

**The contributions of distinct Pd surface sites in palladium-ceria
catalysts to low-temperature CO oxidation**

*Ke Tang,^{*ab} Dan Zeng,^c Feng Lin,^a Yanzhao Yang^b and Lishun Wu^a*

^aSchool of Chemistry and Chemical Engineering, Heze University, Heze, 274015, P. R. China.

^bKey Laboratory for Special Functional Aggregate Materials of Education Ministry, School of Chemistry and Chemical Engineering, Shandong University, Jinan, 250100, P. R. China.

^cHeze Municipal Hospital, Heze, 274015, P. R. China.

**E-mail: t1338530@163.com*

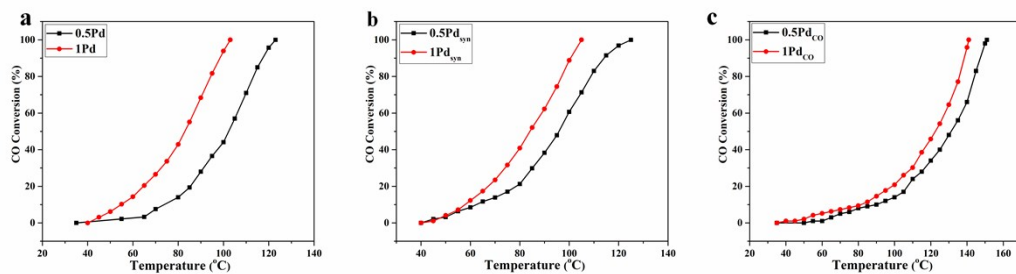


Fig. S1 Comparison of catalytic properties.

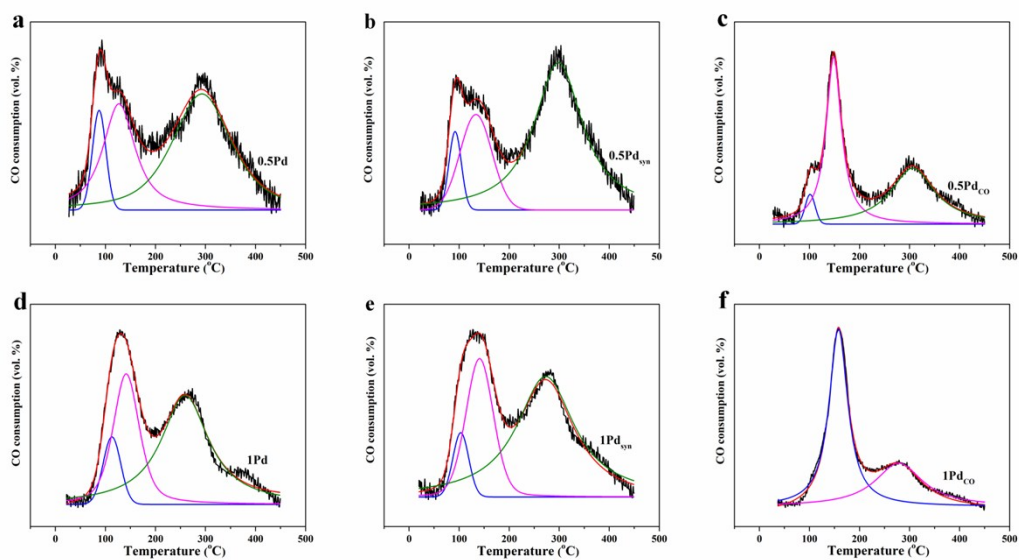


Fig. S2 Magnified CO-TPR profiles of palladium-ceria catalysts.

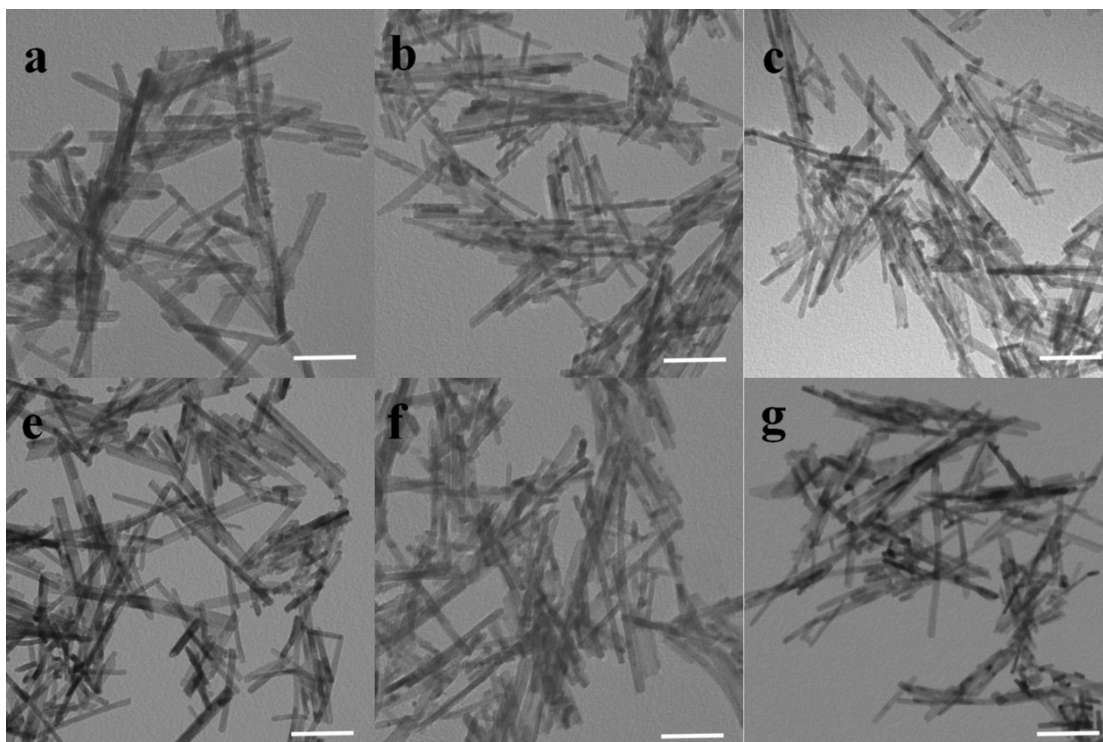


Fig. S3 TEM images of (a) 0.5Pd (b) 0.5Pd_{CO} (c) 0.5Pd_{syn} (d) 1Pd (e) 1Pd_{CO} (f) 1Pd_{syn}. The scale bar is 100 nm.

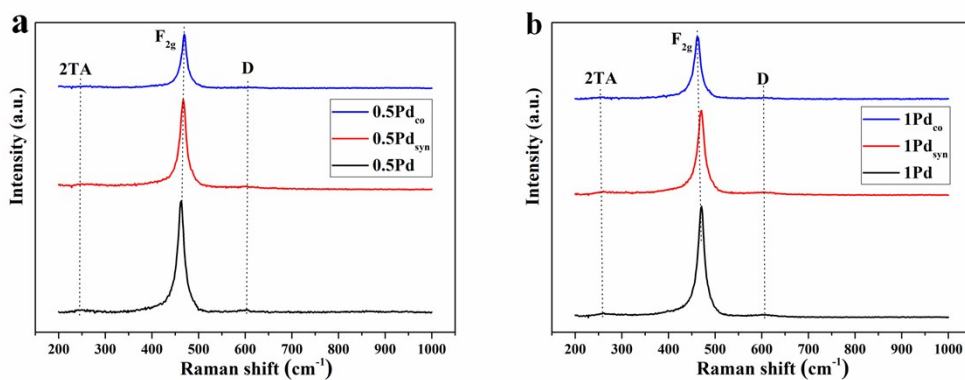


Fig. S4 Raman spectra of palladium-ceria catalysts.

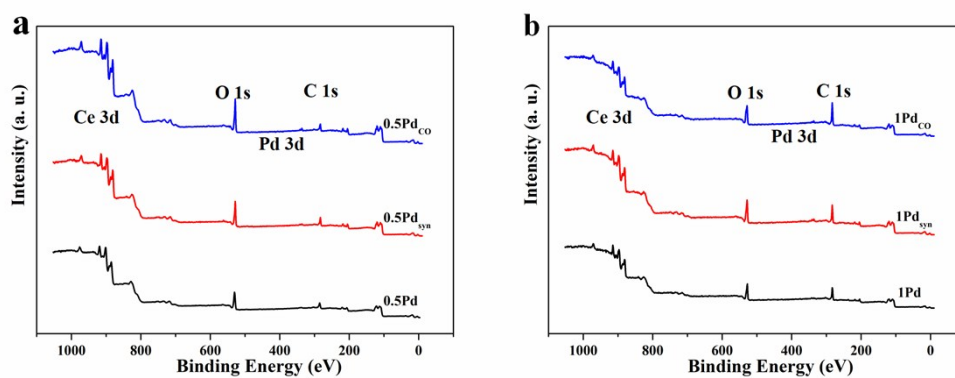


Fig. S5 XPS survey of palladium-ceria catalysts.

Table S1. Binding energies of samples

Sample	Binding energy (eV)							
	Ce3d				O1s		Pd3d _{5/2}	
	v _o v'	u _o u'	v	u				
			v''	u''				
			v'''	u'''				
0.5Pd	881.0	898.7	882.4	900.7	529.0	531.5	336.1	337.5
	885.0	903.1	888.0	907.0				
			897.6	916.4				
0.5Pd _{syn}	881.5	897.5	882.6	900.3	529.3	531.9	336.1	337.7
	884.8	902.7	888.4	907.4				
			898.4	916.3				
0.5Pd _{CO}	881.8	898.8	882.2	900.6	529.4	531.1	337.0	337.7
	884.4	902.4	888.4	907.4				
			897.7	916.4				
1Pd	881.6	899.5	882.7	900.8	529.2	531.8	336.0	337.2
	884.9	902.7	888.4	907.3				
			897.8	916.3				
1Pd _{syn}	881.4	898.9	882.8	900.4	529.3	531.9	336.0	337.1
	885.0	902.6	888.5	907.2				
			897.5	916.3				
1Pd _{CO}	881.6	897.6	882.9	900.7	529.1	531.6	337.0	337.8
	885.0	903.1	888.6	907.4				
			899.1	916.4				

^aThe detailed binding energies are from XPS data.

Table S2. Turnover frequency (TOF) of samples

Sample	CO ^a (TOF S ⁻¹)		
	PdO _x (s)/Pd-O-Ce(s) ^b	PdO ^c	Pd-O-Ce(s) ^d
1Pd	0.1078	0.0775	0.0551
1Pd _{syn}	0.1181	0.0801	0.0516
1Pd _{CO}	--	0.0093	0.0105

^aThe turnover frequency was calculated on the basis of CO conversion at 90 °C for 1 h.

^{b, c, d}The amount of active sites (PdO_x, PdO and Pd-O-Ce) was calculated on the basis of CO-TPR results.