

Supplementary Information

High-resolution transmission electron microscope image of CeO₂ nanoparticles that were synthesized in the presence of hexanedioic acid

Figure S1a shows a magnified TEM image that is identical to Fig. 4f in the main text. Figures S1b and S1c respectively show the unit cell structure of CeO₂ crystal and atomic structure of CeO₂ octahedral nanocrystals from the [110] direction. Figure S1a shows that the cubic products were assembled from smaller (ca. 7 nm) CeO₂ octahedral nanocrystals. In addition, a comparison between Figs. S1a and S1c suggests that the primary octahedral nanocrystals share the same crystallographic orientation, aligning in the [110] direction to the electron beam of TEM.

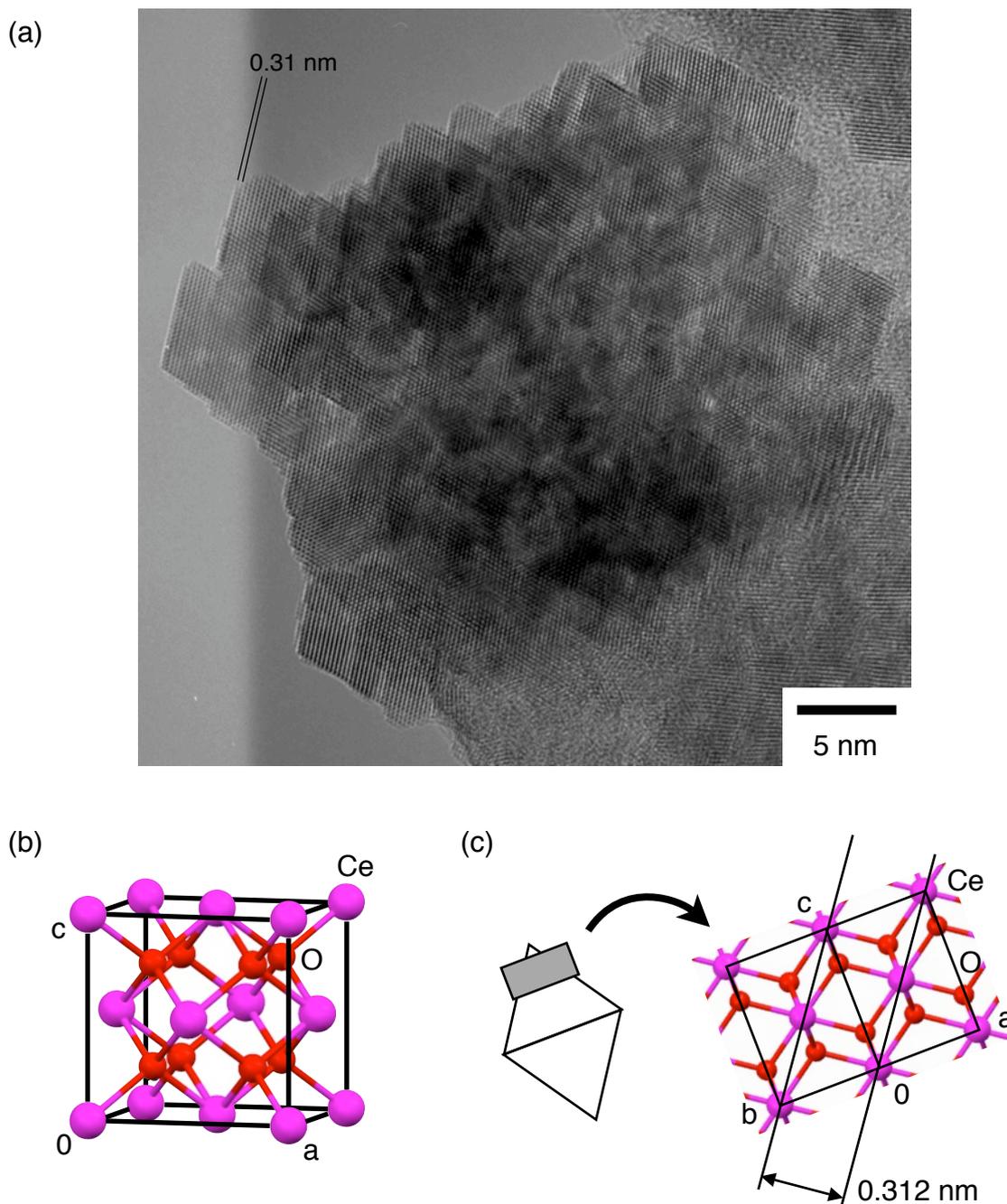


Figure S1 (a) Magnified TEM image of CeO₂ nanoassemblies that were synthesized in the presence of hexanedioic acid (HOOC(CH₂)₄COOH), (b) unit cell structure of CeO₂, and (c) atomic structure of CeO₂ octahedral nanocrystals from the [110] direction.

Thermogravimetry

Figure S2 shows the thermogravimetry spectra of the synthesized CeO_2 products. The results show that the cubic CeO_2 nanoassemblies that were synthesized with $\text{HOOC}(\text{CH}_2)_4\text{COOH}$ had larger weight loss than the octahedral CeO_2 nanocrystals that were synthesized without $\text{HOOC}(\text{CH}_2)_4\text{COOH}$. The difference in the weight loss corresponds to the weight of attached $\text{HOOC}(\text{CH}_2)_4\text{COOH}$. Based on the weight loss and the diameter of primary CeO_2 octahedral nanocrystals, the coverage of $\text{HOOC}(\text{CH}_2)_4\text{COOH}$ on CeO_2 surface was estimated as 1.3 molecules / nm^2 .

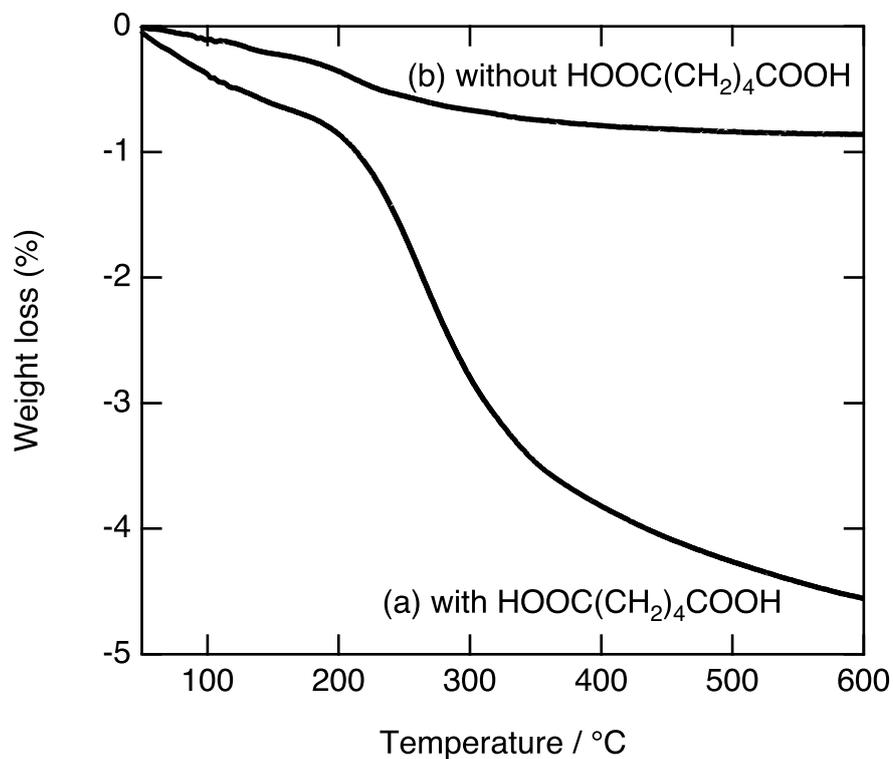


Figure S2 Thermogravimetric spectra of CeO_2 products that were synthesized (a) with and (b) without hexanedioic acid ($\text{HOOC}(\text{CH}_2)_4\text{COOH}$).