

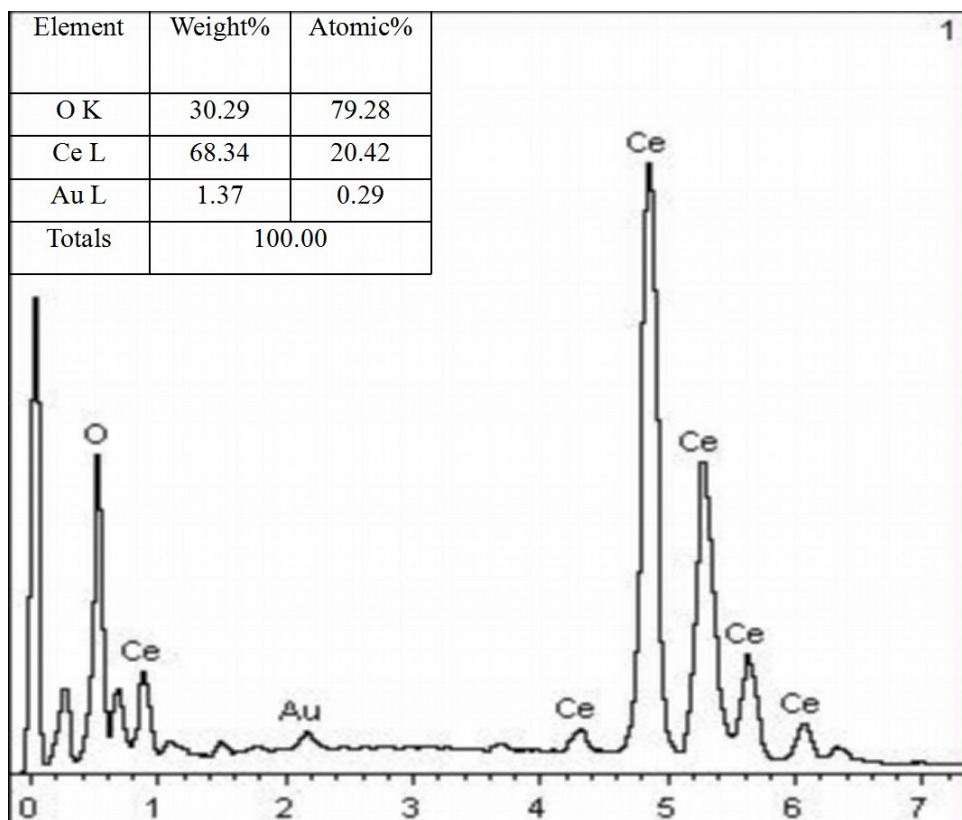
## Supporting Information

### **Tuning the metal-support interaction in the thermal-resistant Au-CeO<sub>2</sub> catalysts for CO oxidation: influence of one mild N<sub>2</sub> pretreatment**

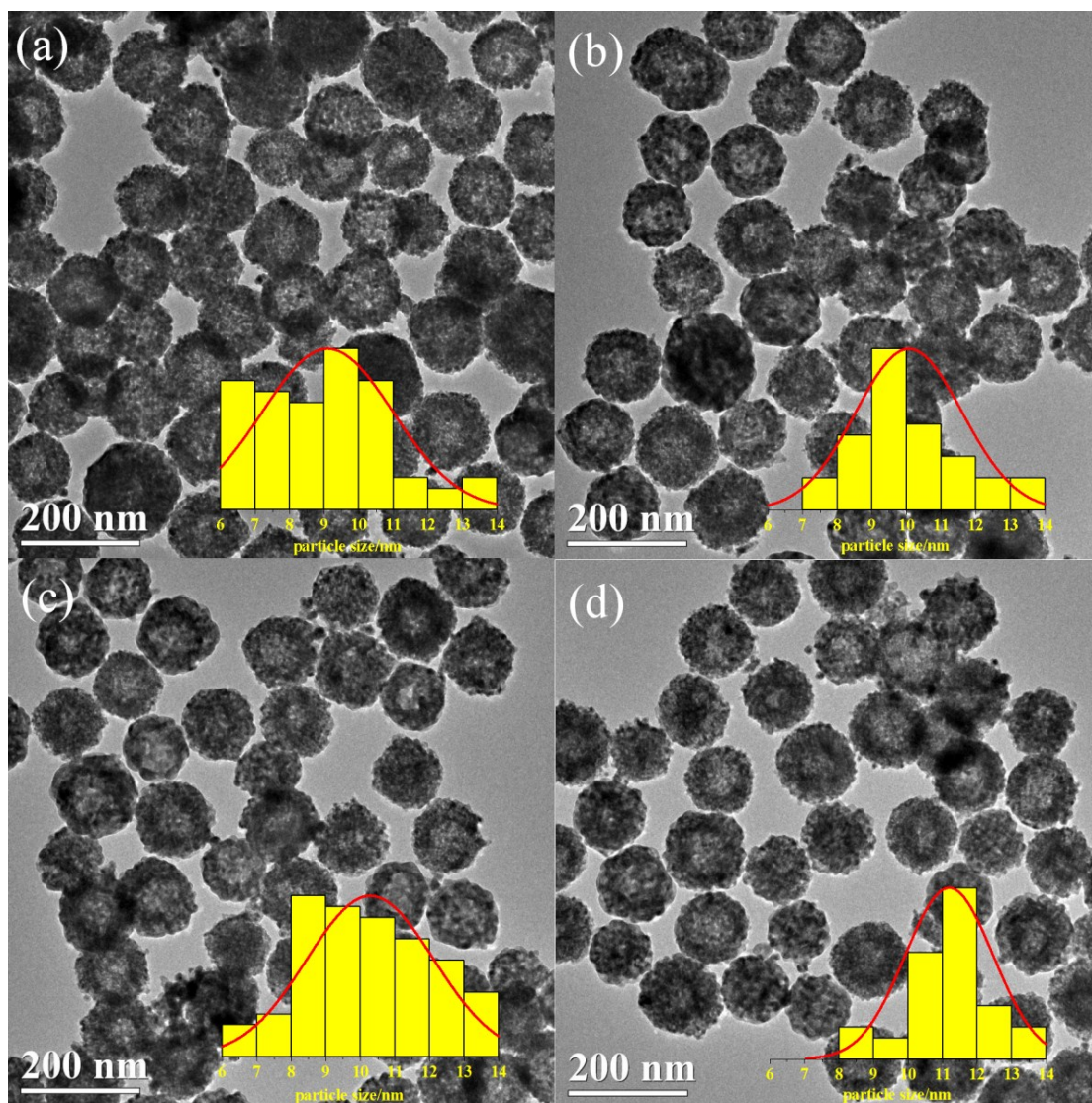
Yuqi Sun <sup>a</sup>, Wei Liu <sup>\*a</sup>, Miao Tian <sup>a</sup>, Ligu Wang <sup>a</sup>, Zhongpeng Wang <sup>\*a</sup>

<sup>a</sup>School of Water Conservancy and Environment, University of Jinan, Jinan  
250022, China.

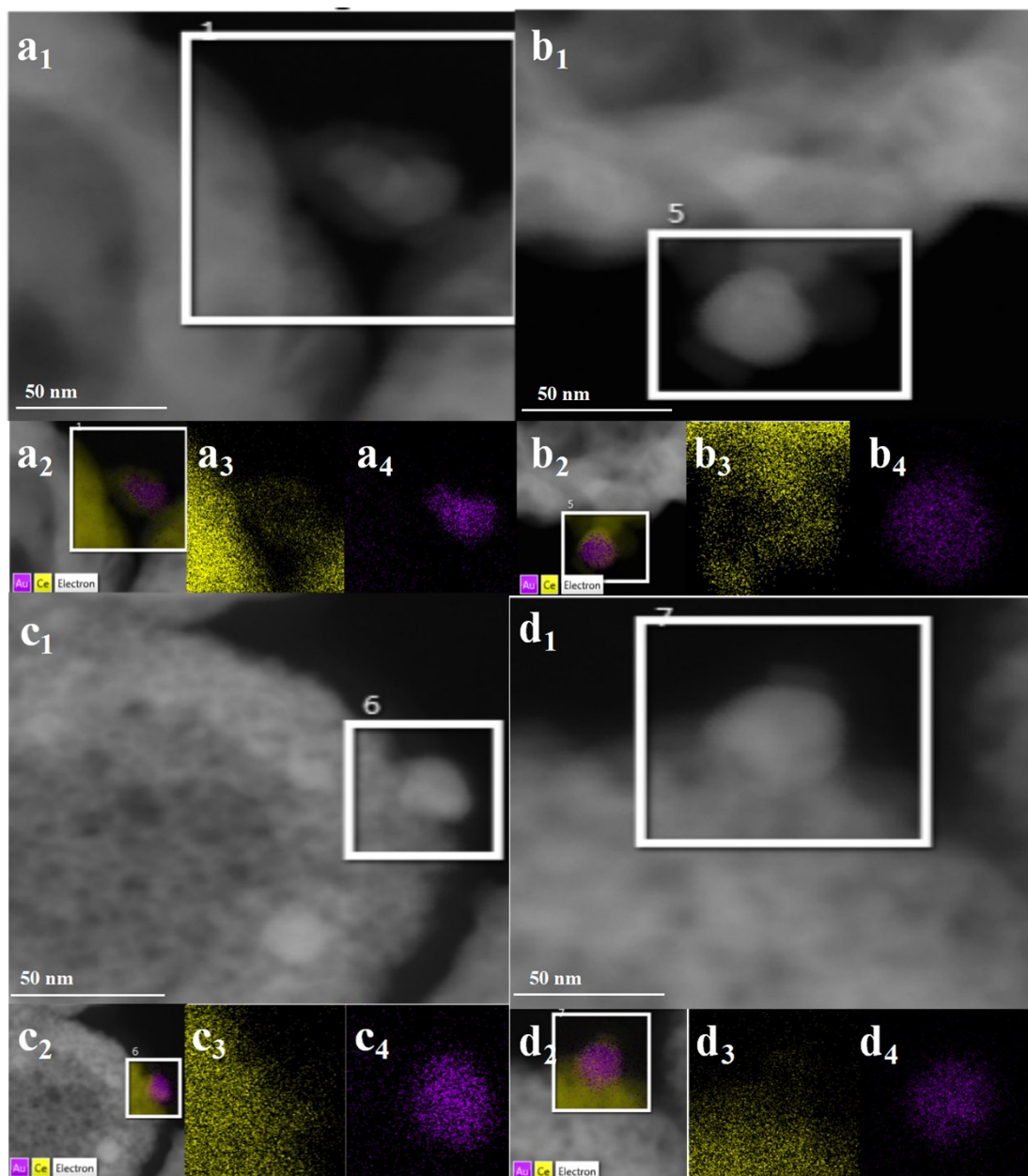
*\*Corresponding to: [stu\\_liuw@ujn.edu.cn](mailto:stu_liuw@ujn.edu.cn) (Wei Liu); [chm\\_wangzp@ujn.edu.cn](mailto:chm_wangzp@ujn.edu.cn)  
(Zhongpeng Wang).*



**Fig. S1** EDS spectrum of AC600 samples.



**Fig. S2** TEM images and the corresponding size distribution of the different samples Au NPs. (a) AC600; (b) AC600-O; (c) AC600-N; (d) AC600-H.



**Fig. S3** STEM ( $x_1$ ) and element mapping results ( $x_2$ ,  $x_3$ , and  $x_4$ ) of the AC600, AC600-O, AC600-N and AC600-H samples ( $x=a, b, c$  and  $d$  for AC600, AC600-O, AC600-N and AC600-H).

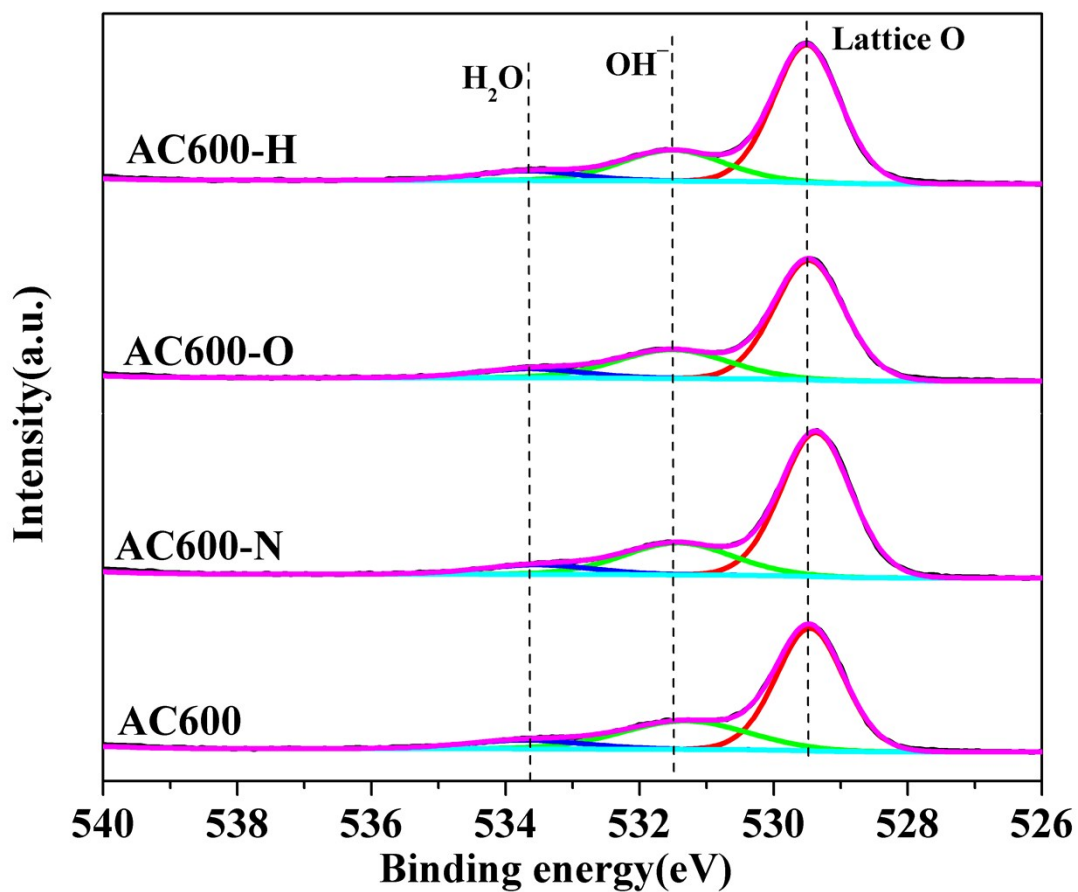
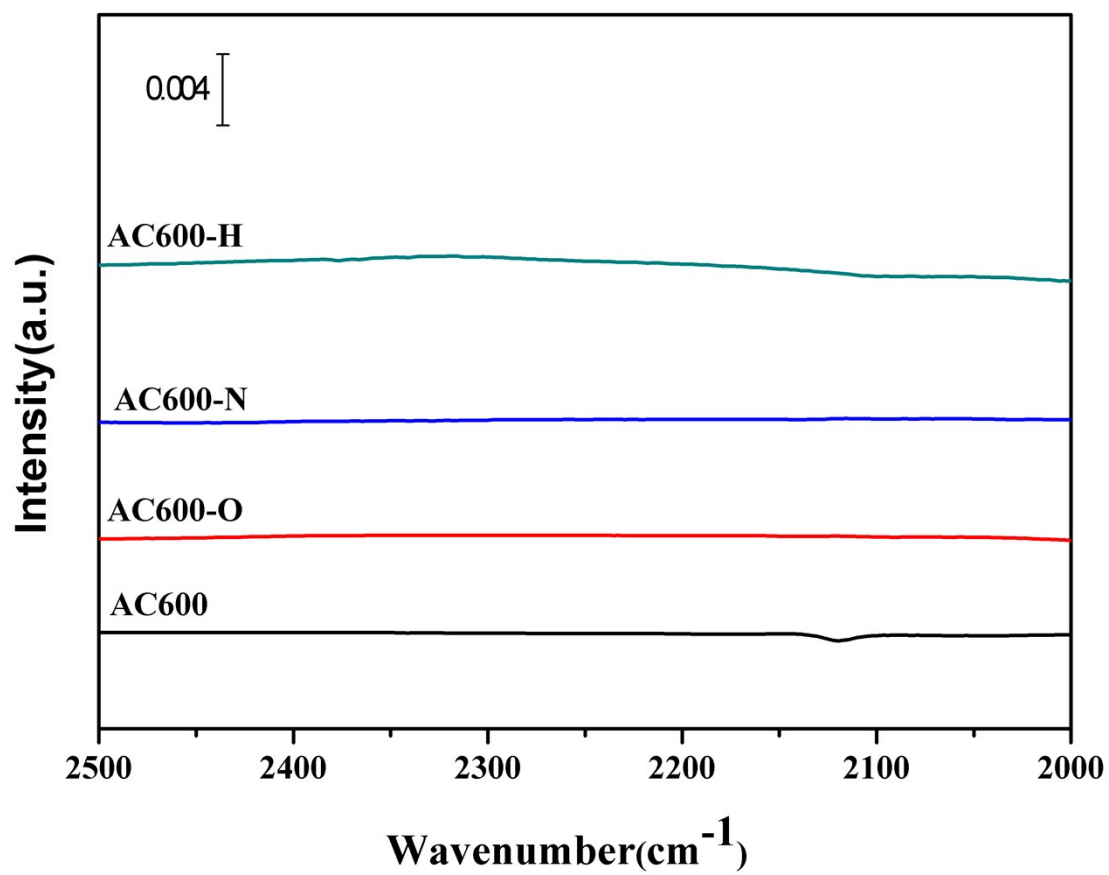


Fig. S4 XPS O1s spectra of AC600, AC600-N, AC600-O and AC600-H catalysts.



**Fig. S5** The in situ DRIFT spectra of CO adsorption on AC600, AC600-O, AC600-N and AC600-H under the purge of He at room temperature.

**Table S1**  $T_{50}$  and  $T_{100}$  for Au-CeO<sub>2</sub> pretreated in different atmospheres.

Samples	600°C	
	$T_{50}$	$T_{100}$
AC600	74	192
AC600-O	43	110
AC600-N	37	94
AC600-H	38	128

**Table S2** Structural parameters of Au nanoparticles on various samples.

Samples	Average Au nanoparticle diameter (nm)	Percentage of surface Au atoms (%) <sup>a</sup>
AC600	9.1	14.6
AC600-O	10.1	13.1
AC600-N	10.3	12.9
AC600-H	11.2	11.9

<sup>a</sup>Calculated from the average Au nanoparticle diameters following the equation:

$$\text{Au dispersion} = (1.33/\text{Average nanoparticle diameter}) * 100\%.$$



**Table S3** Relative content of Au species for different catalysts obtained from

Au4f XPS spectra.

Samples	Au <sup>0</sup>			Au <sup>δ+</sup>		
	Peaks (eV)	content	FWHM (eV)	peaks	content	FWHM (eV)
AC600	84.3	50.7%	0.78	84.6	49.3%	2.06
	87.8			88.4		
AC600-O	84.3	51.8%	0.82	84.5	48.2%	1.90
	87.8			88.5		
AC600-N	84.4	71.3%	0.95	84.8	28.7%	2.32
	88.1			88.4		
AC600-H	84.2	76.2%	0.93	84.5	23.8%	2.02
	87.9			88.4		



**Table S4** Relative content of Ce species for different catalysts obtained from Ce3d XPS spectra.

Catalysts	Ce <sup>3+</sup>		Ce <sup>4+</sup>	
	peaks	Content(%)	peaks	content(%)
AC600	885.1 902.5	18.4%	882.4, 889.1, 898.3, 900.8, 916.6, 907.4	81.6%
AC600-O	885.1 902.5	17.7%	882.4, 889.1, 898.3, 900.8, 916.6, 907.4	82.3%
AC600-N	885.2 902.5	18.0%	882.4, 889.1, 898.3, 900.8, 916.6, 907.4	82.0%
AC600-H	885.3 902.5	18.0%	882.4, 889.1, 898.3, 900.8, 916.6, 907.4	82.0%

**Table S5** Relative content of oxygen species for different catalysts obtained

from O1s XPS spectra.

Samples	lattice O		OH <sup>-</sup>		H <sub>2</sub> O	
	B.E. (eV)	Content(%)	B.E. (eV)	Content(%)	B.E. (eV)	Content(%)
AC600	529.5	64	531.3	28	533.7	8
AC600-O	529.5	67	531.5	26	533.6	7
AC600-N	529.4	69	531.4	24	533.5	7
AC600-H	529.5	69	531.5	24	533.7	7