Supplementary Information

for

Fine Control for the Preparation of Ceria Nanorods (111)

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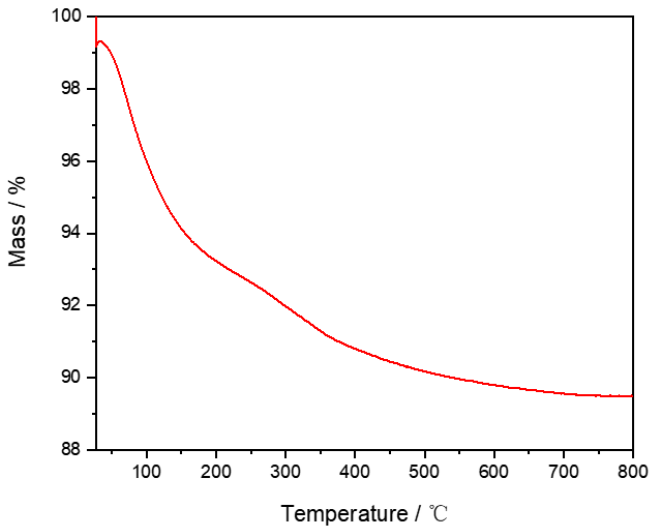

Figure S1. The thermogravimetric curve of the as-prepared product before high temperature calcination. The mass loss is found at a temperature lower than 400 ℃, presumably due to dehydration at below 150 ℃ and dehydroxylation at 200 to 400 ℃. The weight loss is not significant above 400 ℃ while a temperature as high as 700 ℃ is proved to be successful to transform high energy facets such as (100) and (110) to the thermodynamically stable (111) facets.[1] Thus a calcination temperature of 700 ℃ is used in the sample preparation process.

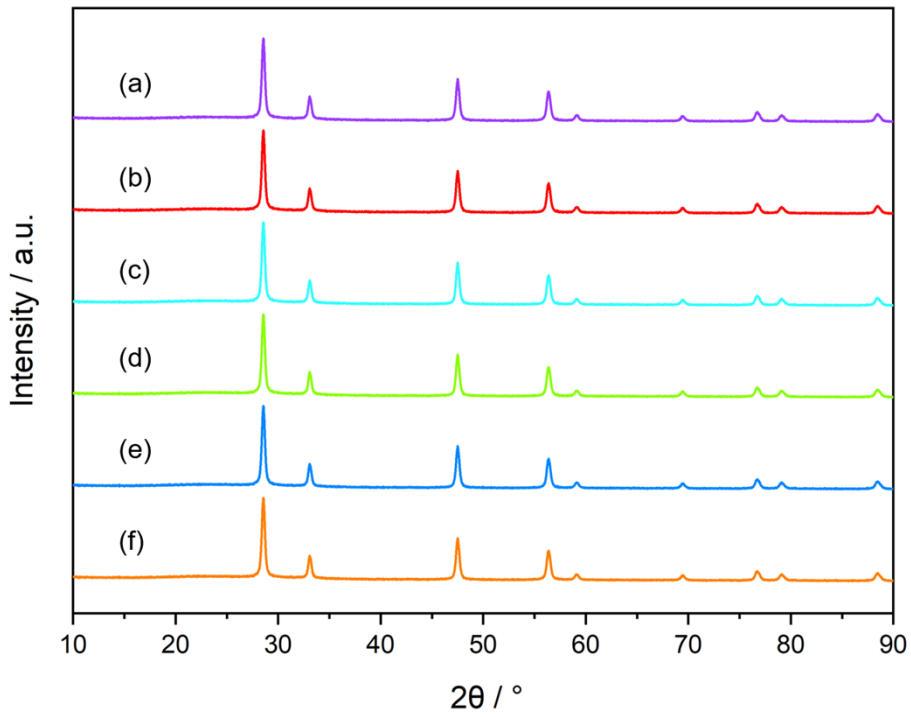

Figure S2. The XRD patterns of CeO_2 nanostructures obtained by pouring 0.05 mol·L^{-1} $CeCl_3$ solution to NaOH solutions with different concentrations. (a) 0.1 mol·L^{-1}, (b) 1 mol·L^{-1}, (c) 3 mol·L^{-1}, (d) 4 mol·L^{-1} (e) 5 mol·L^{-1} and (f) 6 mol·L^{-1}. Hydrothermal temperature: 100 °C, time: 24 h. Cerium source: 0.05 mol·L^{-1} $CeCl_3$ solution.

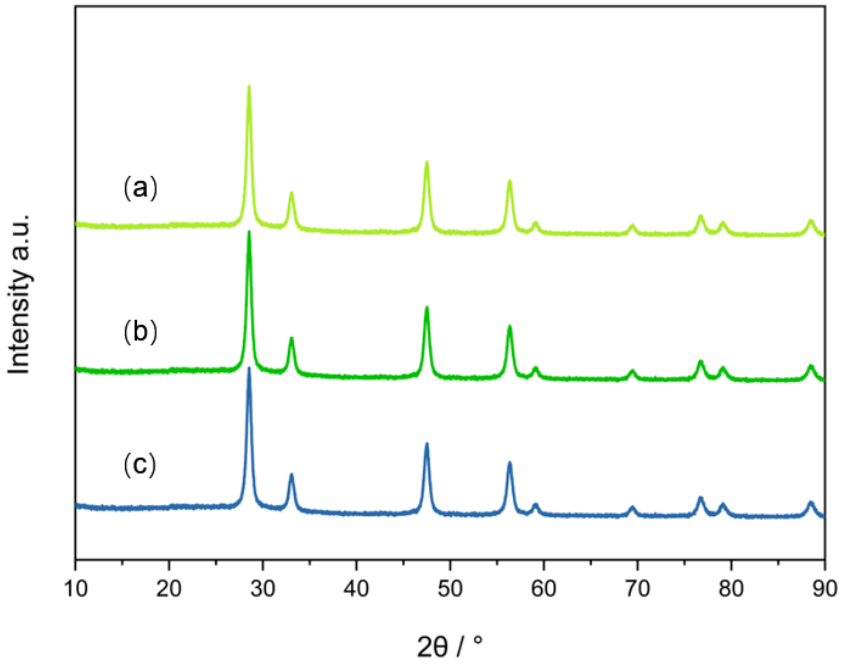

Figure S3. The XRD patterns of CeO_2 nanostructures obtained with different hydrothermal temperatures. (a) 100 ℃, (b) 140 ℃ and (c) 180 ℃. Hydrothermal time: 24 h. Cerium source: 0.05 $mol \cdot L^{-1}$ $CeCl_3$ solution. NaOH solution concentration: 6 $mol \cdot L^{-1}$.

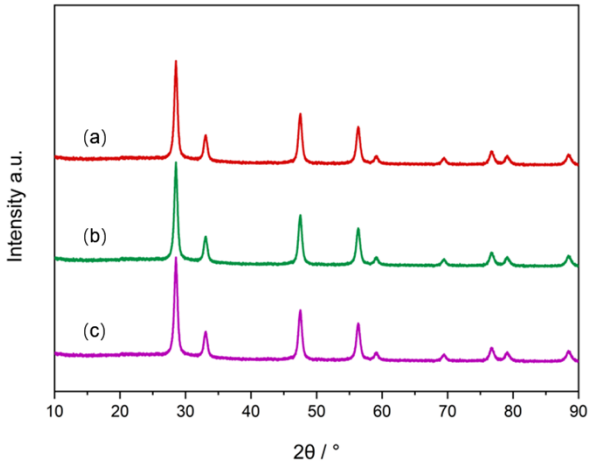

Figure S4. The XRD patterns of CeO_2 nanostructures obtained with different hydrothermal time. (a) 12 h, (b) 24 h and (c) 36 h. Hydrothermal temperature: 100 ℃. Cerium source: 0.05 mol·L^{-1} $CeCl_3$ solution. NaOH solution concentration: 6 mol·L^{-1}.

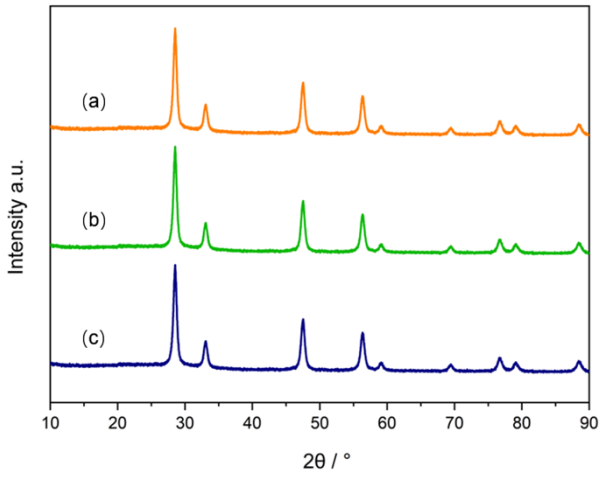

Figure S5. The XRD patterns of CeO_2 nanostructures obtained with different cerium sources. (a) $Ce(NO_3)_3$, (b) $CeCl_3$, (c) $Ce(NH_4)_2(NO_3)_6$. Hydrothermal temperature and time: 100 ℃ and 24 h. NaOH solution concentration: 6 $mol \cdot L^{-1}$.

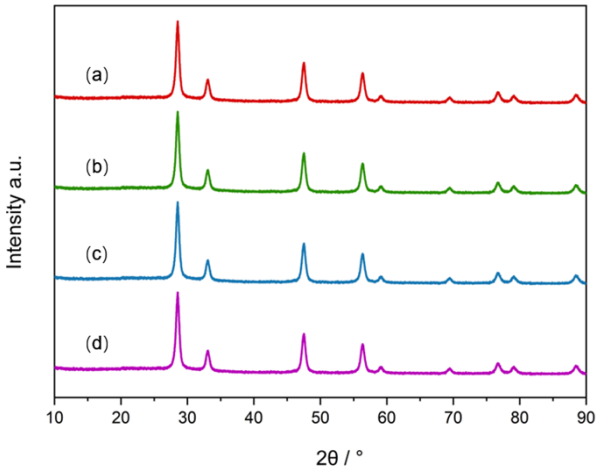

Figure S6. The XRD patterns of CeO_2 nanostructures obtained with different oxidants. (a) H_2O_2, (b) air (reaction time: 120 min), (c) air (reaction time: 30 min) and (d) trace oxygen in N_2 atmosphere. Hydrothermal temperature and time: 100 ℃ and 24 h. Cerium source: 0.05 mol·L^{-1} $CeCl_3$ solution. NaOH solution concentration: 6 mol·L^{-1}.

References

1. B. Sudduth, D. Yun, J. Sun and Y. Wang, *J. Catal.*, 2021, **404**, 96-108.