.6 \times Q_{s+}} \quad \ldots \text{(S3)}$$

where Q_+, Q_-, Q_{s+}, C_{s-}, m_+, m_- and ΔV are the charge for positive, charge for negative, specific capacity for the positive electrode (mAh g^{-1}), specific capacitance (F g^{-1}) for the negative electrode, masses (mg) of the positive and negative electrodes and ΔV is the potential window (V), respectively.

The columbic efficiency was calculated using equation (S4)

$$C_E = \frac{t_D}{t_C} \times 100\ [\%] \quad \ldots \text{(S4)}$$

where t_D and t_C are the discharge and charge time (s), respectively.