

Electronic Supplementary Information for

Insights into the stability of gold nanoparticles supported on metal oxides for the base-free oxidation of glucose to gluconic acid

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1. Materials

D-glucose (>99.5%), potassium D-gluconate (>99%), D-gluconic acid solution (52.3 wt% in water), zirconium(IV) oxynitrate hydrate ($\text{ZrO}(\text{NO}_3)_2 \cdot x\text{H}_2\text{O}$, >99%), cerium(III) nitrate hexahydrate ($\text{Ce}(\text{NO}_3)_3 \cdot 6\text{H}_2\text{O}$, >99%), nanosized titanium(IV) oxide (TiO_2 , $\geq 99.5\%$), microsized cerium(IV) oxide (CeO_2 , 99.9%), microsized zirconium(IV) oxide (ZrO_2 , 99%), microsized titanium(IV) oxide (TiO_2 , $\geq 99\%$), activated carbon (DARCO[®], 100 mesh), gold(III) chloride trihydrate ($\text{HAuCl}_4 \cdot 3\text{H}_2\text{O}$, $\geq 99.9\%$), sodium hydroxide (NaOH , >98%), and poly(vinyl alcohol) (>99%) were purchased from Sigma-Aldrich and used as received.

2. Nitrogen physisorption

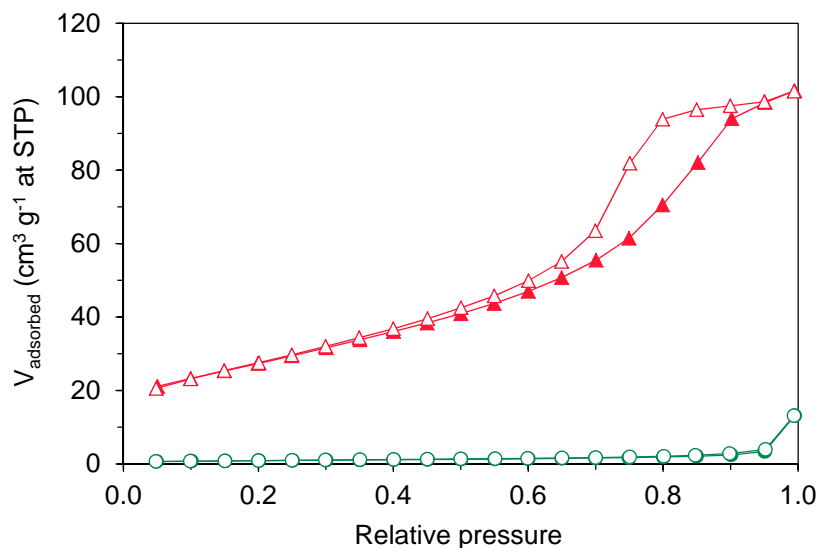


Fig. S1 N_2 adsorption/desorption isotherms of μCeO_2 (green circles) and $n\text{CeO}_2$ (red triangles).

3. Thermogravimetric analysis

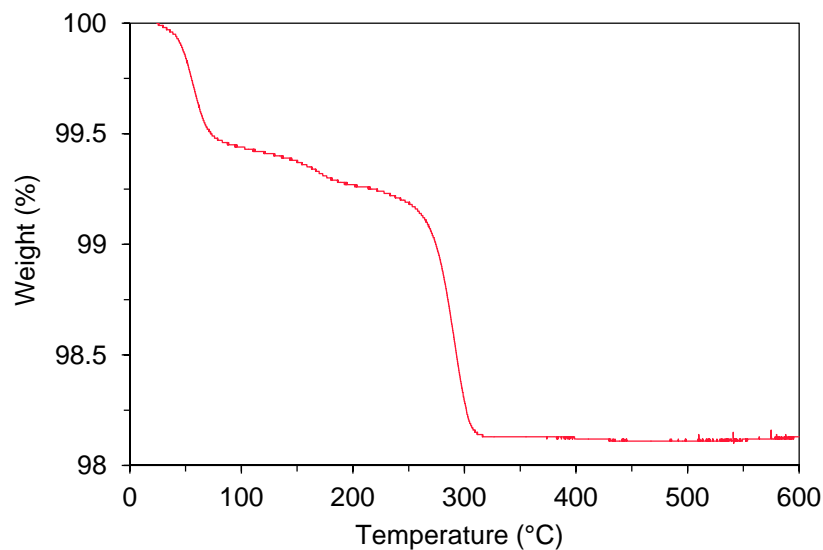


Fig. S2 TGA curve of the 0.02 wt% Au/ μ CeO₂ catalyst after 72 h reaction with glucose. Reaction conditions: see Fig. 4 in the manuscript.

4. Au particle size distribution histograms

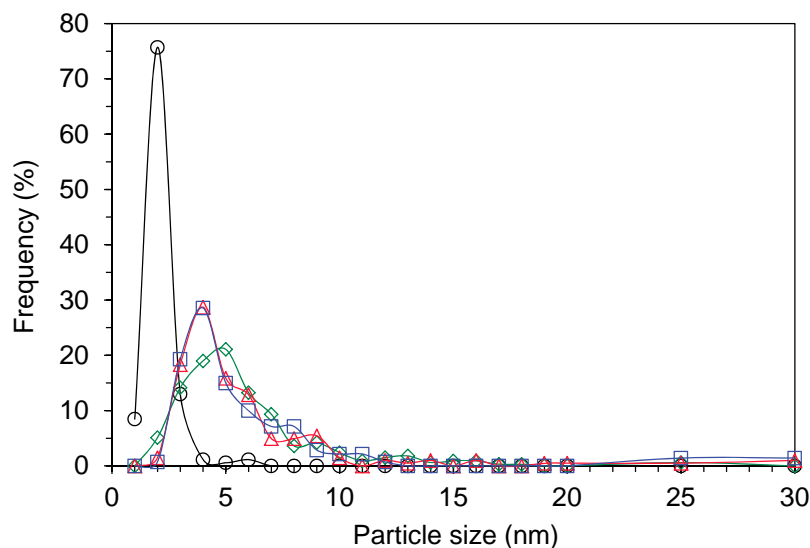


Fig. S3 Au particle size distribution histograms of 0.02 wt% Au/ μ CeO₂: as-synthesized (black circles), after 72 h reaction with glucose and washing with deionized water (green diamonds), after regeneration by calcination at 225 °C (red triangles), and after regeneration by calcination at 325 °C (blue squares). Particle sizes were 1.7 ± 0.6 , 5.3 ± 3.2 , 5.2 ± 3.8 and 5.7 ± 5.5 , respectively. Reaction conditions: see Fig. 4 in the manuscript.