

Structure-activity relationship of nanostructured ceria for the catalytic generation of hydroxyl radicals

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ELECTRONIC SUPPLEMENTARY INFORMATION

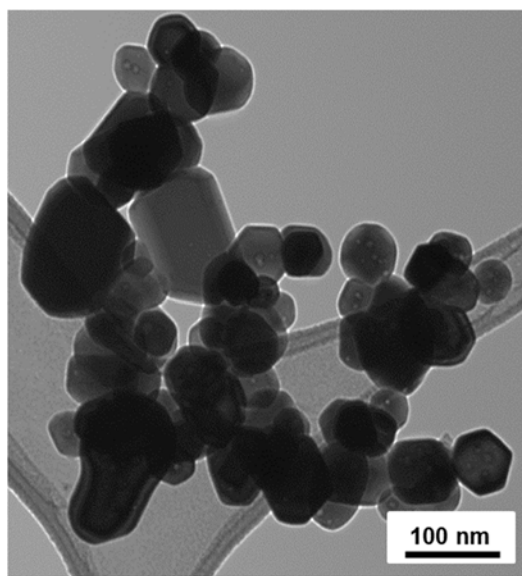


Figure S1. TEM image of commercial ceria particles.

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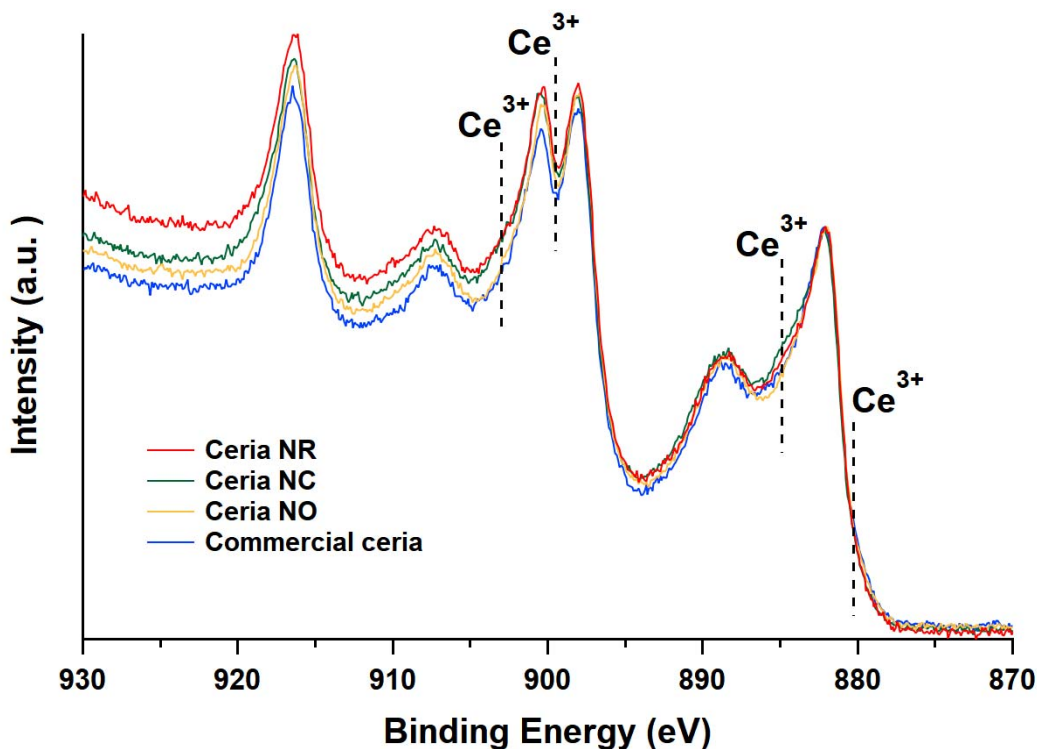


Figure S2. Ce 3d XPS spectra of ceria nanorods (NR), ceria nanocubes (NC), ceria nanooctahedra (NO), and commercial ceria. The spectra were normalized at 882.15 eV. The locations of the Ce^{3+} 3d peaks are indicated by the dashed lines. Note: the similarities between the spectra suggests that these ceria samples have similar % of surface Ce^{3+} .

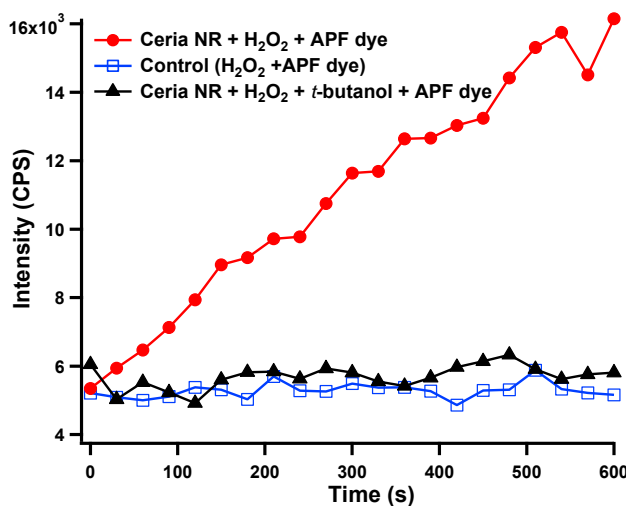


Figure S3. Reaction kinetics of catalytic generation of hydroxyl radicals with and without *t*-butanol as the hydroxyl radical scavenger. Reaction conditions: Reaction temperature: 21.8 °C; $[\text{H}_2\text{O}_2] = 3 \text{ mM}$; $[\text{Ceria NR}] = 0.1 \text{ g/L}$; $[t\text{-butanol}] = 2 \text{ M}$.

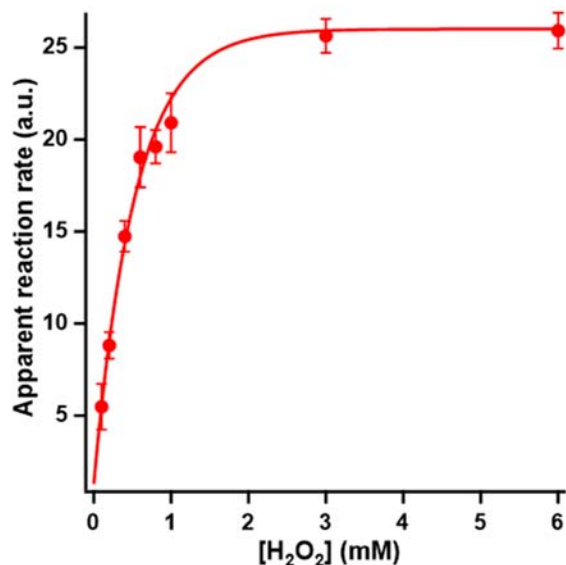


Figure S4. Determination of optimum [H₂O₂] from reaction kinetics for the catalytic generation of hydroxyl radicals from disproportionation of hydrogen peroxide using ceria nanorods. Reaction conditions: 21.8 °C, [H₂O₂] = 0.1 – 6 mM, [Ceria NR] = 0.1 g/L. The solid line was drawn to guide the eye on the trend line of the apparent reaction rate at higher [H₂O₂].

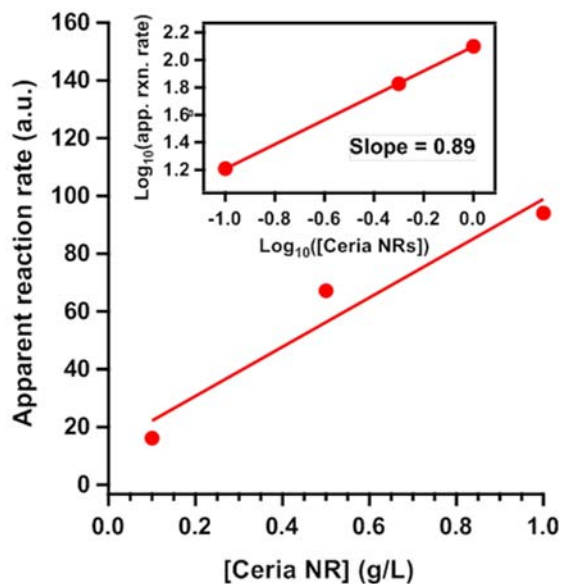


Figure S5. Reaction kinetics for the catalytic generation of hydroxyl radicals from disproportionation of hydrogen peroxide using ceria nanorods. (inset) Log-Log plot of the kinetics data for determining the reaction order with respect to the concentration of ceria nanorod catalysts. Reaction conditions: Reaction temperature: 21.8 °C; [H₂O₂] = 3 mM; [Ceria NR] = 0.1, 0.5, and 1.0 g/L.