Unexpected redox behavior of high surface alumina containing highly dispersed cerium cations

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SUPPORTING INFORMATION
Figure S1. TG-DTA profiles for the as-synthesized samples (a) Al, (b) Ce2Al, (c) Ce10Al and (d) Ce20Al.

Figure S2. N\textsubscript{2} adsorption-desorption curves (a) and corresponding BJH desorption pore size distribution (b) obtained over the solids after calcination at 600 °C.

Figure S3. X-ray diffraction patterns recorded under air atmosphere on 20 – 80° region at: RT, 400, 600, 800, 1000 °C and RT after heating; for the samples: (a) Ce2Al; (b) Ce10Al; (c) Ce20Al; and all the samples heated up to 1000 °C and cooled down to RT.

Figure S4. TEM picture of Ce20Al sample.

Figure S5. FTIR subtraction spectra collected after CO\textsubscript{2} adsorption at RT and desorption under secondary vacuum at 150 ºC.

Figure S6. Ce L\textsubscript{3} edge XANES spectra of CeO\textsubscript{2}, CeAlO\textsubscript{3} and CeXAl samples at RT. The peaks contributions A\textsubscript{1}, A\textsubscript{2}, B, C and D were assigned as explained in reference [1].

Figure S7. EXAFS k\textsuperscript{3}–weighted oscillations for Ce10Al (green line), Ce20Al (red line) and CeO\textsubscript{2} (blue line).

Figure S8. 27\textsuperscript{Al}-17\textsuperscript{O} heteronuclear correlation spectra of 17\textsuperscript{O}-exchanged Al sample.

Figure S9. X-ray diffraction patterns recorded under hydrogen atmosphere on 20 – 80° region at: RT, 400, 600, 800, 1000 °C and RT after heating over Ce15Al sample.
Figure S1. TG-DTA profiles for the as-synthesized samples (a) Al, (b) Ce2Al, (c) Ce10Al and (d) Ce20Al.
Figure S2. N$_2$ adsorption-desorption curves (a) and corresponding BJH desorption pore size distribution (b) obtained over the solids after calcination at 600 °C.
Figure S3. X-ray diffraction patterns recorded under air atmosphere on 20 – 80° region at: RT, 400, 600, 800, 1000 °C and RT after heating; for the samples: (a) Ce2Al; (b) Ce10Al; (c) Ce20Al; and all the samples heated up to 1000 °C and cooled down to RT.
**Figure S4.** TEM picture of Ce20Al sample

The mean interplanar spacing measured on some particles matched the distance between two consecutive planes expected for the fluorite cubic phase of cerium dioxide (~0.31 nm).
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Figure S8. $^{27}$Al-$^{17}$O heteronuclear correlation spectra of $^{17}$O-exchanged Al sample
Figure S 9. X-ray diffraction patterns recorded under hydrogen atmosphere on 20 – 80° region at: RT, 400, 600, 800, 1000 °C and RT after heating over Ce15Al sample.

Reference