Supporting Information

Lignocellulosic Biomass-Derived, Graphene Sheet-like Porous Activated Carbon for Electrochemical Supercapacitor and Catechin Sensing


Figure S1. SEM and HR-TEM images of the as-synthesized AC-700 (a and b), and AC-900 (c and d) samples. Inset indicates the corresponding high magnification images.
Figure S2. XRD (a), Raman spectroscopy (b), N$_2$ adsorption/desorption isotherms (c), and Pore size distribution profile studies (d) for as-synthesized AC-700, and AC-900 samples.
Figure S3. XPS full survey spectra for the as-synthesized AC-700, GPAC, and AC-900 samples.

Figure S4. (a) CV curves at fixed scan rate 5 mV s$^{-1}$ for various electrode. (b) GPAC electrode as a function of scan rate vs specific capacitance.
Figure S5. (A) GCD profiles of the solid-state ASC (GPAC/PVA/KOH/GPAC) device at one cell, two cell and three cell device connected in series.

Table S1. Comparison of the specific capacitance value with previously reported biomass-derived carbon in literatures.

<table>
<thead>
<tr>
<th>Materials</th>
<th>Electrolyte</th>
<th>Specific capacitance (F g⁻¹)</th>
<th>Ref</th>
</tr>
</thead>
<tbody>
<tr>
<td>GHAC-900</td>
<td>2.0 M KOH</td>
<td>63</td>
<td>[5]</td>
</tr>
<tr>
<td>SPC-1000</td>
<td>1 M Li₂SO₄</td>
<td>121</td>
<td>[9]</td>
</tr>
<tr>
<td>ACSB</td>
<td>6 M KOH</td>
<td>202</td>
<td>[37]</td>
</tr>
<tr>
<td>EDMCT</td>
<td>6 M KOH</td>
<td>90</td>
<td>[S1]</td>
</tr>
<tr>
<td>Carbon₄₉₂</td>
<td>1 M LiOH</td>
<td>204</td>
<td>[S2]</td>
</tr>
<tr>
<td>ZAC-10</td>
<td>1.0 M H₂SO₄</td>
<td>127</td>
<td>[S3]</td>
</tr>
<tr>
<td>Coconut kernel</td>
<td>1.0 M H₂SO₄</td>
<td>173</td>
<td>[S4]</td>
</tr>
<tr>
<td>sugarcane</td>
<td>0.5 M H₂SO₄</td>
<td>232</td>
<td>[S5]</td>
</tr>
<tr>
<td>Rice husk</td>
<td>3 M KCl</td>
<td>210</td>
<td>[S6]</td>
</tr>
<tr>
<td>Corn grains</td>
<td>6 M KOH</td>
<td>257</td>
<td>[S7]</td>
</tr>
<tr>
<td><strong>GPAC</strong></td>
<td><strong>2.0 M KOH</strong></td>
<td><strong>233</strong></td>
<td>This work</td>
</tr>
</tbody>
</table>
Figure S6. (a) Various CA concentrations from 49 µM to 950 µM. Electrode: GPAC modified GCE. (b) DPV curves of GPAC modified GCE with different concentrations of CA using a standard addition method. Electrolyte: 0.1 M PBS (pH 7.0) solution; scan rate: 50 mV s⁻¹.
Table S2. Comparison of the analytical parameters with previously reported literatures.

<table>
<thead>
<tr>
<th>Electrode Materials</th>
<th>Linear Range (µM)</th>
<th>Limit of Detection (µM)</th>
<th>Sensitivity (µA/µM.cm²)</th>
<th>Ref</th>
</tr>
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<tbody>
<tr>
<td>Pt/MnO₂/f-MWCNT</td>
<td>2-950</td>
<td>0.02</td>
<td>-</td>
<td>[25]</td>
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<tr>
<td>f-MWCNT/YHCF</td>
<td>5–200</td>
<td>0.28</td>
<td>1.311</td>
<td>[26]</td>
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<tr>
<td>Poly-aspartic acid</td>
<td>0.2-30</td>
<td>0.07</td>
<td>-</td>
<td>[40]</td>
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<tr>
<td>MWCNT</td>
<td>0.10-2.69</td>
<td>0.017</td>
<td>-</td>
<td>[41]</td>
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<tr>
<td>Ni(II) complex and thiol on gold electrode</td>
<td>3.31–25.3</td>
<td>0.82</td>
<td>-</td>
<td>[42]</td>
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<td>GPAC</td>
<td>4-368</td>
<td>0.67</td>
<td>7.2</td>
<td>This work</td>
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</table>

Reference