Supplementary Information for:

Heterostructured Ceria−Titania-Supported Platinum Catalyst for the Water Gas Shift Reaction

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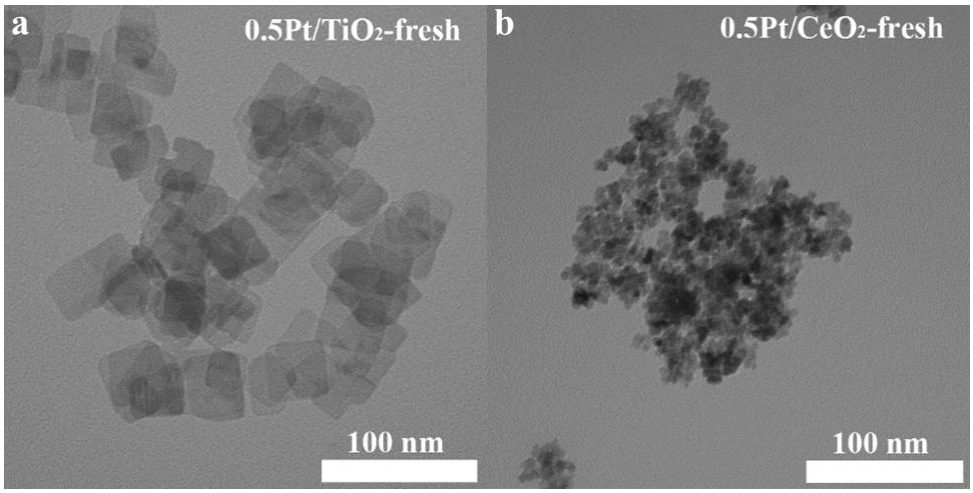

Figure S1. TEM images of the fresh (a) 0.5Pt/TiO_2 and (b) 0.5Pt/CeO_2 catalysts.

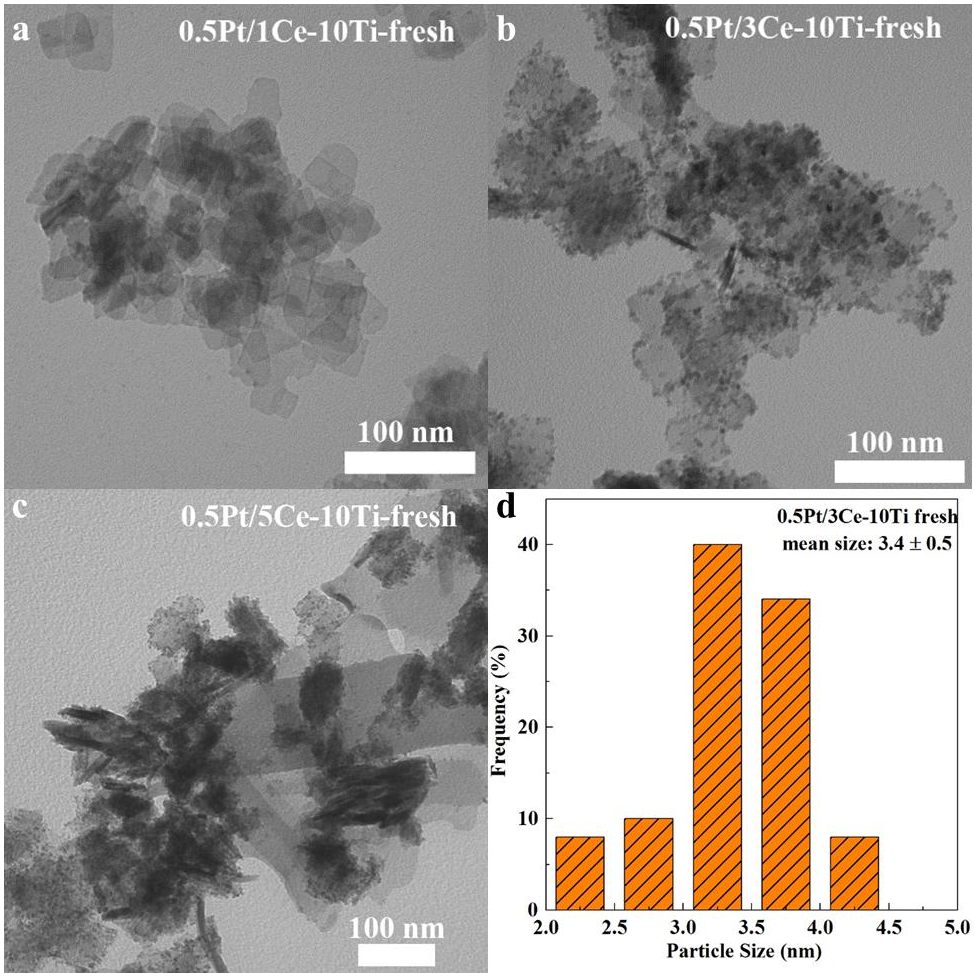

Figure S2. TEM images of the fresh (a) 0.5Pt/1Ce−10Ti, (b) 0.5Pt/3Ce−10Ti, (c) 0.5Pt/5Ce−10Ti catalysts, and (d) the size distribution of the CeO_2 nanoparticles on the 0.5Pt/3Ce−10Ti fresh catalyst.

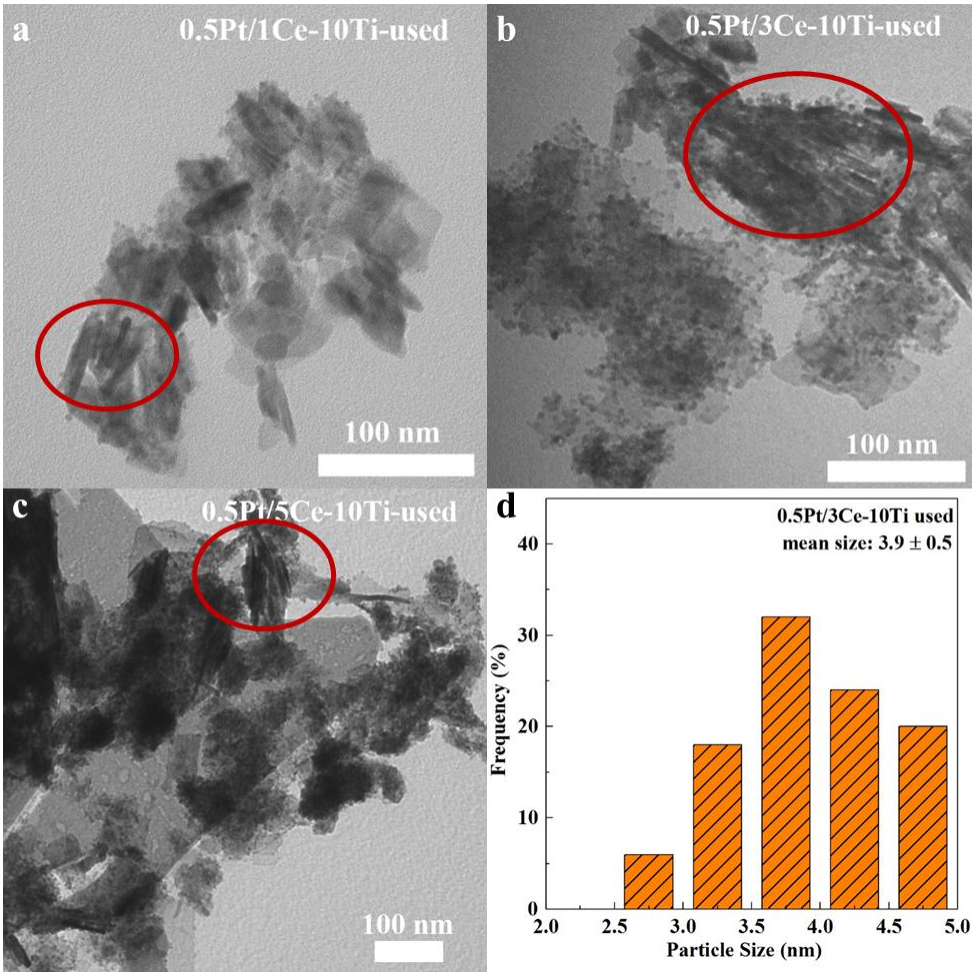

Figure S3. TEM images of the used (a) 0.5Pt/1Ce−10Ti, (b) 0.5Pt/3Ce−10Ti, (c) 0.5Pt/5Ce−10Ti catalysts, and (d) the size distribution of the CeO_2 nanoparticles on the 0.5Pt/3Ce−10Ti used catalyst. (Circled in red: the TiO_2 nanosheets)

Note: The part indicated by the red circle was TiO_2 nanosheet instead of CeO_2 irregular flakes.

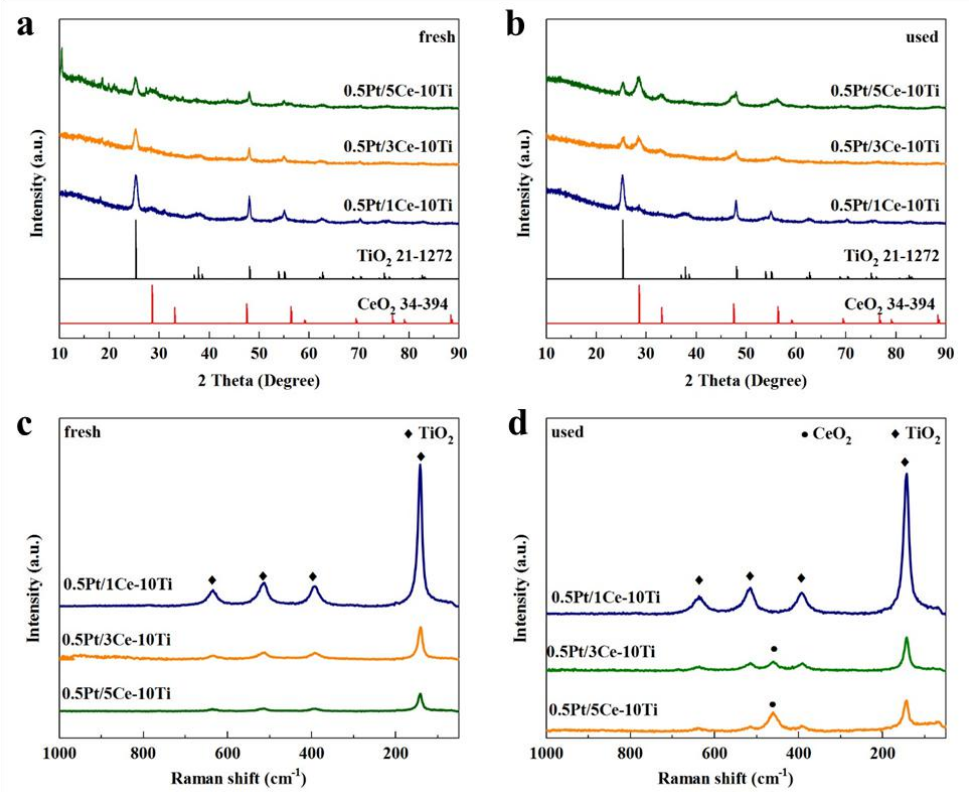

Figure S4. (a, b) XRD patterns and (c, d) Raman spectra of the fresh (a, c) and used (b, d) 0.5Pt/*x*Ce−10Ti catalysts.

For the fresh samples, there were very weak CeO_2 peaks (JCPDS no. 34-394) in the XRD patterns (Figure S4a), while almost all the other diffraction peaks were indexed to anatase TiO_2 (JCPDS no. 21-1272). Similarly, only the characteristic peaks of TiO_2 appeared in the Raman spectra (Figure S4c). For the catalysts after catalytic test, the characteristic peaks of TiO_2 and CeO_2 were observed simultaneously in the XRD patterns (Figure S4b) and Raman (Figure S4d) spectra, and the peak strength of CeO_2 became stronger with the increase of CeO_2 proportion.

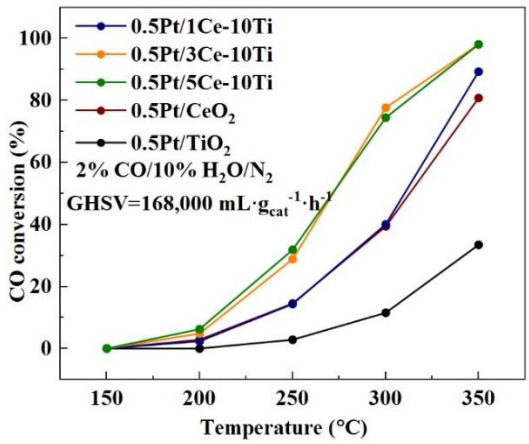

Figure S5. The CO conversion of supported Pt catalysts under GHSV=168,000 $mL \cdot g_{cat}^{-1} \cdot h^{-1}$.

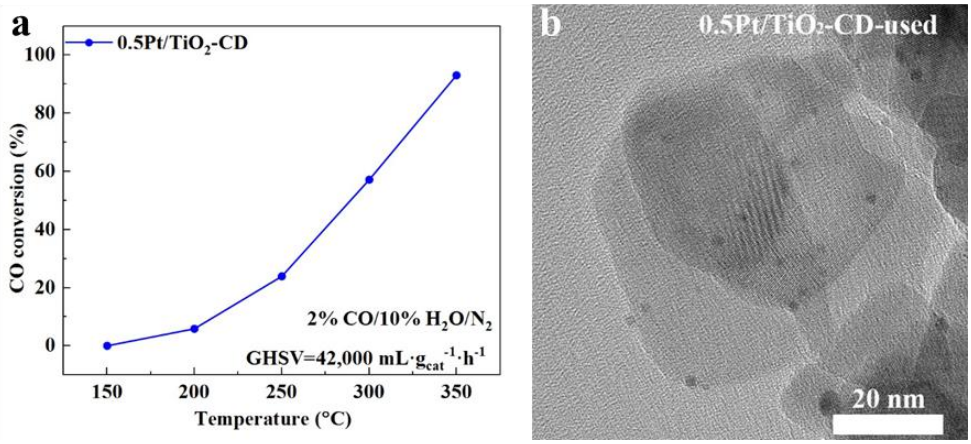

Figure S6. (a) The CO conversion of 0.5Pt/TiO_2-CD catalysts under GHSV=42,000 $mL \cdot g_{cat}^{-1} \cdot h^{-1}$. (b) The HRTEM image of 0.5Pt/TiO_2-CD used catalysts.

Table S1. Comparison of CO conversion rate for the as-prepared and literature reported catalysts.

Catalyst	Temperature (°C)	Reaction rate ($\mu mol \cdot gcat^{-1} \cdot s^{-1}$)	Ref.
0.5Pt/3Ce−10Ti	200	2.03	This work
0.5Pt/3Ce−10Ti	225	5.25	This work
0.5Pt/3Ce−10Ti	300	55.40	This work
0.5Pt/CeO_2	300	29.20	This work
0.5Pt/TiO_2	300	4.40	This work
0.5Pt/$Ce_{0.8}Ti_{0.2}O_{2-\delta}$	200	0.78	Ref [1]
Pt/Ce-Ti-T	200	0.92	Ref [2]
Pt/Ce-Ti-T	300	8.66	Ref [2]
Au-Ti(15Ce)O_2	225	3.10	Ref [3]
$Ti_2Ce_1O_x$/npAu	300	27.00	Ref [4]
Pt/CeO_2/Al_2O_3 (M0.3)	200	1.83	Ref [5]
5Ni-10Ce-85Zr	200	0.32	Ref [6]

Table S2. The elements and surface composition analysis of different samples.

Catalyst	Pt loading (wt.%)[a]	Ce:Ti (molar ratio)[a]	Surface composition[b]		
			$Pt^{2+}+Pt^{4+}$/ $Pt^{0}+Pt^{2+}+Pt^{4+}$	Ce^{3+}/ $Ce^{3+}+Ce^{4+}$	O_α/ $O_\alpha+O_\beta$
0.5Pt/TiO_2	0.58	–	0.79	–	0.05
0.5Pt/3Ce−10Ti	0.46	0.42	0.61	0.46	0.20
0.5Pt/CeO_2	0.61	–	1.00	0.43	0.22

[a] A value by ICP-MS analysis.

[b] A value by XPS analysis.

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