

## SUPPORTING INFORMATION

### Tuning Ceria Catalysts in Aqueous Media at the Nanoscale: How Do Surface Charge and Area Determine Peroxidase- and Haloperoxidase-Like Reactivity

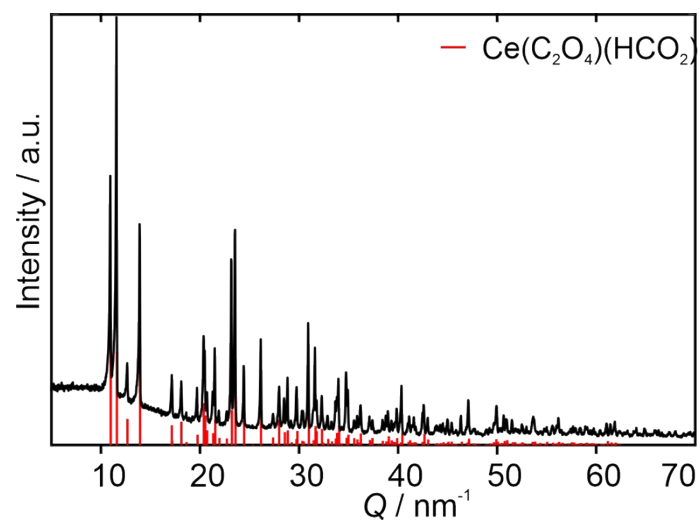
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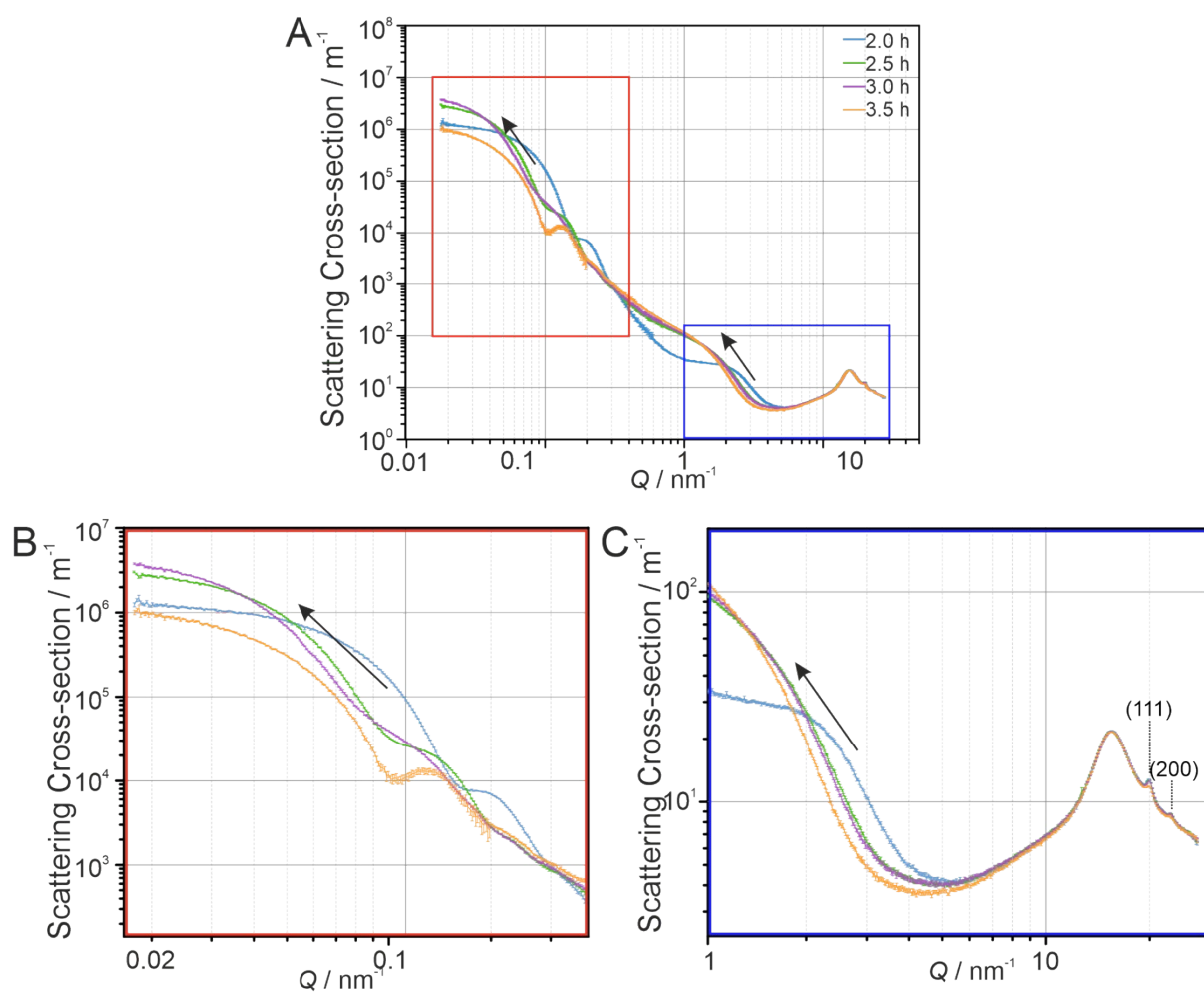
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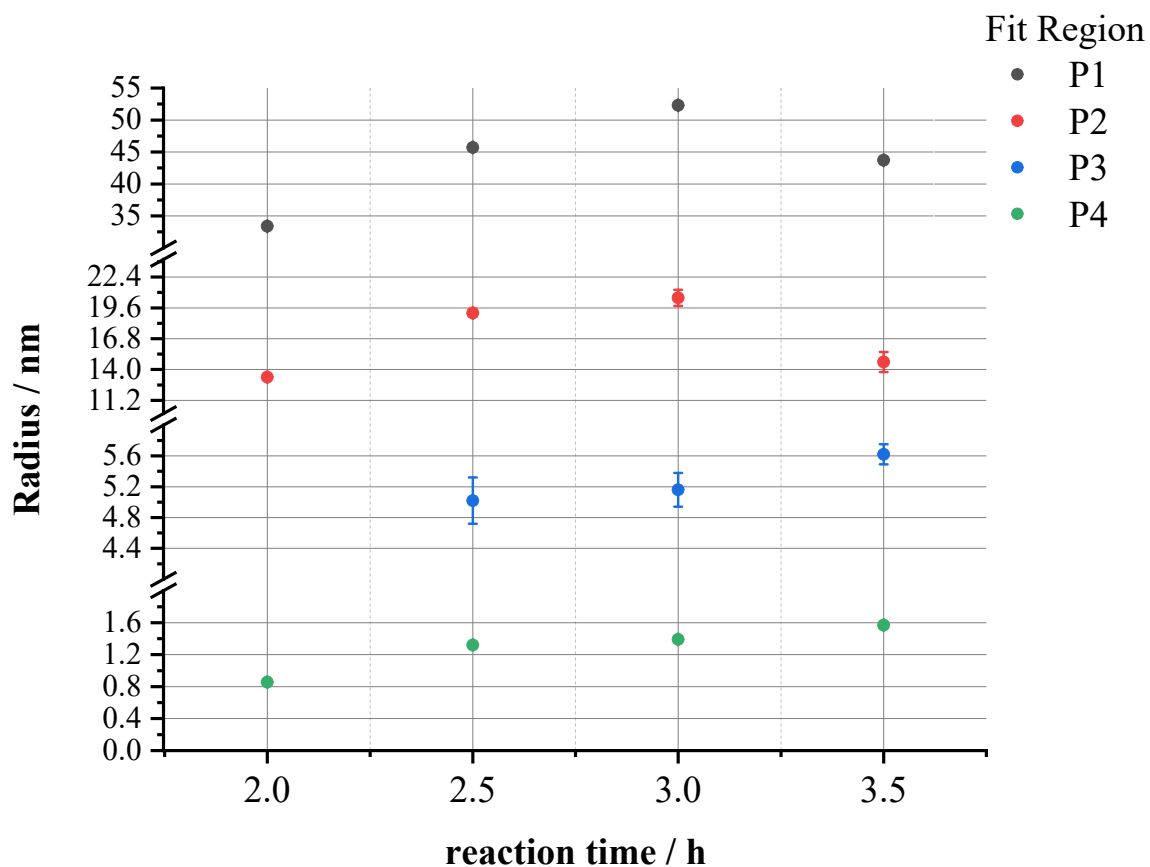
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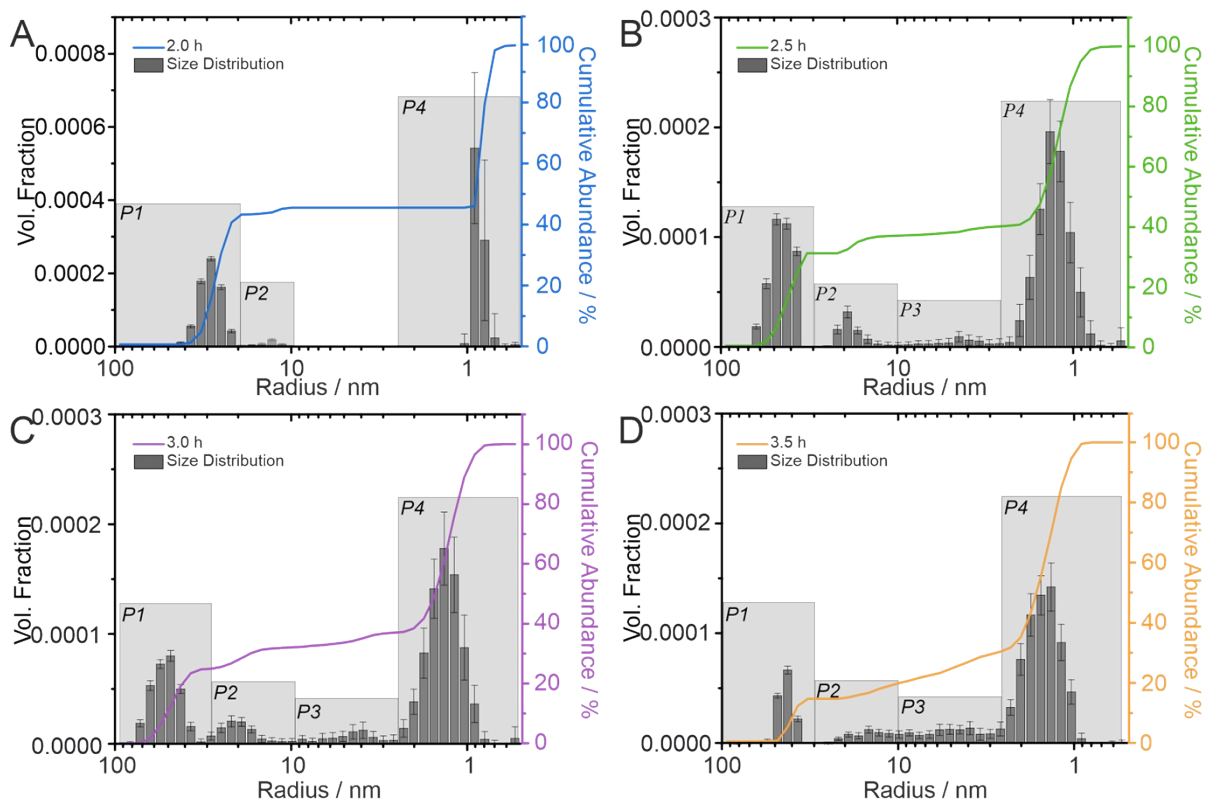
**Fig. S1.** X-ray powder diffraction pattern of Ce(C<sub>2</sub>O<sub>4</sub>)(HCO<sub>2</sub>) formed after 120 h in a flask reaction. Red ticks indicate the calculated reflection positions for Ce(C<sub>2</sub>O<sub>4</sub>)(HCO<sub>2</sub>) based on structural data from the ICSD data bank (ICSD# 43450).



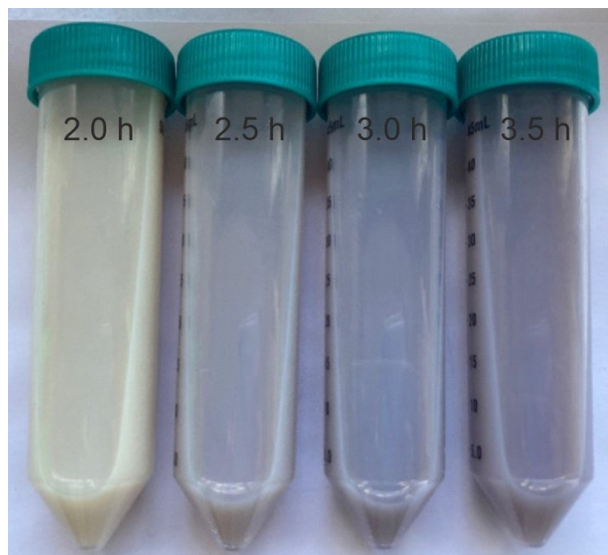
**Fig. S2.** SAXS measurements (A) of mesoporous  $\text{CeO}_{2-x}$  nanoparticles formed after 2.0 h, 2.5 h, 3.0 h and 3.5 h of reaction time, with (B) and (C) showing the red and blue regions marked in (A) in more detail. Arrows are a guide for the eye to show the shift to larger values of  $q$  for 2.0 h, 2.5 h and 3.0 h samples.



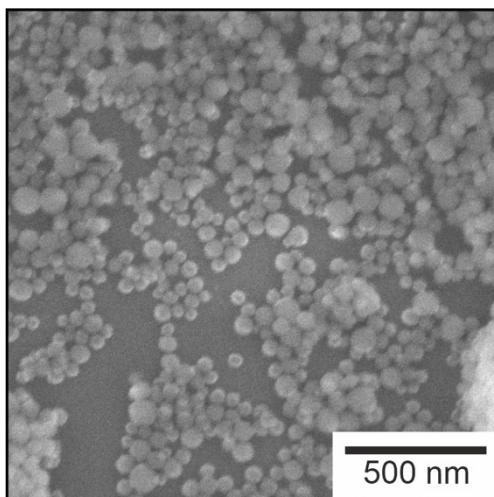
**Fig. S3.** Average radial dimension of the four populations observed from fits of the SAXS for mesoporous  $\text{CeO}_{2-x}$  nanoparticles formed at different reaction times. Fit regions refer to the population distributions and are set to the ranges of (*P1*) 0.5 – 2.5 nm, (*P2*) 2.5 – 10 nm, (*P3*) 10 – 30 nm and (*P4*) 30 – 100 nm, though for 2.0 h reaction times regions *P3* and *P4* are set between 10 – 20 nm and 20 – 100 nm respectively.



**Fig. S4.** Particle radial histograms derived from small angle X-ray scattering data with cumulative abundance (right y-axis) for mesoporous  $\text{CeO}_{2-x}$  nanoparticles formed after (A) 2.0 h, (B) 2.5 h, (C) 3.0 h and (D) 3.5 h of reaction time.



**Fig. S5.** Digital images of the reaction solutions after 2.0 h, 2.5 h, 3.0 h and 3.5 h.



**Fig. S6.** Scanning electron microscopy images of mesoporous CeO<sub>2</sub> nanoparticles formed after 2.0 h.