Supporting Information:

Polymer-templated synthesis of hollow Pd-CeO$_2$ nanocomposite spheres and its catalytic activity and thermal stability

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Figure S1. TEM image of PVP-protected Pd NPs and its size distribution profile.

Figure S2. TEM image of Pd NPs loaded on resin polymer sphere.
**Figure S3.** TG curve of the hollow Pd-CeO$_2$ nanocomposite spheres.

**Figure S4.** EDS line-scanning profile across individual h-Pd-CeO$_2$ NCSs.

**Figure S5.** Pd 3d XPS spectra of hollow Pd-CeO$_2$ nanocomposite spheres calcined at (a) 500 °C and (b) 700 °C.
**Figure S6.** TEM image of h-Pd-CeO$_2$ NCSs reduced by NaBH$_4$ then treated at 650 °C for 4 h in N$_2$.

**Figure S7.** TEM images of physical mixture of Pd + CeO$_2$ calcined at 500 °C.
**Figure S8.** TEM images of Pd/CeO$_2$-imp calcined at 500 °C. (White arrows indicate the formation of PdO species).

**Figure S9.** Pd 3d XPS spectra of (a) Pd/CeO$_2$-imp and (b) Pd-CeO$_2$ NCSs samples.
**Figure S10.** TEM image of h-Pd-CeO$_2$ NCSs after 5 cycles of 4-NP reduction reaction.

**Figure S11.** TEM image of h-Pd-CeO$_2$ NCSs after cycled treatment in CO oxidation reaction.
**Figure S12.** O1s XPS spectra of (a) hollow Pd-CeO$_2$ nanocomposite spheres and (b) supported Pd/CeO$_2$ catalyst.

**Table S1.** BET surface area ($S_{\text{BET}}$), pore volume and crystallite sizes of the catalysts.

<table>
<thead>
<tr>
<th>Catalyst</th>
<th>$S_{\text{BET}}$(m$^2$/g)</th>
<th>Pore volume (cm$^3$/g)</th>
<th>Crystallite size (nm)</th>
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<tbody>
<tr>
<td>h-Pd-CeO$_2$-773K</td>
<td>59.3</td>
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<td>5-10</td>
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<td>0.11</td>
<td>10-15</td>
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<tr>
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