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# SUPPLEMENTARY INFORMATION

## Efficient Ceria Nanostructures for Enhanced Solar Fuel Production via High-Temperature Thermochemical Redox Cycles

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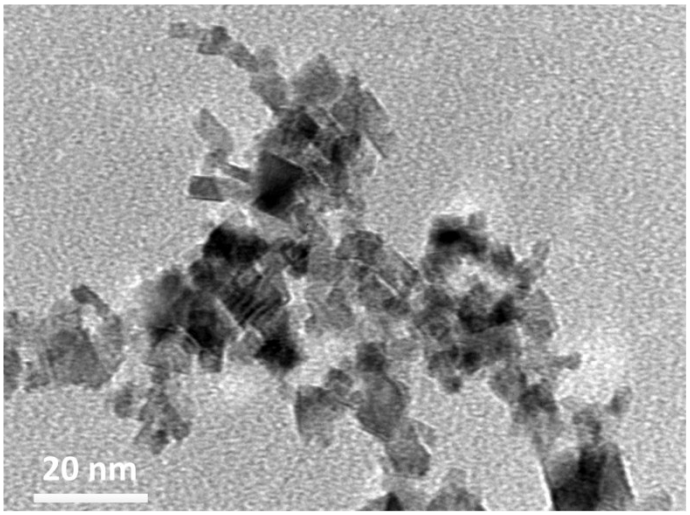


**Figure S1.** TEM images of the as-prepared flame-made agglomerates showing primary particles of 6-13 nm.

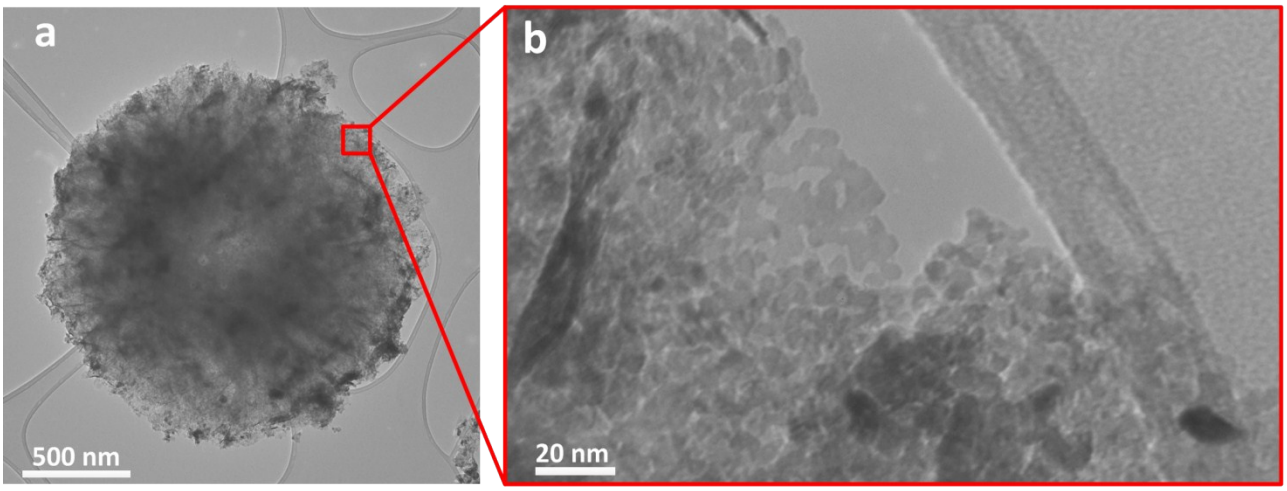


**Figure S2.** TEM micrographs of the as-prepared flower-like agglomerates showing (a) a single flower-like spherical agglomerate, and (b) the primary particles.

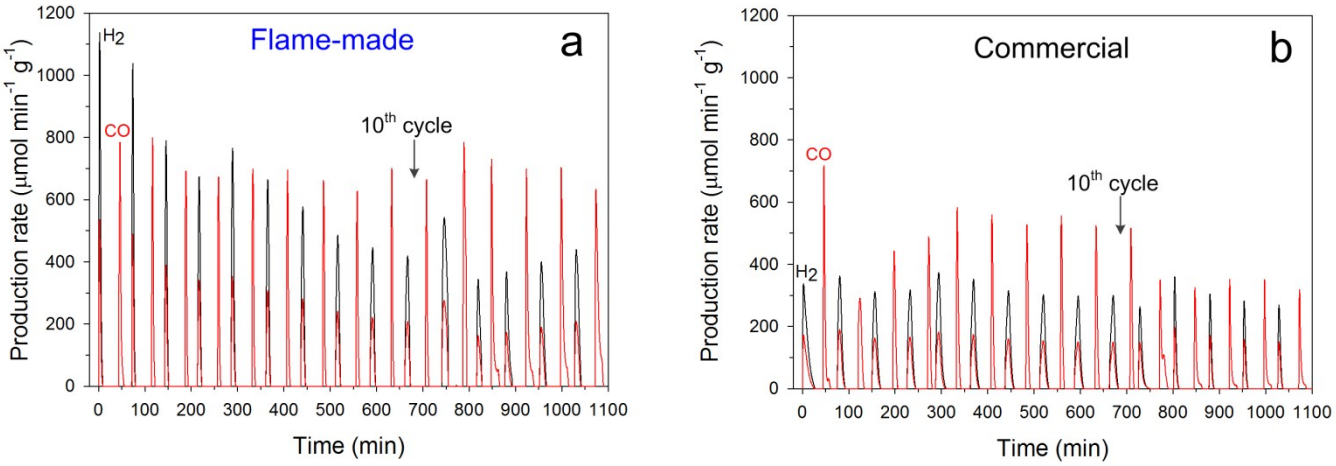


**Figure S3.** $H_2$ and CO production rates of the (a) flame-made ceria and (b) commercial ceria during 15 isothermal MPO-CDS cycles at 1173 K.

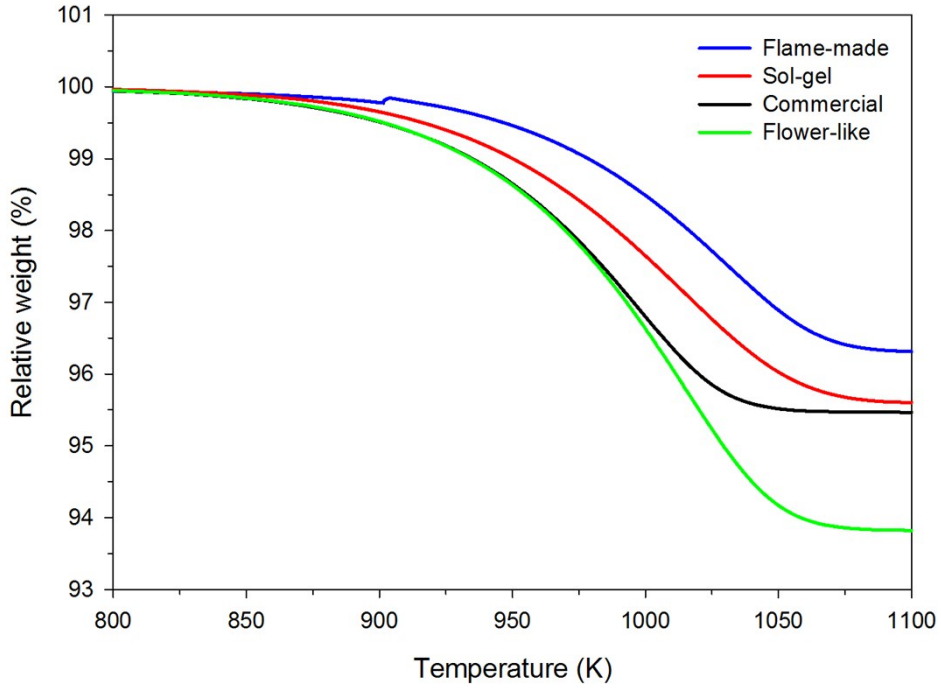


**Figure S4a.** TGA profile in air of the flame-made (blue), flower-like (green), sol-gel (red) and commercial (black) ceria after 10 MPO-CDS cycles. Measurement conditions: heating rate 5 K $min^{-1}$, air flow rate 100 mL $min^{-1}$, sample size 25-35 mg.

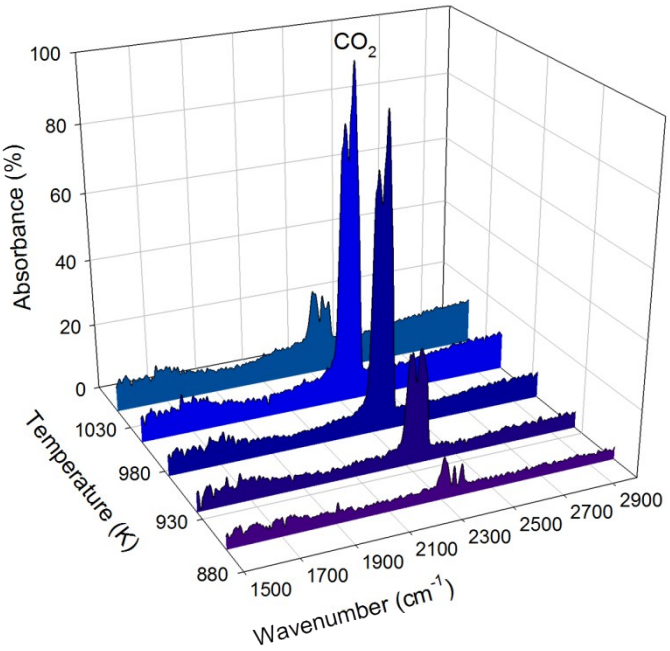


**Figure S4b.** FTIR-EGA profile of $CO_2$ evolution during the temperature programmed oxidation of the flame-made ceria after 10 MPO-CDS cycles. $CO_2$ production is attributed to oxidation of the carbon deposits.