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

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SUPPORTING INFORMATION

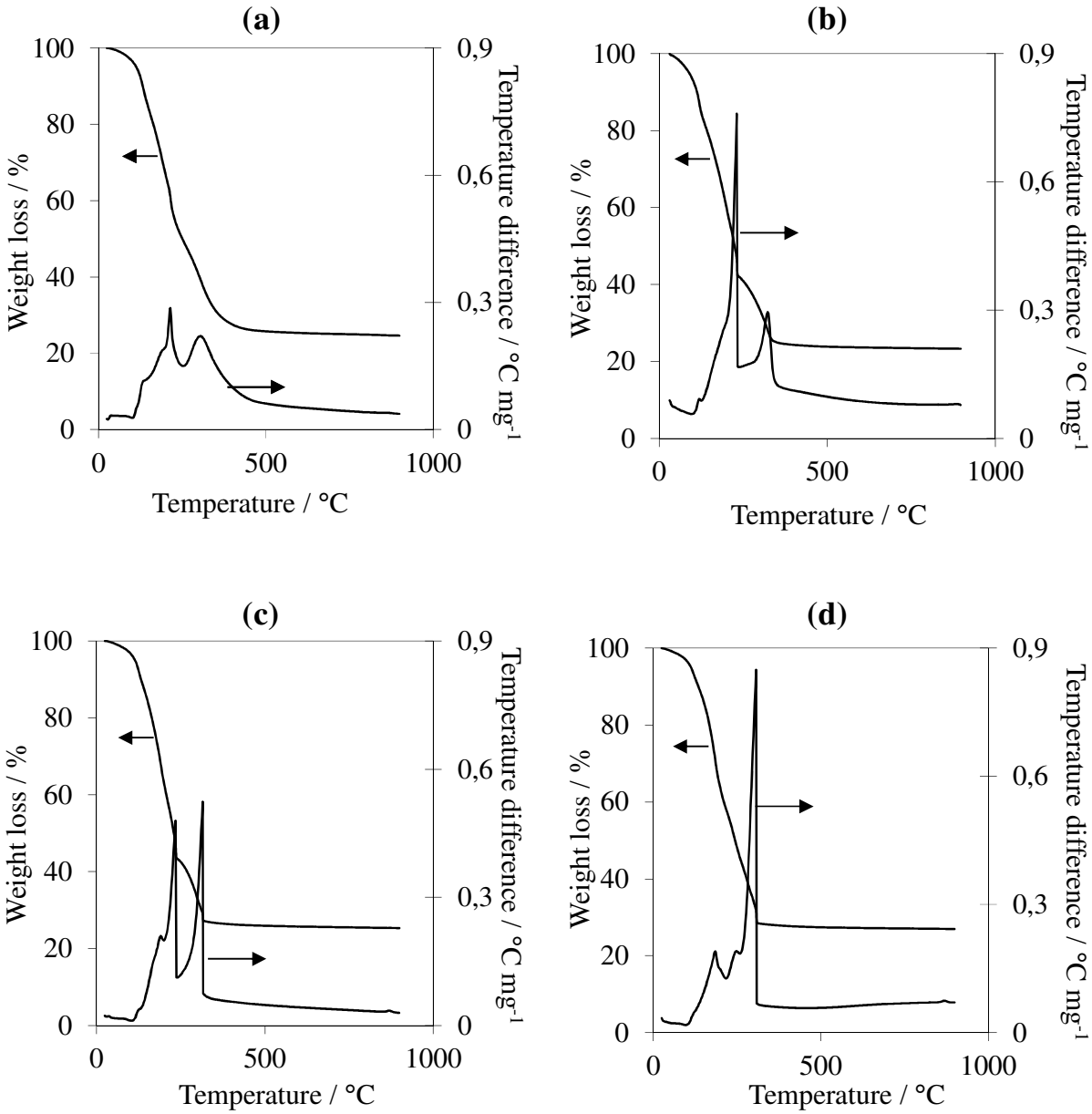

Figure S1. TG-DTA profiles for the as-synthesized samples (a) Al, (b) Ce2Al, (c) Ce10Al and (d) Ce20Al.

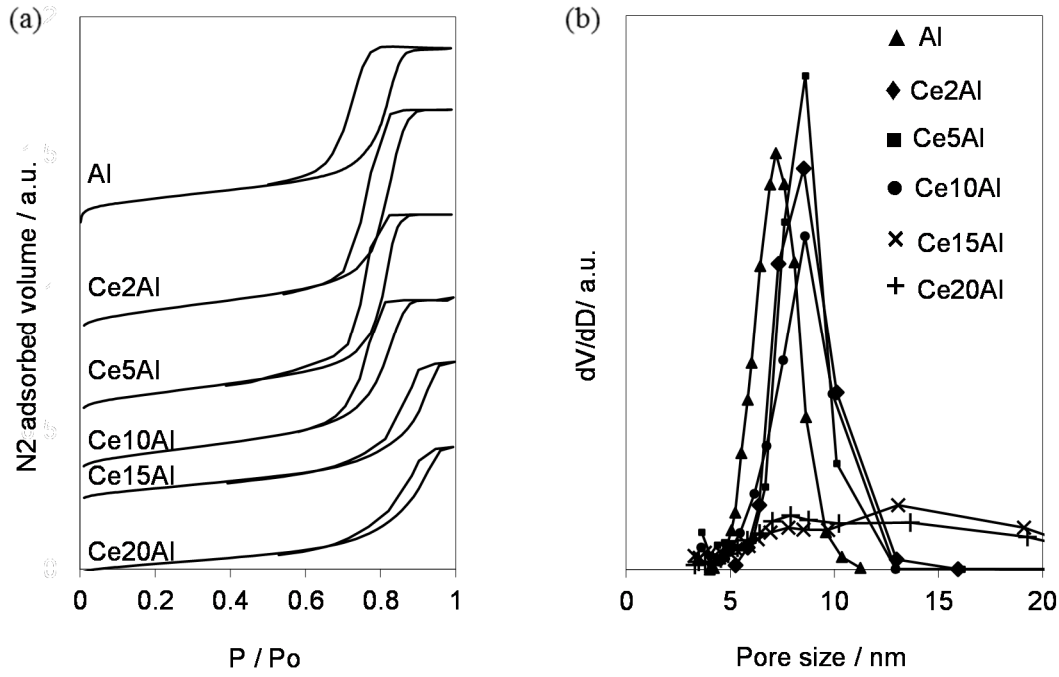

Figure S2. N_2 adsorption-desorption curves (a) and corresponding BJH desorption pore size distribution (b) obtained over the solids after calcination at 600 °C.

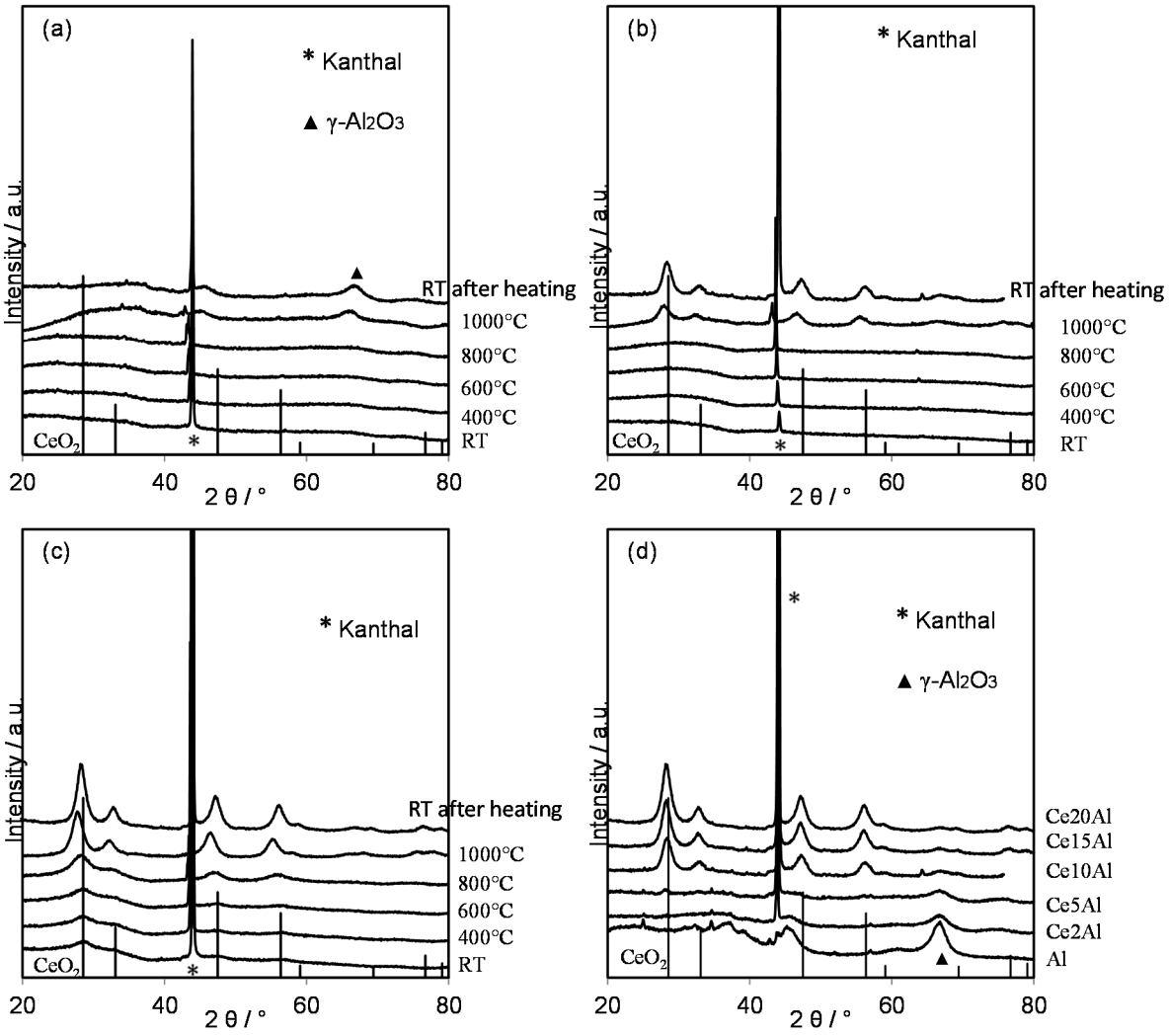

Figure S3. X-ray diffraction patterns recorded under air atmosphere on 20 – 80° region at: RT, 400, 600, 800, 1000 °C and RT after heating; for the samples: (a) Ce2Al; (b) Ce10Al; (c) Ce20Al; and all the samples heated up to 1000 °C and cooled down to RT.

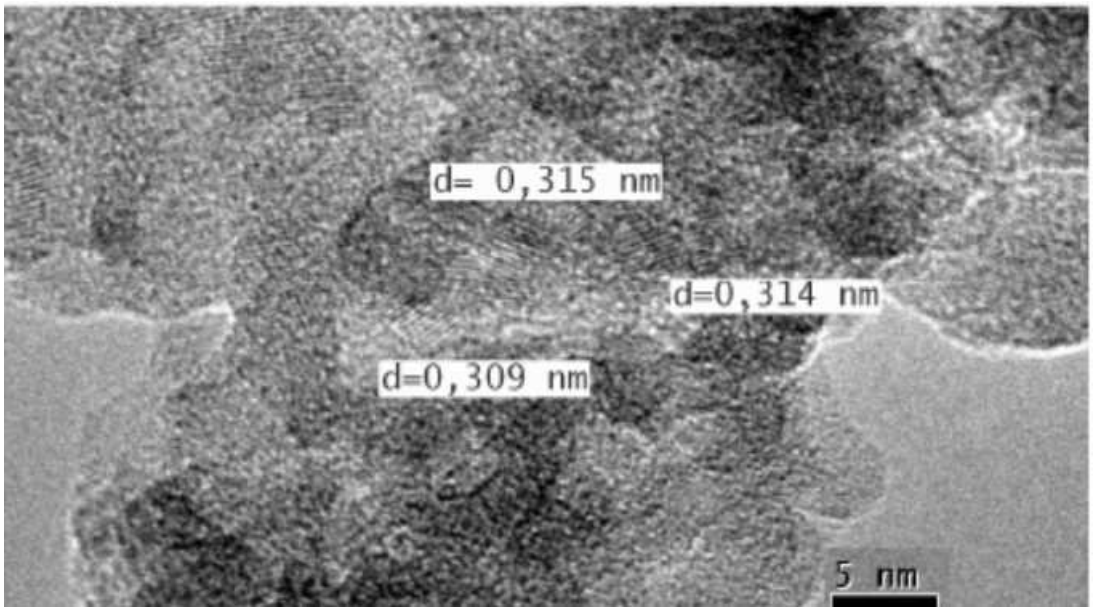

Figure S4. TEM picture of Ce20Al sample

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).

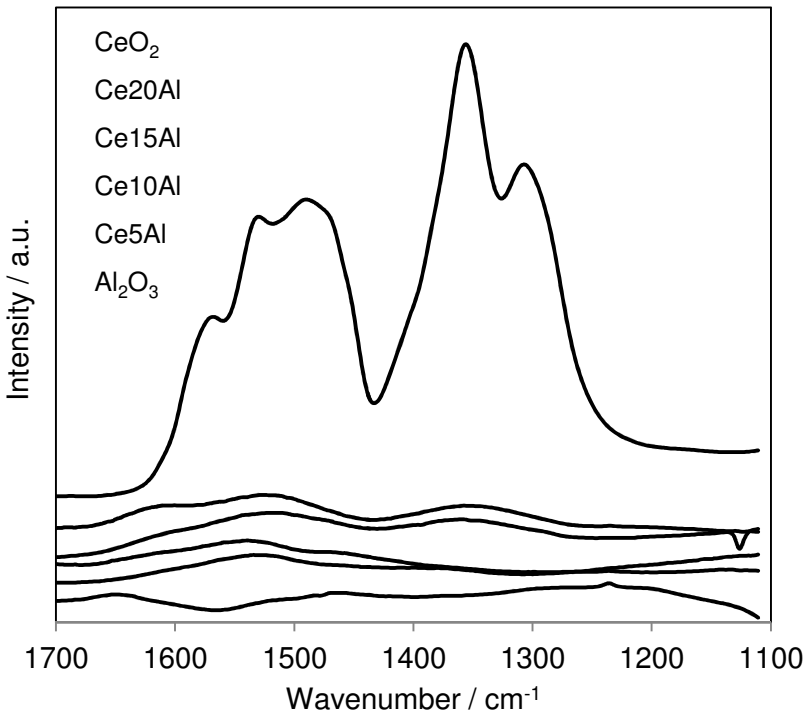

Figure S5. FTIR subtraction spectra collected after CO_2 adsorption at RT and desorption under secondary vacuum at 150 ºC.

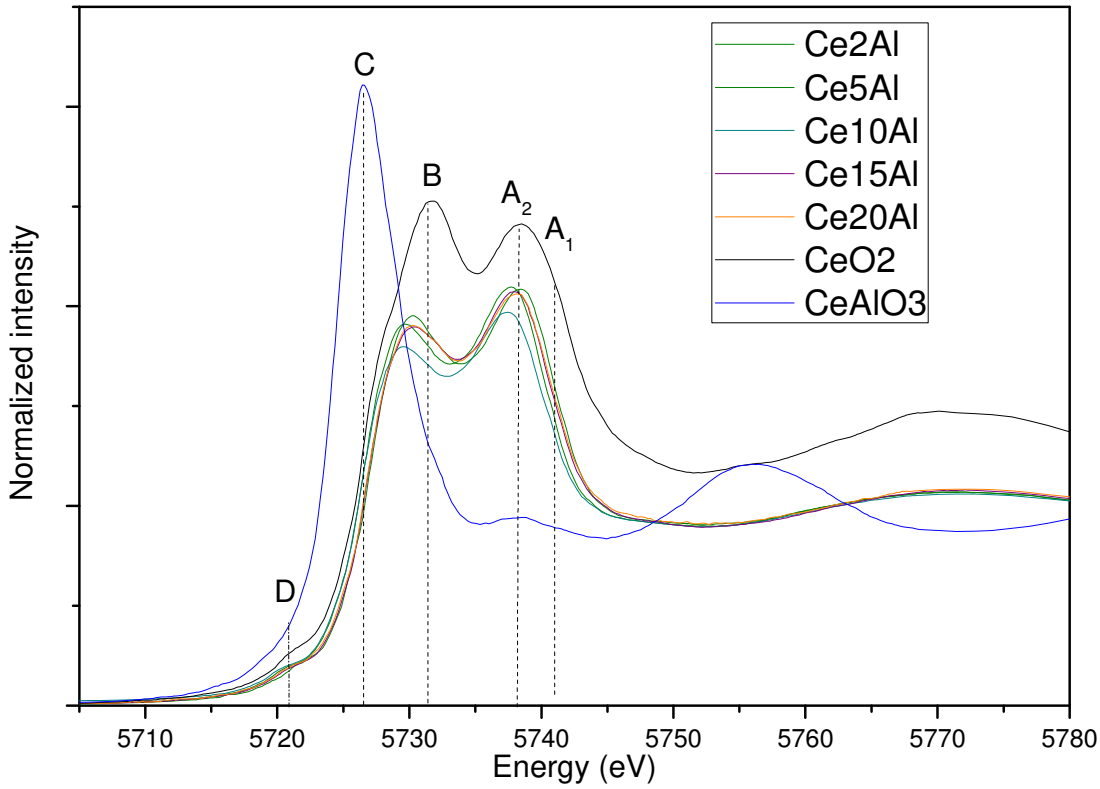

Figure S6. Ce L_3 edge XANES spectra of CeO_2, $CeAlO_3$ and CeXAl samples at RT. The peaks contributions A_1, A_2, B, C and D were assigned as explained in reference [1].

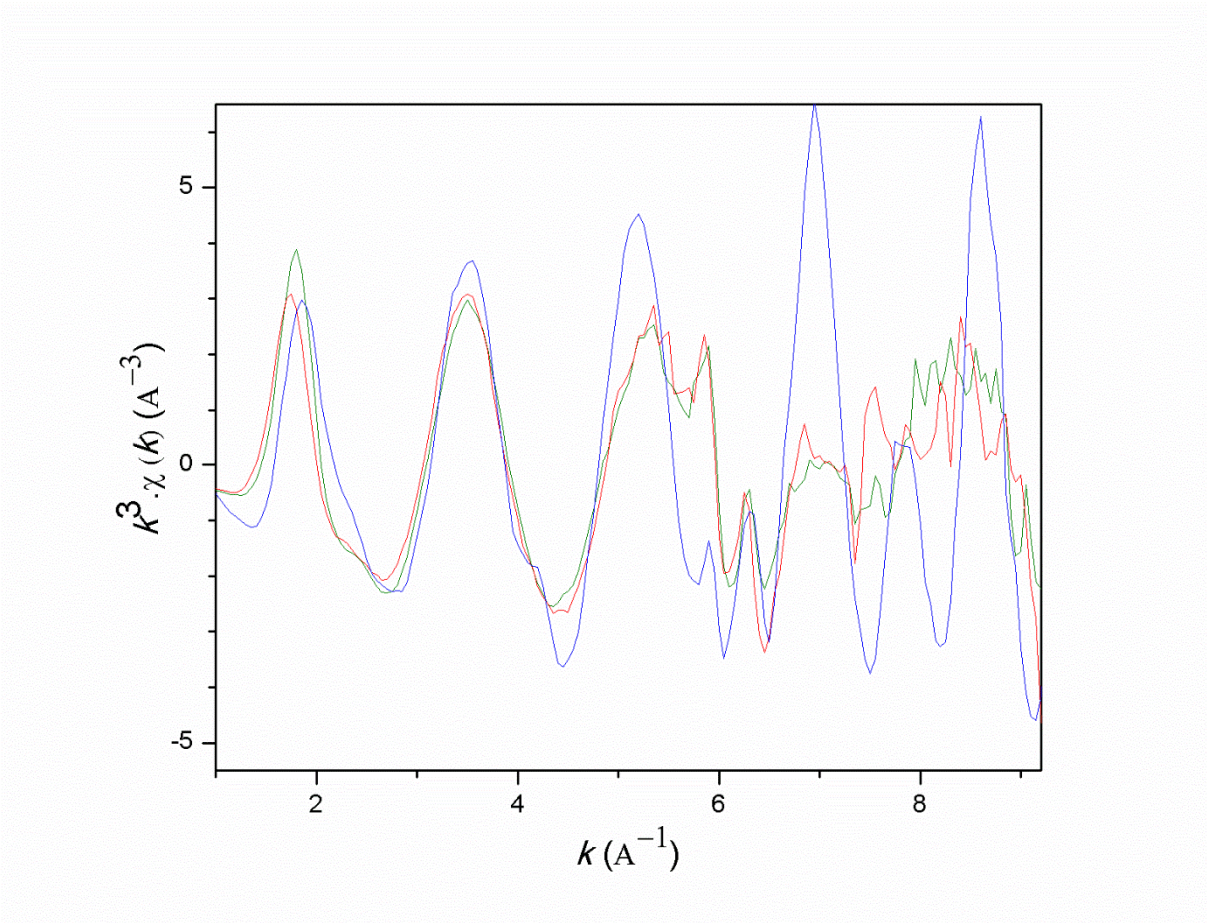

Figure S7. EXAFS k^3 –weighted oscillations for Ce10Al (green line), Ce20Al (red line) and CeO_2. (blue line)

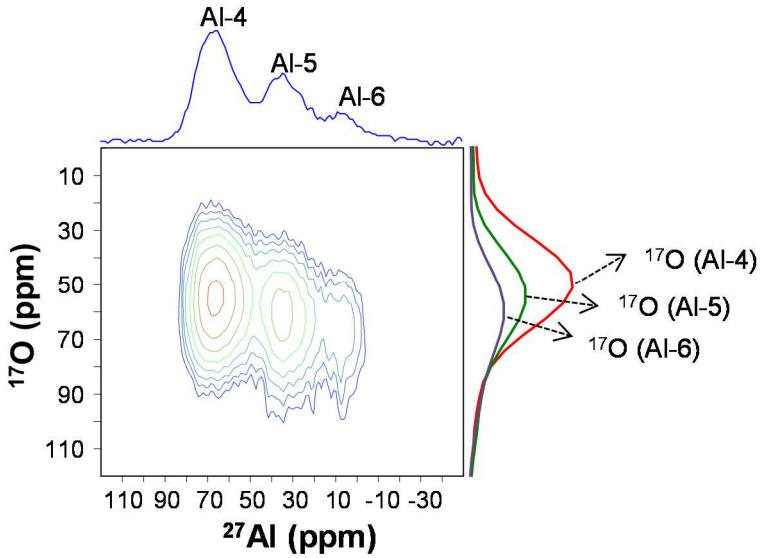

Figure S8. ^{27}Al-^{17}O heteronuclear correlation spectra of ^{17}O-exchanged Al sample

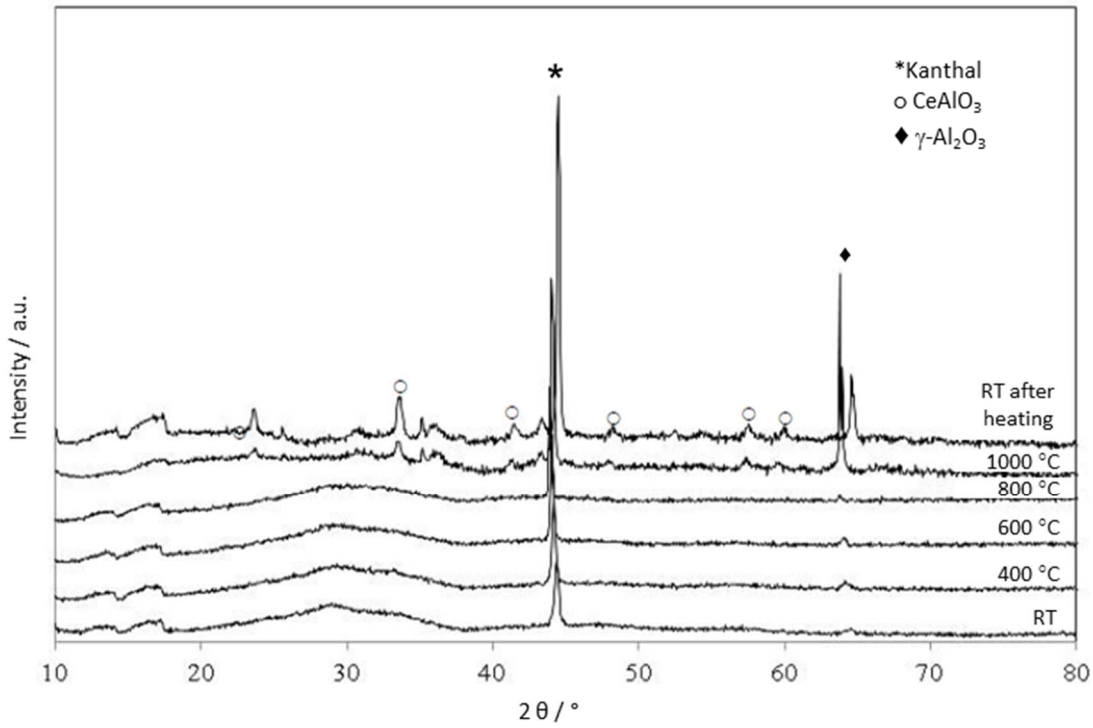

Figure S 9. X-ray diffraction patterns recorded under hydrogen atmosphere on 20 – 80° region at: RT, 400, 600, 800, 1000 °C and RT after heating over Ce15Al sample.

Reference

(1) Nachimuthu, P.; Shih, W.-C.; Liu, R.-S.; Jang, L.-Y.; Chen, J.-M. *J. Solid State Chem.* **2000**, *149* (2), 408–413.