Electronic Supplementary Information (ESI)

Mesoporous hollow carbons on graphene and their electrochemical property

Gyoung Hwa Jeonga, Ilbok Leeb, Ji-goo Kangc, Heewoong Leec, Songhun Yoonb, Sang-Wook Kimc
Fig. S1. TEM images of porous silica sheets on the graphene. The scale bar is 500 (a), 200 (b), 100 (c), and 50 nm (d), respectively.
Fig. S2.  TEM images of porous silica sheets on the graphene by CTAB as a surfactant.
Fig. S3. HAADF-STEM mapping images of porous silica sheets on the graphene.
Fig. S4. Different conditions (a) adding 100 % amount of the template (b) 50 % amount of the template (c) at 750 C under N₂ (d) furfuryl alcohol as a carbon source instead of sucrose.
Fig. S5. (a) AFM topology (b) AFM line profiles of MHCG (C) XRD pattern of MHCG
<table>
<thead>
<tr>
<th>R + R' (Ω)</th>
<th>C (μF)</th>
<th>F</th>
<th>A</th>
<th>V</th>
<th>R</th>
<th>C</th>
<th>(Ω)</th>
<th>(Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.01</td>
<td>0.01</td>
<td>0.3</td>
<td>0.4</td>
<td>0.5</td>
<td>0.6</td>
<td>0.7</td>
<td>0.8</td>
<td>0.9</td>
</tr>
</tbody>
</table>

Table SI: Best Fitting Results of Nyquist Spectra According to Change of Measuring Potential
Fig. S6 Equivalent circuits for nonlinear least square fitting of EIS data.

Mathematical elements for NLLS fitting are given as follows;

\[ Q(\Omega) = j = \sqrt{-1}, \quad \omega = 2\pi f \]

For semicircle components;

\[ Q_s; \quad Y^*(\omega) = Y_o (j\omega)^n, \quad \tau_s = R_s C_s \]

Here, \( Y(\omega), Y_o, n \) and \( \tau_s \) are frequency dependent admittance, magnitude of admittance and time constant of semicircle, respectively.

For hypercotangent components;

\[ T; \quad Y^*(\omega) = Y_o (j\omega)^{0.5} \tanh[B (j\omega)^{0.5}] \]

\[ B = \tau_p^{0.5}, \quad Y_o = B / R_t \]

Here, \( \tau_p \) and \( R_t \) are time constant for electrolyte in pores and total electrolyte resistance within pores, respectively.