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 curves of 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.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Electrode materials</th>
<th>Phase at 120 Hz</th>
<th>$f$(Hz) at -45$^\circ$</th>
<th>$\tau_{RC}$ (μs)</th>
<th>$\tau_0$ (μs)</th>
<th>$C_A$ (μFcm$^{-2}$)</th>
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<tr>
<td>Miller et al.$^1$</td>
<td>Vertical Graphene</td>
<td>$82^\circ$</td>
<td>15000</td>
<td>200</td>
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<td>Sheng et al.$^2$</td>
<td>Electrochemical reduced graphene oxide</td>
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<td>1350</td>
<td>240</td>
<td>&lt;1000</td>
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<td>Du and Pan$^3$</td>
<td>Carbon nanotubes</td>
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<td>Lin et al.$^4$</td>
<td>Graphene-Carbon nanotube carpets</td>
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<td>El-Kady et al.$^5$</td>
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<td>Commercial* (Present study)</td>
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<td>319</td>
<td>371</td>
<td>487</td>
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*As obtained from the manufacturer
References