

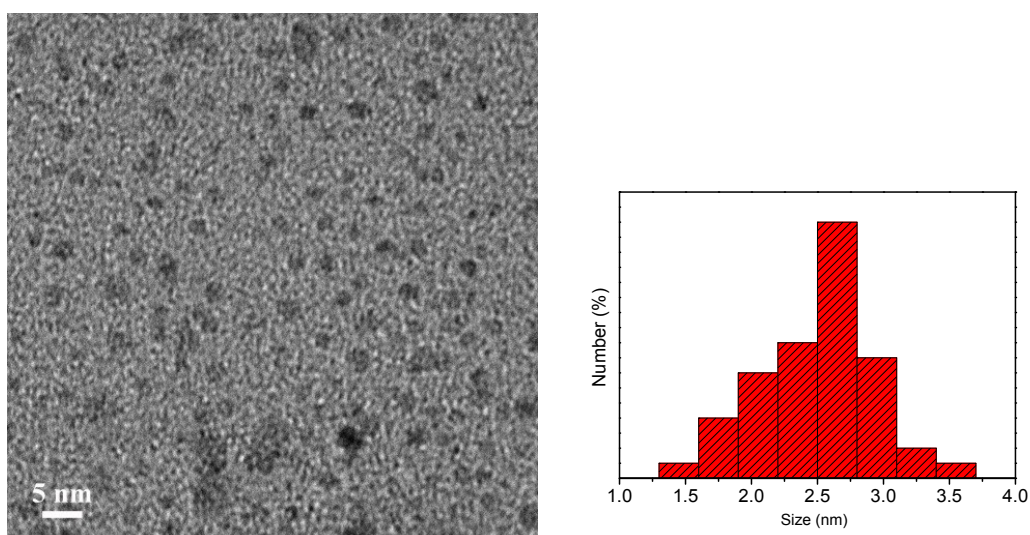
## Supporting Information:

# Polymer-templated synthesis of hollow Pd-CeO<sub>2</sub> nanocomposite spheres and its catalytic activity and thermal stability

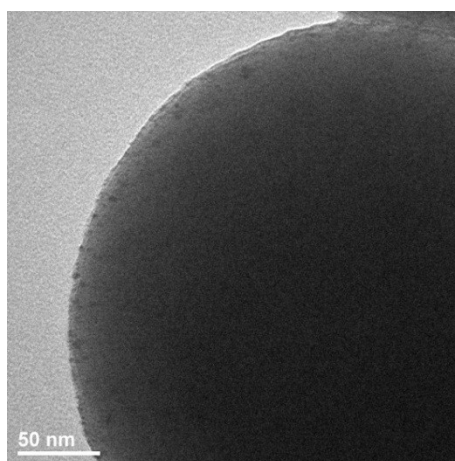
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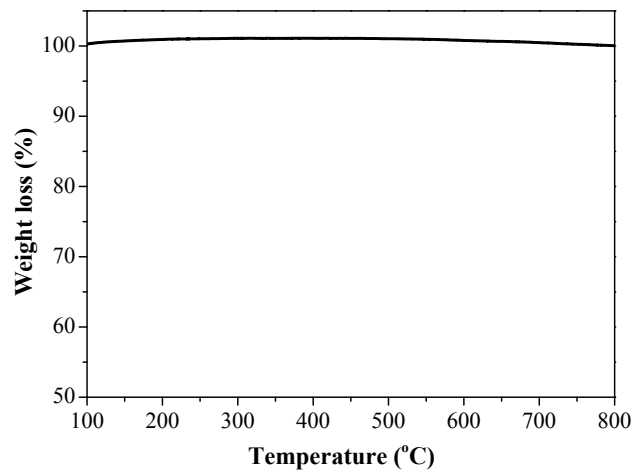
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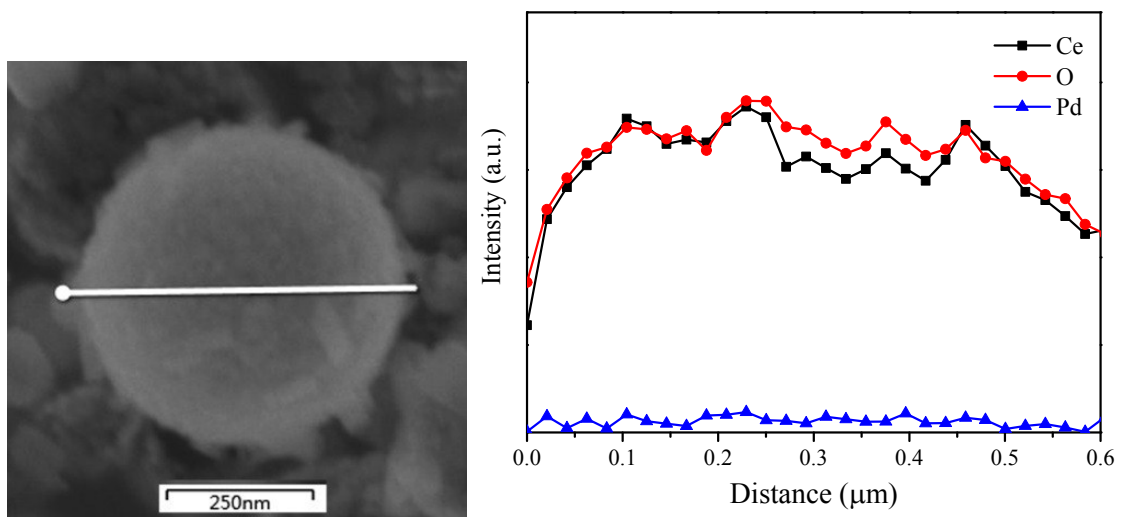
**Figure S1.** TEM image of PVP-protected Pd NPs and its size distribution profile.



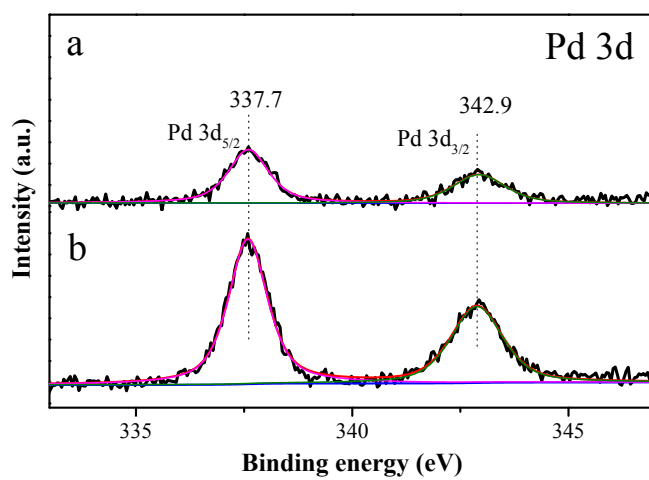
**Figure S2.** TEM image of Pd NPs loaded on resin polymer sphere.



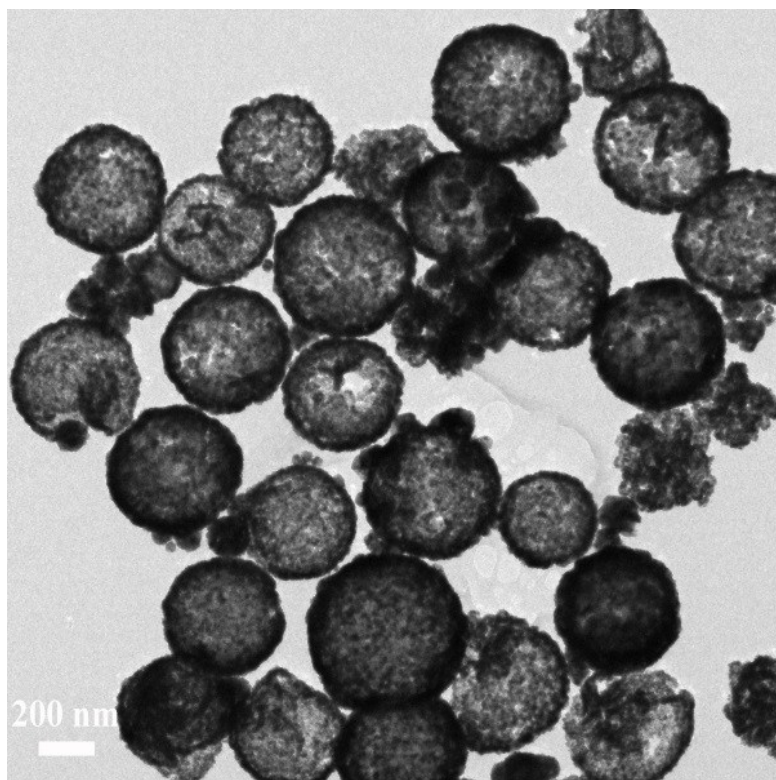
**Figure S3.** TG curve of the hollow Pd-CeO<sub>2</sub> nanocomposite spheres.



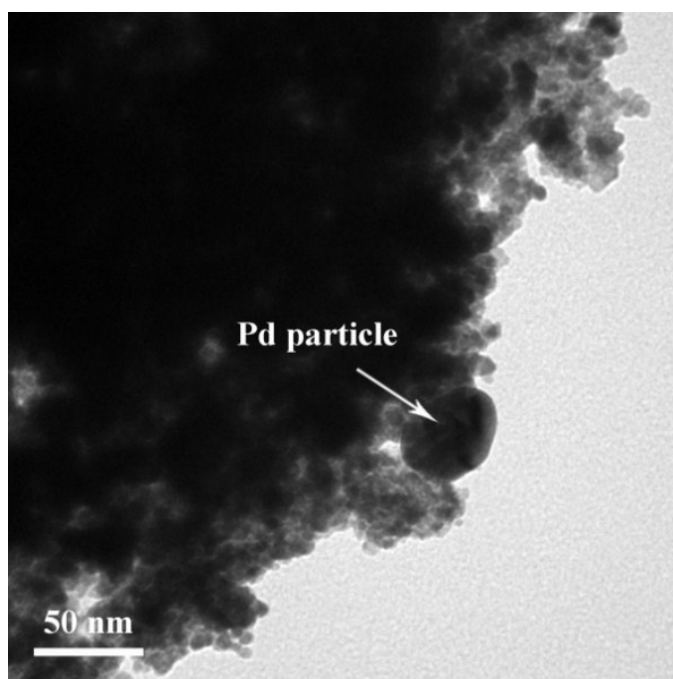
**Figure S4.** EDS line-scanning profile across individual h-Pd-CeO<sub>2</sub> NCSs.



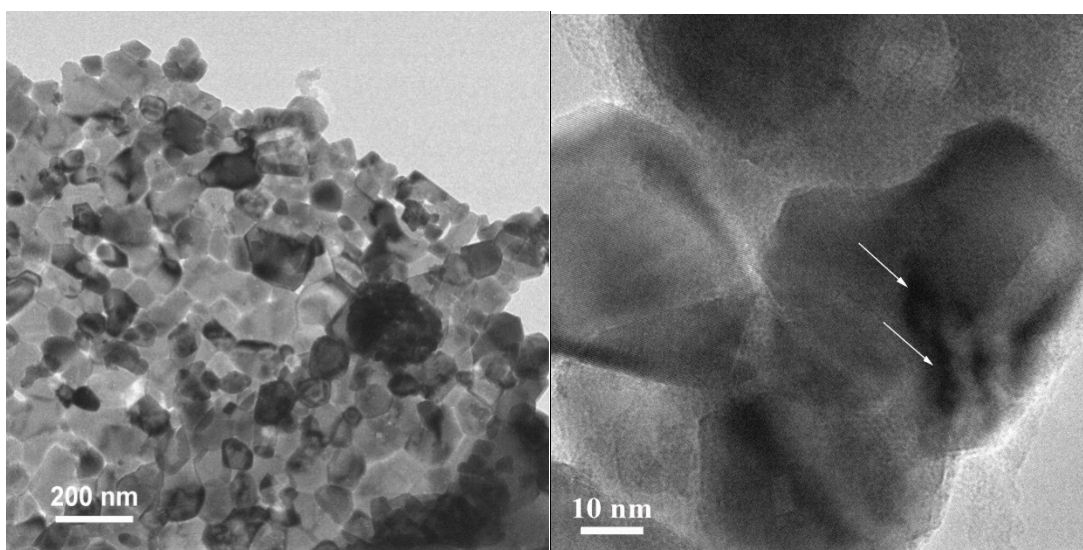
**Figure S5.** Pd 3d XPS spectra of hollow Pd-CeO<sub>2</sub> nanocomposite spheres calcined at (a) 500 °C and (b) 700 °C.



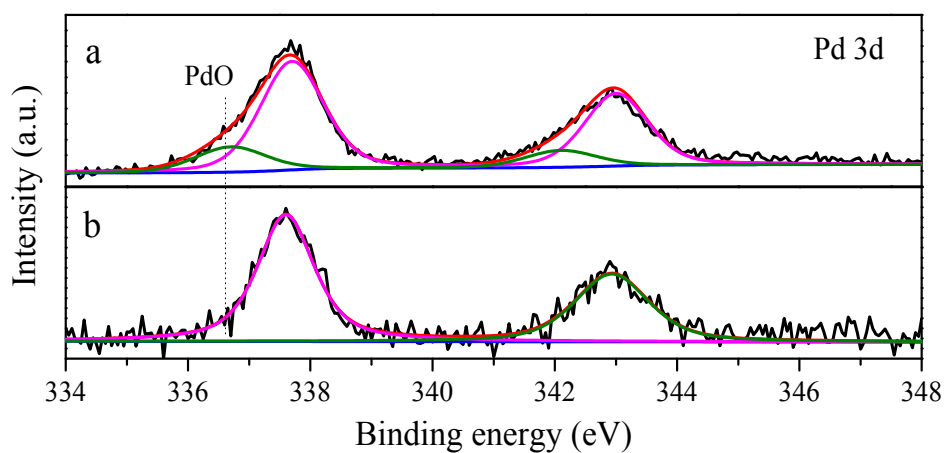
**Figure S6.** TEM image of h-Pd-CeO<sub>2</sub> NCSs reduced by NaBH<sub>4</sub> then treated at 650 °C for 4 h in N<sub>2</sub>.



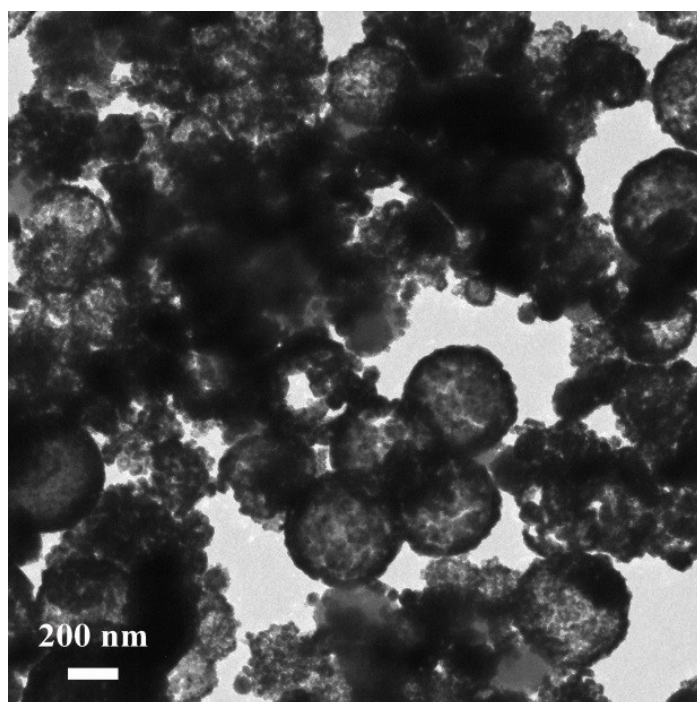
**Figure S7.** TEM images of physical mixture of Pd + CeO<sub>2</sub> calcined at 500 °C.



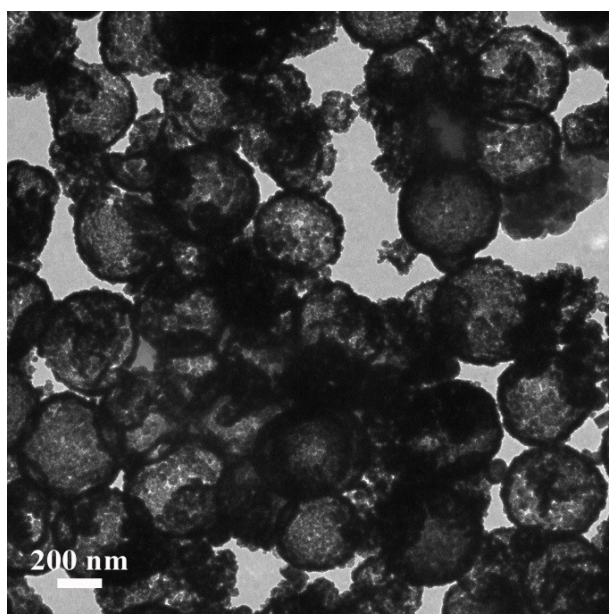
**Figure S8.** TEM images of Pd/CeO<sub>2</sub>-imp calcined at 500 °C. (White arrows indicate the formation of PdO species).



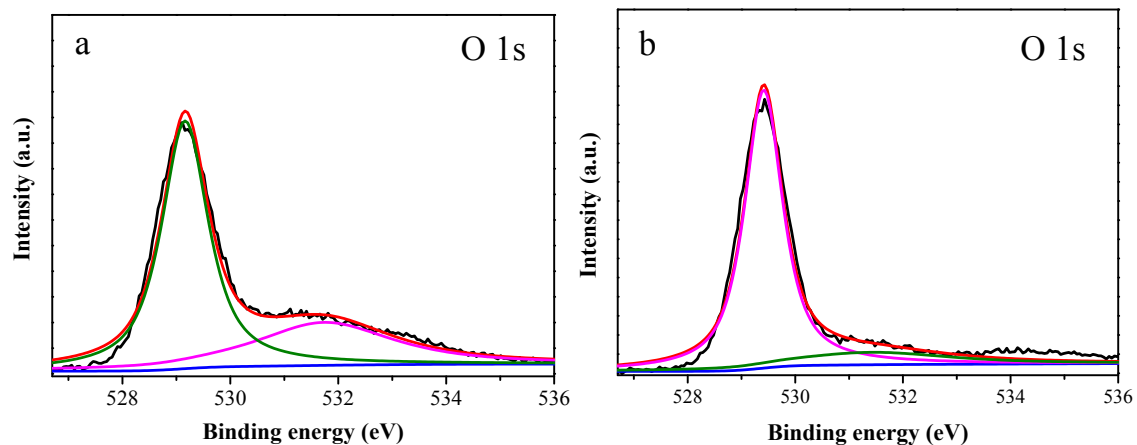
**Figure S9.** Pd 3d XPS spectra of (a) Pd/CeO<sub>2</sub>-imp and (b) Pd-CeO<sub>2</sub> NCSs samples.



**Figure S10.** TEM image of h-Pd-CeO<sub>2</sub> NCSs after 5 cycles of 4-NP reduction reaction.



**Figure S11.** TEM image of h-Pd-CeO<sub>2</sub> NCSs after cycled treatment in CO oxidation reaction.



**Figure S12.** O1s XPS spectra of (a) hollow Pd-CeO<sub>2</sub> nanocomposite spheres and (b) supported Pd/CeO<sub>2</sub> catalyst.

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

Catalyst	$S_{\text{BET}}$ (m <sup>2</sup> /g)	Pore volume (cm <sup>3</sup> /g)	Crystallite size (nm)
h-Pd-CeO <sub>2</sub> -773K	59.3	0.14	5-10
h-Pd-CeO <sub>2</sub> -973K	33.9	0.11	10-15
Pd/CeO <sub>2</sub> -imp-773K	9.3	-	bulk
Pd/CeO <sub>2</sub> -imp-973K	9.1	-	bulk