Electronic Supplementary Material (ESI) for Catalysis Science & Technology

The relationship between chemical state of Pd species and catalytic activity of methane combustion on Pd/CeO_2

Jian Ma[†a], Yang Lou[†b], Yafeng Cai[a], Zhenyang Zhao[a], Li Wang*[a], Wangcheng Zhan[a], Yanglong Guo[a], Yun Guo*[a]

[a] Key Laboratories for Advanced Materials, Research Institute of Industrial Catalysis, East China University of Science and Technology, Shanghai 200237, P. R. China

[b] Department of Physics, Arizona State University, Tempe, Arizona 85287, United States

AUTHOR INFORMATION

***Corresponding Author**

Tel/Fax: +86-21-64253703; Email: yunguo@ecust.edu.cn; wangli@ecust.edu.cn

Author Contributions

†: These two authors contributed equally to this paper.

Table of Contents

Fig. S1 Pd 3d XPS spectra of Pd/CeO_2 catalysts after stability test

Fig. S2 Pd 3d XPS spectra of Pd/CeO_2 catalysts with low Pd loading

Fig. S3 Data details for H_2-TPR

Table S1 the peak area for each peak from the H_2-TPR results

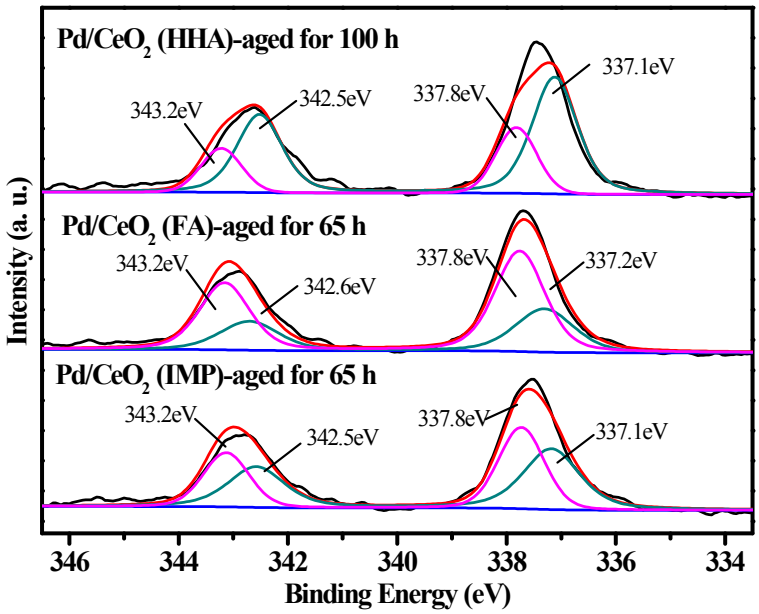

Fig. S1 Pd 3d XPS spectra of Pd/CeO_2 catalysts after stability test

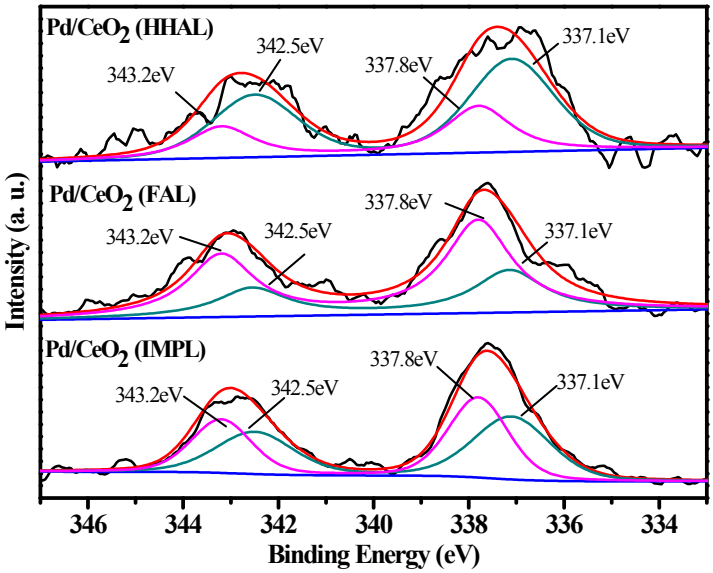

Fig. S2 Pd 3d XPS spectra of Pd/CeO_2 catalysts with low Pd loading

Data details for H_2-TPR Calibration by CuO

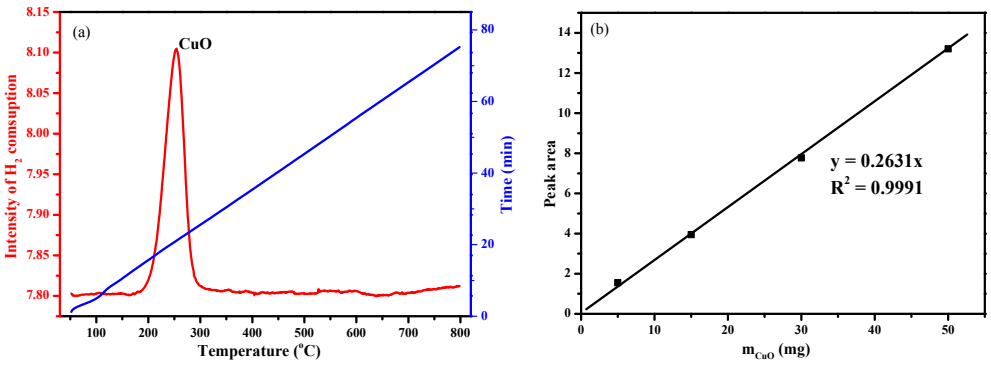

Fig. S3 H_2-TPR profile for 50 mg of CuO (a); the Peak area of H_2 consumption by CuO with different mass (b).

H_2-TPR measurement of CuO with different mass is carried on and the H_2-TPR profile for 50 mg of CuO is shown in Fig S1(a), then Peak area of H_2 consumption is integrated and shown in Fig S1(b). The relationship of peak area (A) and the mass of CuO (m_{CuO}) follows the equation S1:

$$A = 0.2631 \times m_{CuO} \qquad [S1]$$

Table S1 Peak area (A) of each peak from the H_2-TPR results

Catalysts	Peak(α)		Peak(β)		Peak(φ)		Peak(γ)		Peak(δ)		Peak(η)	
	T/°C	A	T/°C	A	T/°C	A	T/°C	A	T/°C	A	T/°C	A
Pd/CeO_2 (HHA)	-12	0.081	-/	-	21	0.886	-	-	171	0.055	682	0.531
Pd/CeO_2 (FA)	-12	0.033	18	0.157	-	-	53	0.553	177	0.051	678	0.54
Pd/CeO_2 (IMP)	-11	0.060	31	0.162	-	-	58	0.621	173	0.049	674	0.588
CeO_2 nanorods	-	-	-	-	-	-	-	-	181	0.65	701	0.653

The peak area of each H_2 consumption peak in Fig. 6 is shown in Table S2. The relationship of peak area and the H_2 uptake follows the equation S2:

$$H_2 \text{ uptake} = 956 \times A \qquad [S2]$$