Electronic Supplementary Information

Surface Binding-Mediated Growth of Monodisperse Cobalt Doped Ceria Nanocrystals

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1. X-ray fluorescence spectroscopy (XRF) AND EDS analysis

Based on the reference, *Cryst. Growth Des.* **2012**, **12(2)**, **629**, the chemical compositions of synthesized samples were measured by XRF and compared with standard compounds. As shown in Figure S1, the Co/(Co + Ce) atomic ratio is estimated as 0%, 6.3% and 14.3%, respectively. we have measured cabolt dopant percent upon CeO2 nanocrystals using ICP-AES. The value is 7.0% and 14.0%, for CeCo6 and CeCo14, respectively. The ICP-AES result is consistent with our previous XRF result.

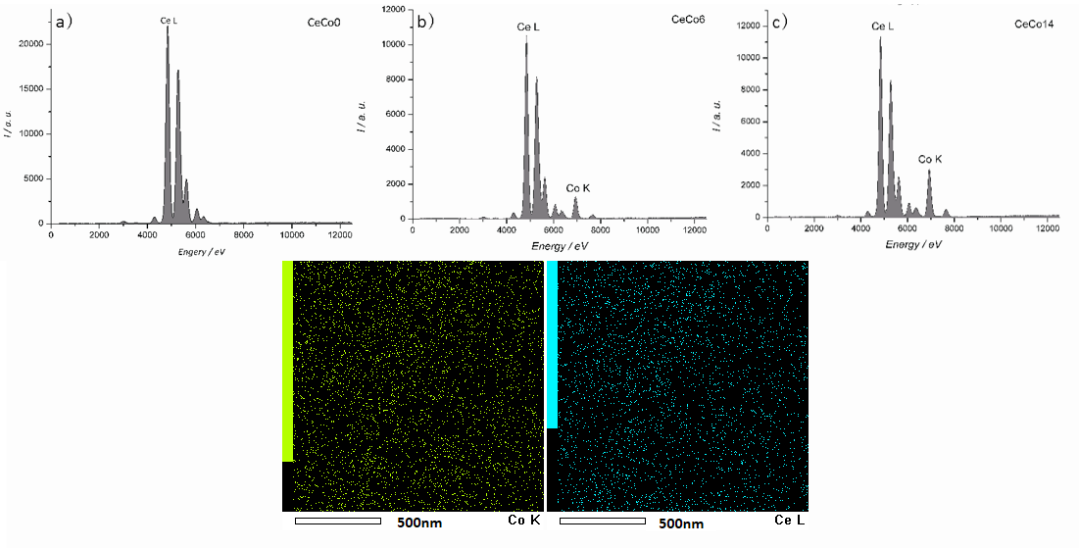
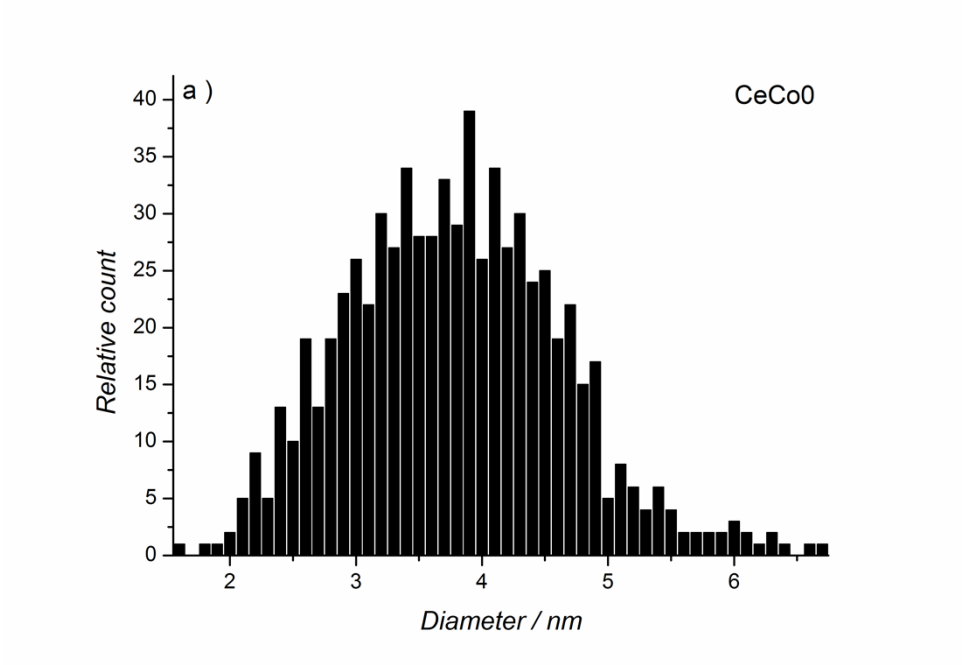


Figure S1. (top) XRF spectra of the synthesized samples and (bottom) EDS analysis of CeCo14. Considering the results from XAFS and FTIR, EDS analysis confirmed the uniform distribution of cerium and cobalt in analysed sample.

2. Particle size distribution of synthesized samples

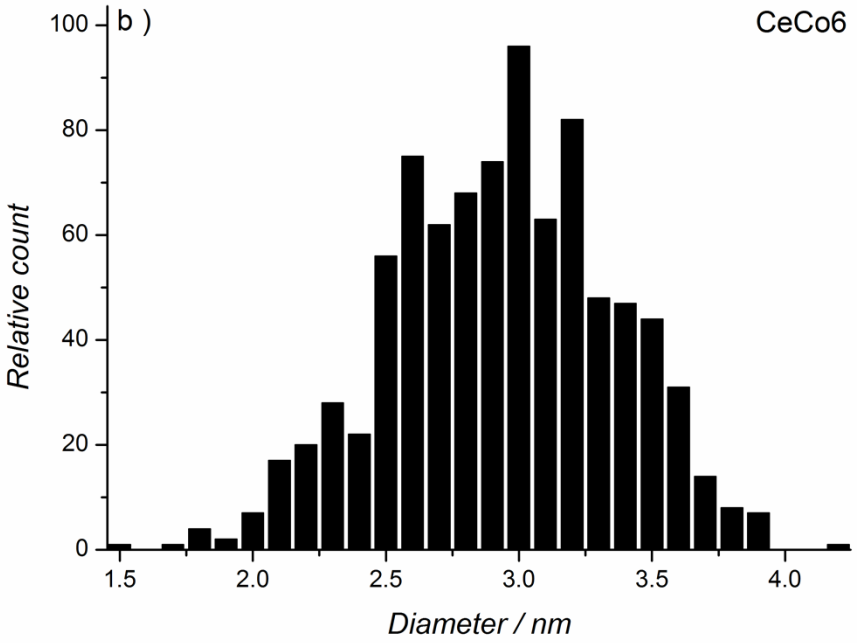
Figure S2: a) CeCo0, b) CeCo6, c) CeCo14.



Count number: 835

Average diameter = 3.8 nm

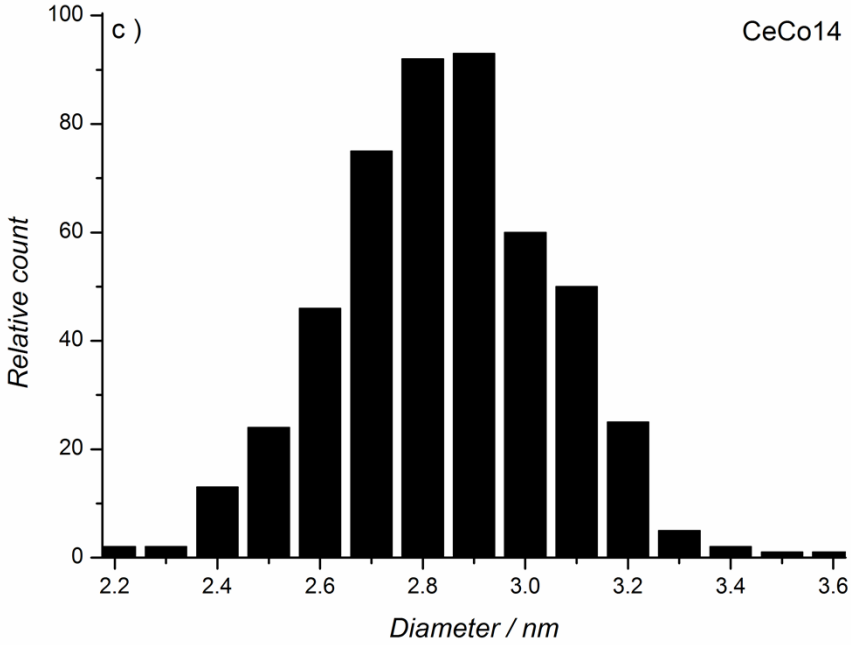
Size variation = ± 0.4nm (±10.5%)



Count number: 878

Average diameter = 2.9 nm

Size variation = ± 0.2nm (±6.9%)



Count number: 886

Average diameter = 2.8 nm

Size variation = ± 0.1nm (±3.6%)

3. **Ceria nanoparticle from shortened reaction time**

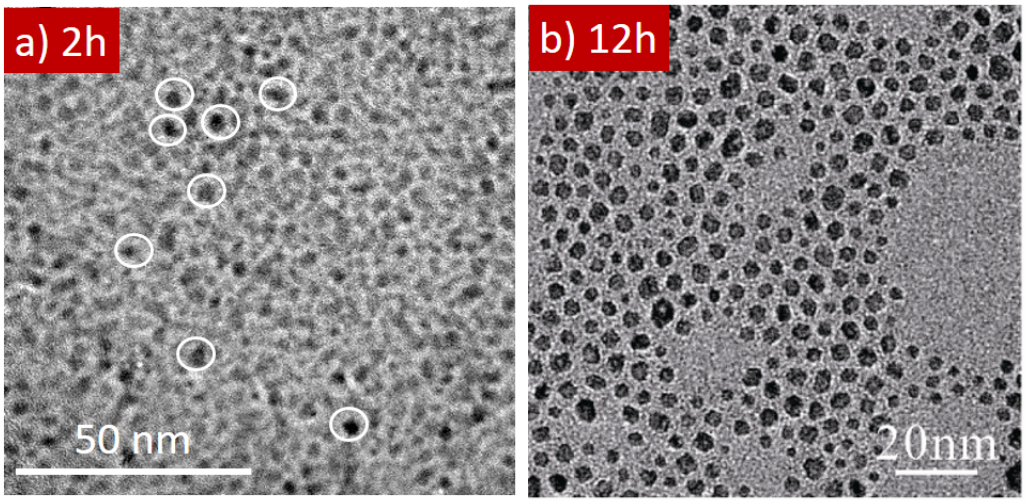


Figure S3. a) TEM image of ceria nanoparticles from shortened reaction time (2 h). b) TEM image of ceria nanoparticles from long reaction time (12 h). The percentage of large ceria nanoparticles (some of them were indicated by circle) was small at the early stage of the hydrothermal reaction. As reaction time increased, different situation appeared. The proportion and mean size of large nanoparticles were increased. Larger particles consumed smaller particles and become larger, which was in coincidence with Ostwald ripening process.