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Supporting Information

Supercapacitors based on camphor-derived meso/macroporous carbon sponge electrodes with ultrafast frequency response for ac line-filtering†

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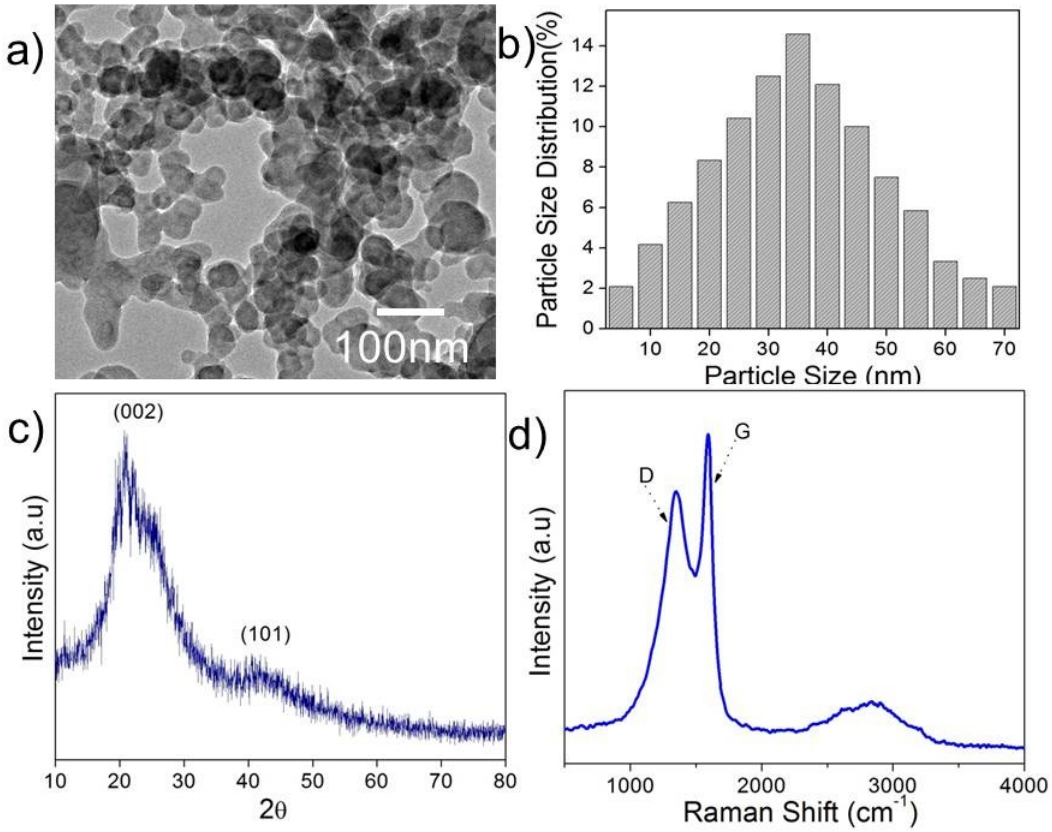

Figure S1. (a) TEM images, (b) diameter size distribution, (c) XRD and (d) Raman spectra of the carbon nanobeads used as the precursors for synthesizing carbon sponges.

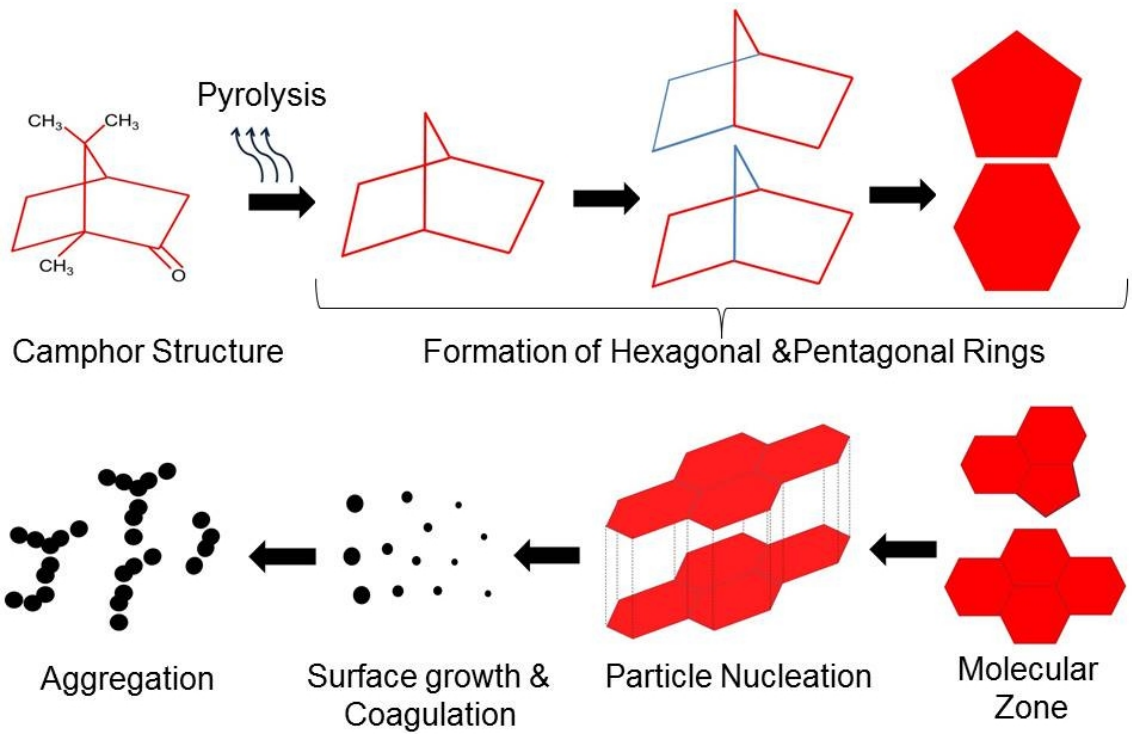

Figure S2. Schematic illustration showing the formation mechanism of graphitic carbon nanobeads obtained from camphor.

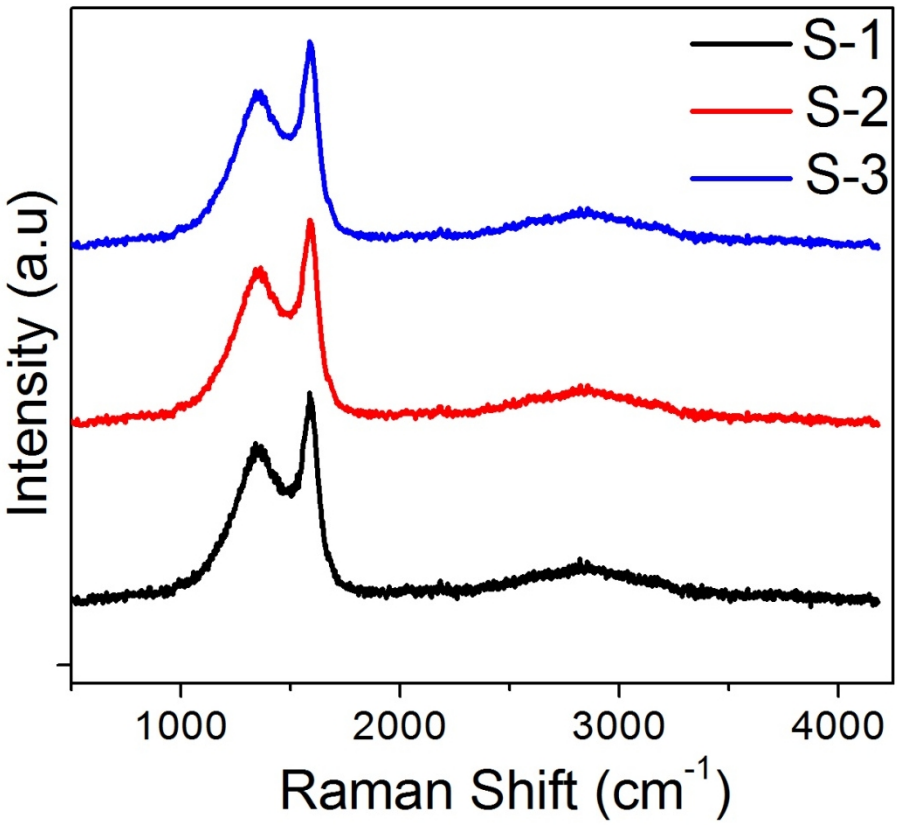

Figure S3. Raman spectra for samples-1, S-2 and S-3

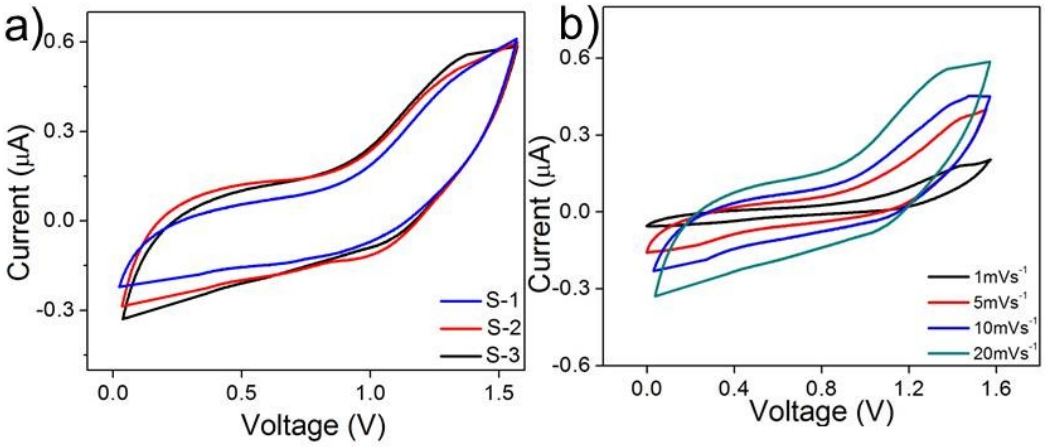

Figure S4. CV curves of (a) sponges at different surfactant concentrations at a scan rate of 20 mV/s, and (b) S-3 at different scan rates from 1 to 20 mVs^{-1}.

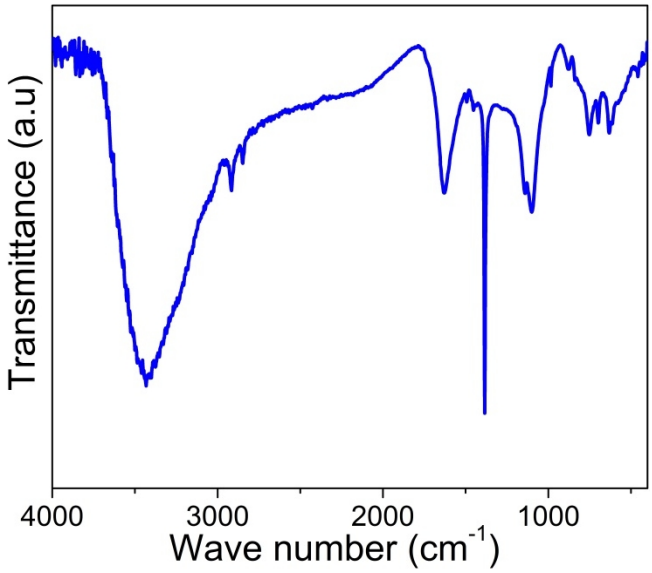

Figure S5. Typical FT-IR spectrum of the S-3 carbon sponge. The spectrum showed O-H stretching (3200-3400 cm^{-1}), C=O and C-O stretching (1629 cm^{-1}) and aromatic C=C stretching (1400-1600 cm^{-1}). The bands corresponding to anti-symmetric and symmetric stretching vibrations of $=CH_2$ were seen at 2925 and 2853 cm^{-1}, respectively.

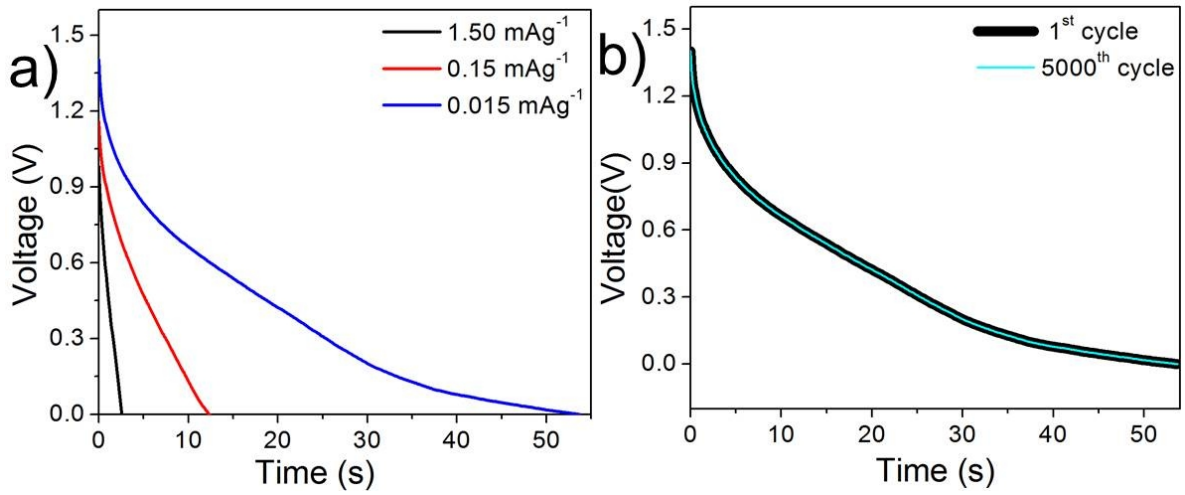

Figure S6. (a) Constant current discharge curves of S-3 sample at different current densities. (b) Constant current discharge curvesof S-3 at the 1st cycle and the 5000th cycle at a current density of 0.015 mA g^{-1}.

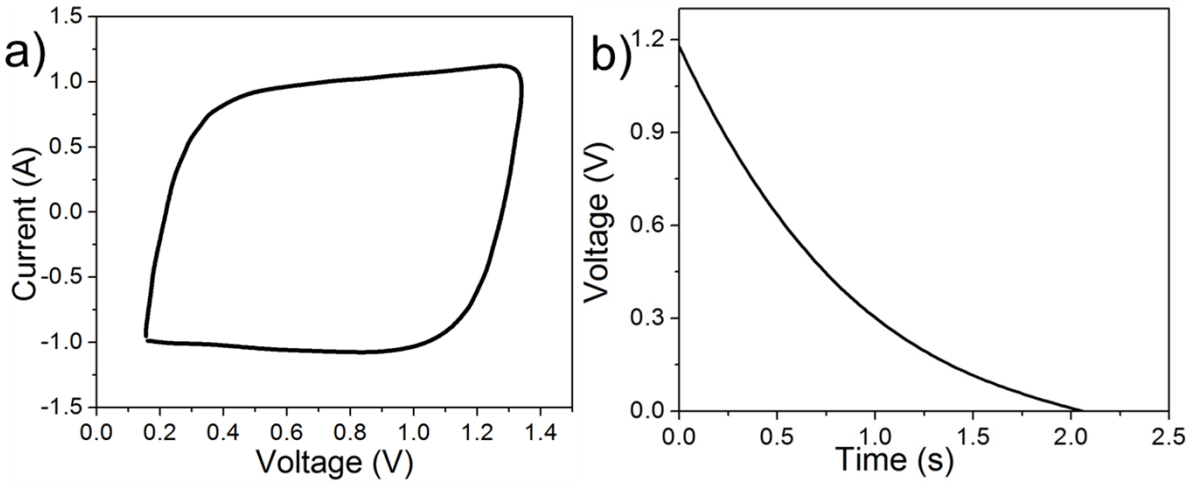

Figure S7. (a) Typical cyclic voltammetry curve at a scan rate of 100 mVs^{-1} and (b) galvanostatic discharge curve at a current density of 1.5 mA for the commercial AEC.

Table S1: Performance of various metrics of the devices made in this study with that of other literature reports.

Reference	Electrode materials	Phase at 120 Hz	f(Hz) at -45°	τ_{RC} (μs)	τ_0 (μs)	C_A (μFcm^{-2})
Miller et al.[1]	Vertical Graphene	82°	15000	200	NA	<200
Sheng et al.[2]	Electrochemical reduced graphene oxide	85.5°	4200	1350	240	<1000
Du and Pan[3]	Carbon nanotubes	<75°	636	NA	1500	NA
Lin et al.[4]	Graphene-Carbon nanotube carpets	81.5°	1343	195	820	2160
El-Kady et al.[5]	Laser Scribed Graphene	<20°	30	NA	NA	3670
Commercial* (Present study)	Aluminium electrolytic capacitor	85.5	20000	150	NA	<100
Present Work	Camphoric carbon sponges	78°	4200	319	371	487

*As obtained from the manufacturer

References

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