Selective Adsorption-deposition of Gold Nanoparticles onto Monodispersed Hydrothermal Carbon Spherules: a Reduction-deposition Coupled Mechanism

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\textbf{Fig. S1} The adsorption percentages of Au(III) by HCSs-M, HCSs-D and HCSs-P. $t = 48$ h, $W = 0.01$ g, $C_i = 1.6$ mM, $V = 10$ mL, $T = 298.15$ K, $pH_e = 4.05$. 

Table S1  Comparison of physical and chemical properties of HCSs-M with a representative activated carbon (AC)

<table>
<thead>
<tr>
<th></th>
<th>Elemental analysis (%)</th>
<th>surface area (m²/g)</th>
<th>Volume of Pores (ml/g)</th>
<th>Ash (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C</td>
<td>H</td>
<td>N</td>
<td>estimated O*</td>
</tr>
<tr>
<td>HCSs-M</td>
<td>65.13</td>
<td>4.700</td>
<td>0</td>
<td>30.17</td>
</tr>
<tr>
<td>apricot-shell</td>
<td>78.81</td>
<td>2.42</td>
<td>0.23</td>
<td>18.54</td>
</tr>
</tbody>
</table>

* The content of oxygen (O) was estimated according to the difference method.

Fig. S2  The effect of the concentration of glycine on the adsorption of Au(III) by HCSs-M. <i>t = 48 h, W = 0.01 g, V = 10 mL, C<sub>i</sub> = 2 mM, T = 298.15 K, pH<sub>e</sub> = 4.05.</i>
**Fig. S3** Adsorption percentages of different metal ions with HCSs-M in the presence of 0.06 M glycine at pH 1 - 4. \( t = 48 \) h, \( W = 0.01 \) g, \( C_i = 0.1 \) mM, \( V = 10 \) mL, \( T = 298.15 \) K.

**Fig. S4** Effect of temperature on the adsorption of Au(III) by HCSs-M. \( t = 48 \) h, \( V = 10 \) mL, \( W = 0.01 \) g, \( C_i = 2.91 \) and 21.9 mM without glycine and with 0.06 M glycine, respectively.
**Fig. S5** TG-DTG (a) and TPD-MS (b) curves of HCSs-M in Ar at 10 °C/min, and TG-DTG curves of Au-loaded HCSs-M in air at 10 °C/min (c).
Fig. S6 XRD curves of as-synthesized HCSs-M and Au-loaded HCSs-M.

Fig. S7 XPS survey spectra of HCSs, HCSs-G (glycine) and HCSs-G-Au (in the presence of glycine)