Electronic Supplementary Information

**Surface engineering on CeO$_2$ nanorods by chemical redox etching and their enhanced catalytic activity for CO oxidation**

Wei Gao, a Zhiyun Zhang, a Jing Li, a Yuanyuan Ma* a and Yongquan Qu* a,b

a Center for Applied Chemical Research, Frontier Institute of Science and Technology, and State Key Laboratory for Mechanical Behavior of Materials, Xi’an Jiaotong University, Xi’an, China, 710049.

b MOE Key Laboratory for Nonequilibrium Synthesis and Modulation of Condensed Matter, Xi’an Jiaotong University, Xi’an, China 710049

* To whom correspondence should be addressed. E-mail: yongquan@mail.xjtu.edu.cn.

**Figure S1** Diameter distributions of (a) CeO$_2$ nanorods (8.5 ± 1.0 nm); (b) CeO$_2$-NR-1 (7.4 ± 1.1 nm); (c) CeO$_2$-NR-4 (6.5 ± 1.0 nm) and (d) CeO$_2$-NR-8 (5.8 ± 1.1 nm).
**Figure S2** Optical images of CeO$_2$: the untreated nanorods, AA reduced samples and H$_2$O$_2$ re-oxidized samples.

**Table S1** Catalytic performance of as-synthesized ceria nanorods and etched ceria nanorods for CO oxidation

<table>
<thead>
<tr>
<th></th>
<th>CeO$_2$ nanorods</th>
<th>CeO$_2$ NRs-1</th>
<th>CeO$_2$ NRs-4</th>
<th>CeO$_2$ NRs-8</th>
</tr>
</thead>
<tbody>
<tr>
<td>$T_{50}/^\circ$C</td>
<td>230</td>
<td>218</td>
<td>213</td>
<td>198</td>
</tr>
<tr>
<td>$T_{90}/^\circ$C</td>
<td>292</td>
<td>282</td>
<td>267</td>
<td>247</td>
</tr>
<tr>
<td>$T_{99}/^\circ$C</td>
<td>327</td>
<td>325</td>
<td>308</td>
<td>286</td>
</tr>
</tbody>
</table>

**Preparation of ceria nanoparticles**

Ceria nanoparticles were prepared in a simple calcining method. Briefly, 500 mg Ce(NO$_3$)$_3$·6H$_2$O were calcined at a muffle furnace at 500 °C for 2h and the temperature ramping rate was 10 °C/min. After cooling to the room temperature, the ceria nanoparticles were obtained.

**Figure S3** (a) Typical TEM image of ceria nanoparticles, (b) CO oxidation property of ceria nanoparticles and CeO$_2$-NR-8.
Figure S4 (a) XPS spectra of the Ce 3d core level of ceria nanoparticles.