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Supporting Information

Enhancement of the visible light photocatalytic activity of CeO_2 by chemisorbed oxygen in the selective oxidation of benzyl alcohol

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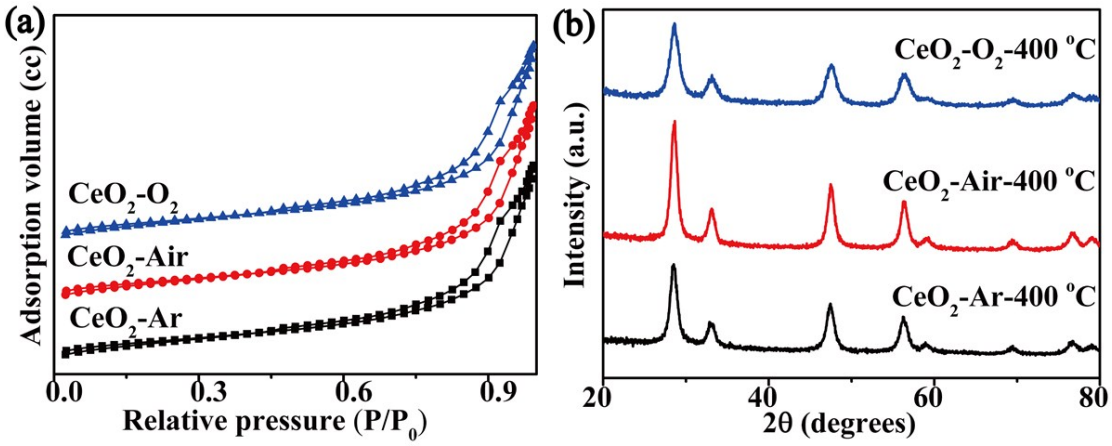

Fig. S1. (a) N_2 adsorption-desorption isotherms of the CeO_2-X samples. (b) XRD patterns of various CeO_2-X samples was calcined at 400 °C for 2 h in air.

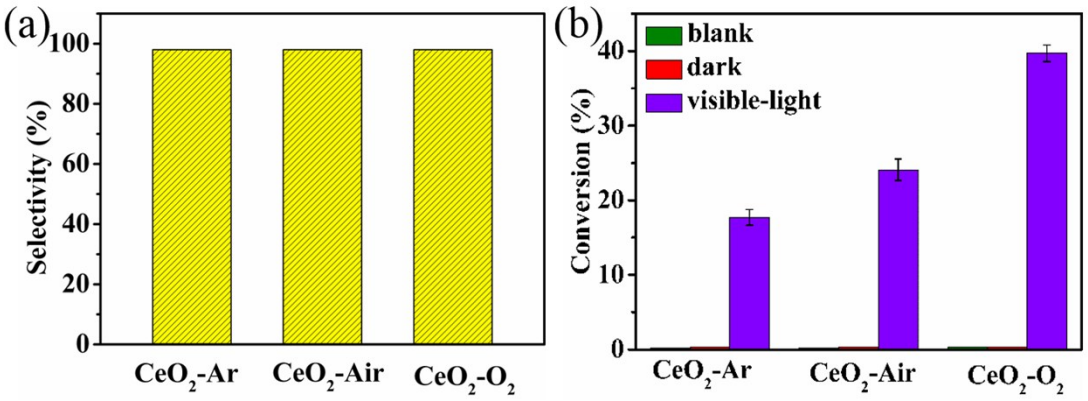

Fig. S2. (a) Reaction selectivity in oxidizing benzyl alcohol to benzaldehyde of various CeO_2-X samples. (b) The photocatalytic conversion of benzyl alcohol without the addition of photocatalysts under light irradiation (blank), in the presence of CeO_2-O_2 composites in the dark (dark) and in the presence of CeO_2-O_2 composites under visible light illumination for irradiation 2 h.

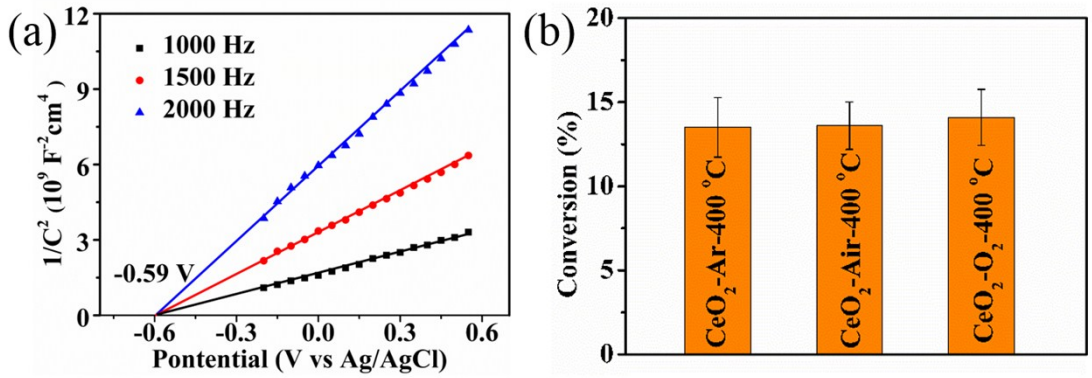

Fig. S3. (a) Mott-Schottky plots of CeO_2-O_2 samples measured under the visible light. (b) Conversions of photocatalytic benzyl alcohol using the CeO_2-Ar-400 °C, CeO_2-Air-400 °C and CeO_2-O_2-400 °C as catalysts under illumination for 2 h.

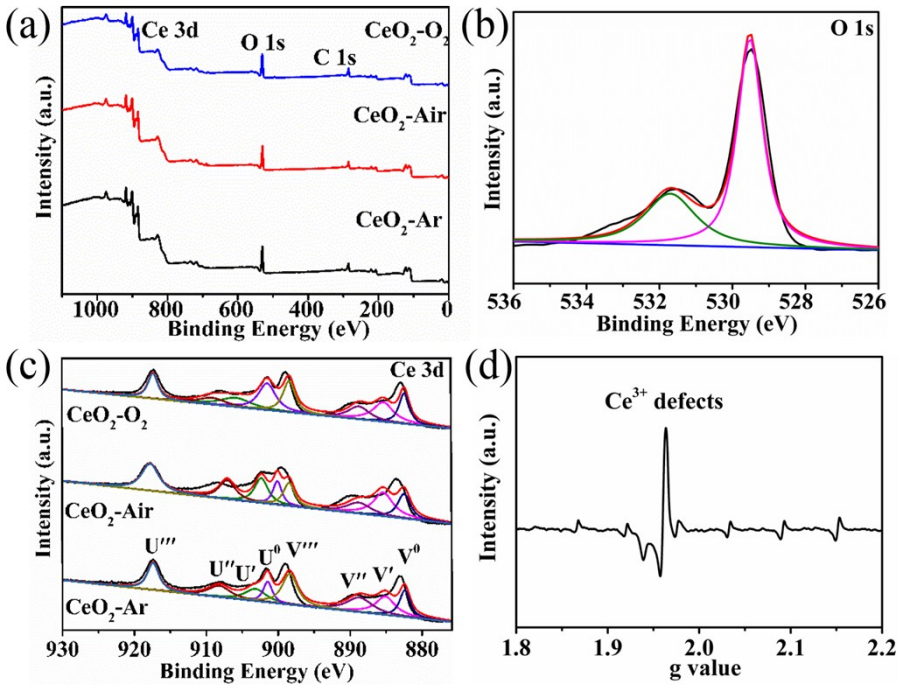

Fig. S4. (a) XPS spectra of CeO_2-Ar, CeO_2-Air and CeO_2-O_2 nanostructures. (b) High-resolution O 1s XPS spectra of CeO_2-400 °C sample. (c) High-resolution O 1s XPS spectra of CeO_2-Ar, CeO_2-Air and CeO_2-O_2. (d) EPR profiles measured at room temperature for CeO_2-O_2 sample.

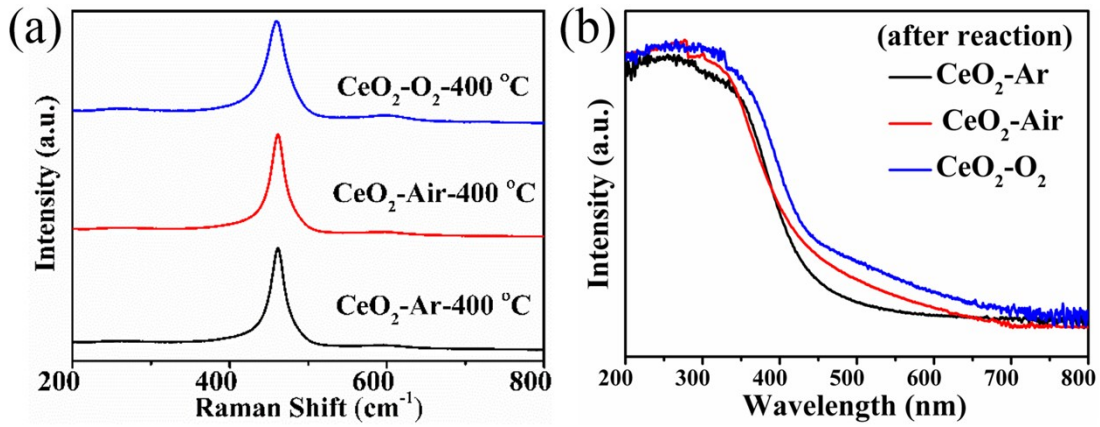

Fig. S5. (a) Raman spectrum of the CeO_2-Ar-400 °C, CeO_2-Air-400 °C and CeO_2-O_2-400 °C. (b) UV–vis DRS of the CeO_2-Ar, CeO_2-Air and CeO_2-O_2 photocatalysts after photocatalytic reaction under O_2-saturated atmosphere.

Table S1. Composition on CeO_2-Ar, CeO_2-Air, CeO_2-O_2, and CeO_2-O_2-400 °C samples characterized by XPS technique.

Sample	O (at.%)	Ce (at.%)	Surface content of O_{ads} (%)	Ce(III) content in total Ce (%)
CeO_2-Ar	77.7	22.3	31.7	17.1
CeO_2-Air	79.2	20.8	33.6	16.6
CeO_2-O_2	82.6	17.4	46.1	14.9
CeO_2-O_2-400 °C	76.8	23.2	31.3	15.2