Supplementary materials for

Characterization and thermal stability of the Yb-doped ceria prepared by methods allowing the controllable of the crystal morphology.

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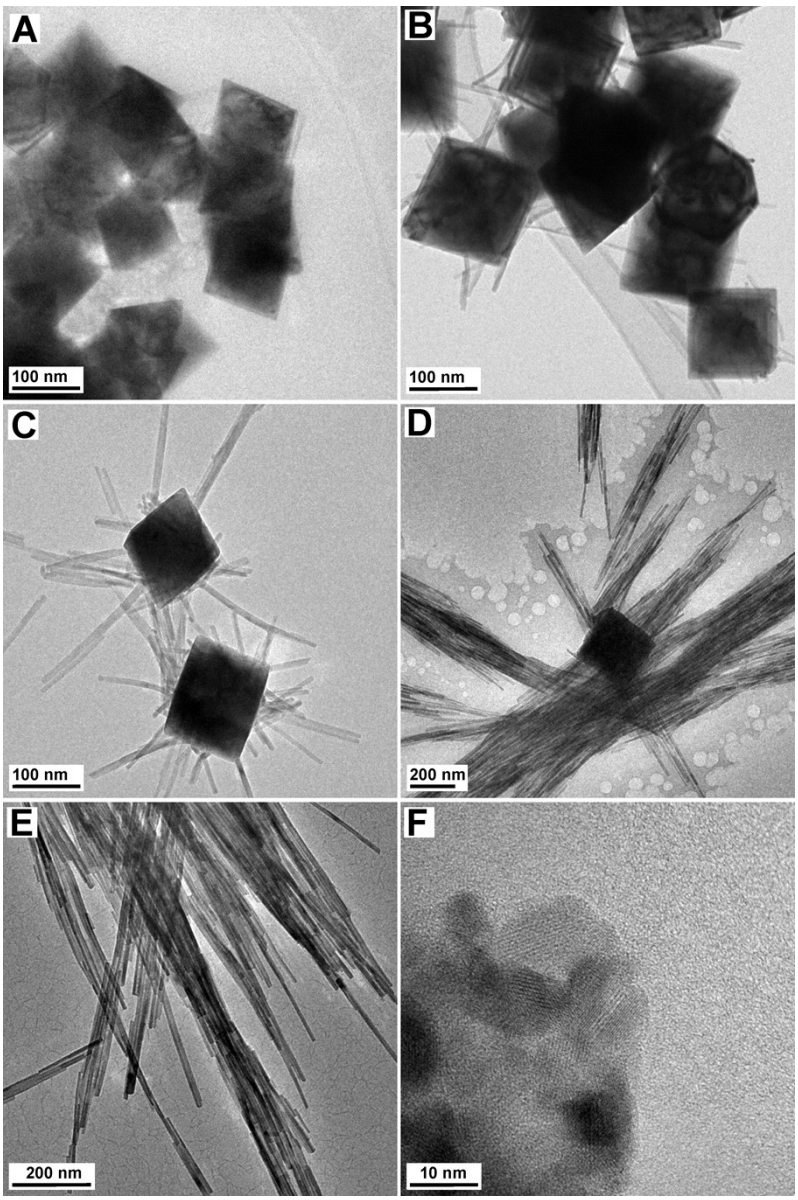


Fig.S1. TEM images of CeO_2 samples prepared by hydrothermal method with different concentration of $Na_3PO_4*12H_2O$ – (A) 0.0038 g, (B) 0.0076 g, (C) 0.0152, (D) 0.0608 g, (E) 0.2432 g, (F) 0.9728 g

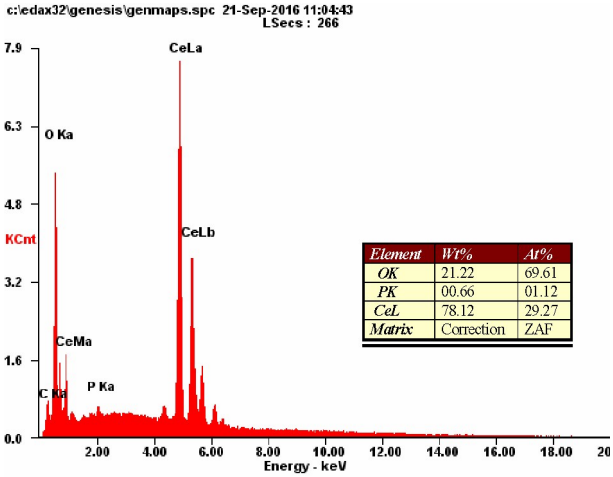


Fig.S2. EDX spectrum collected for “as prepared” octahedral-like CeO_2

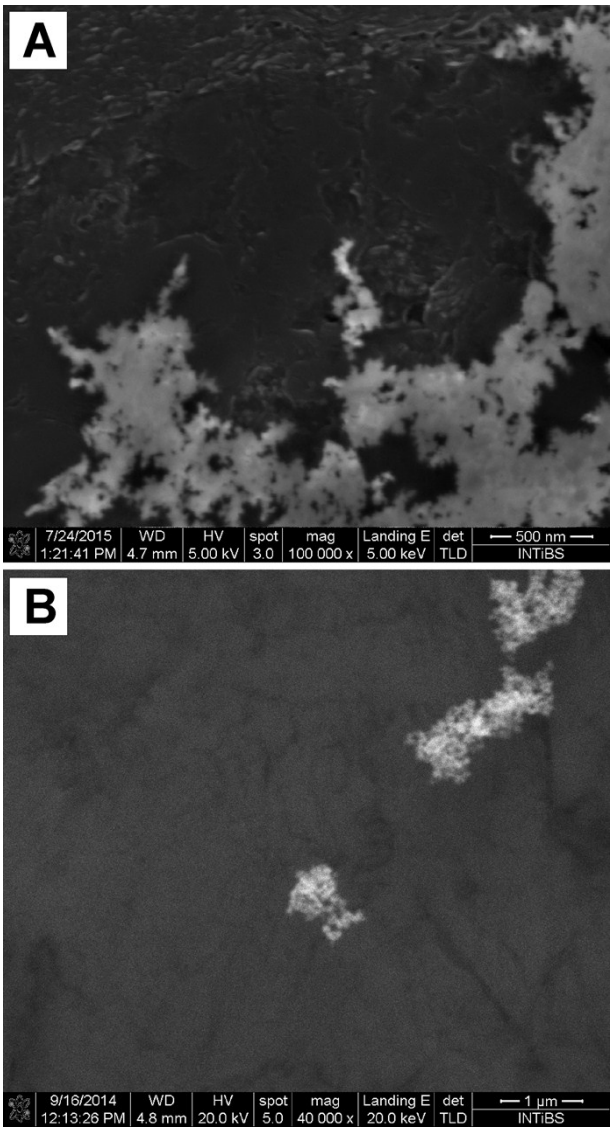


Fig.S3. SEM images of CeO_2 samples with different morphologies: (A) cubic, (B) octahedral

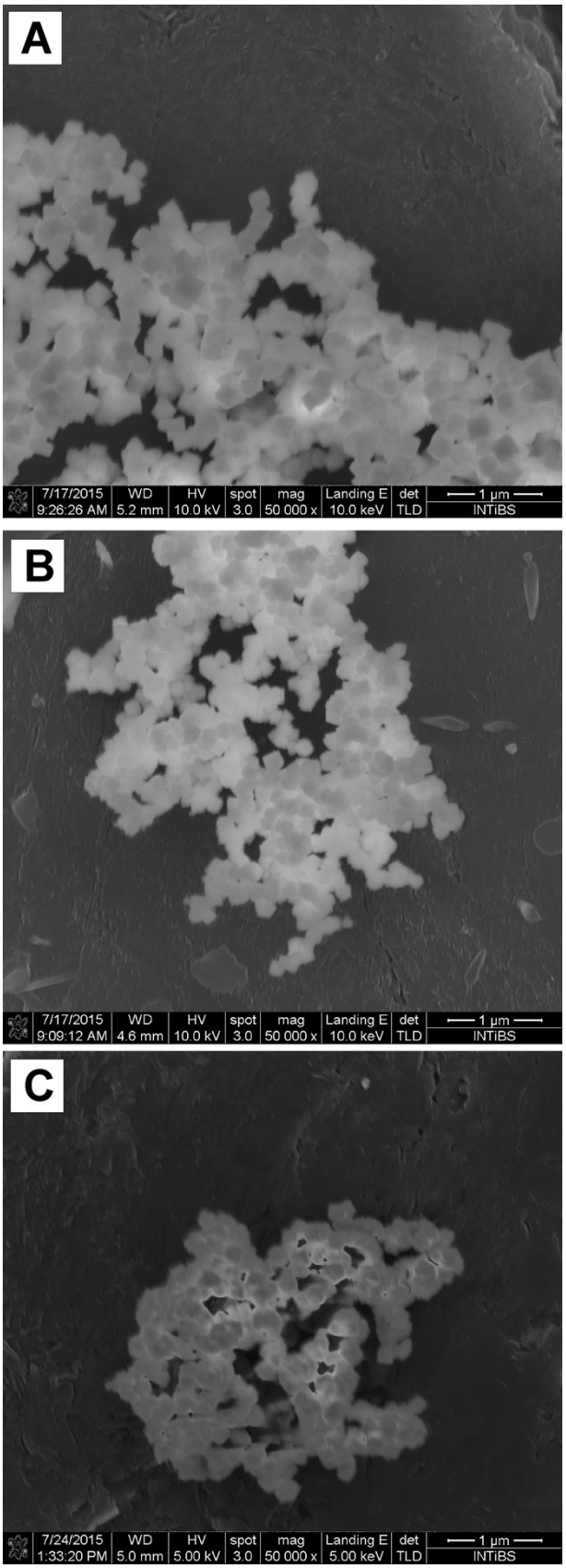
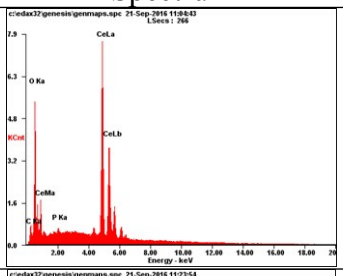
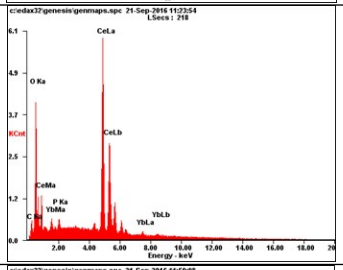
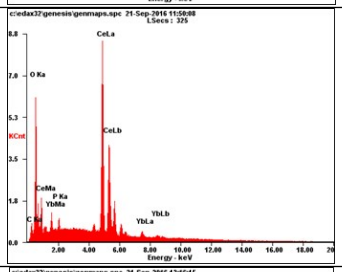
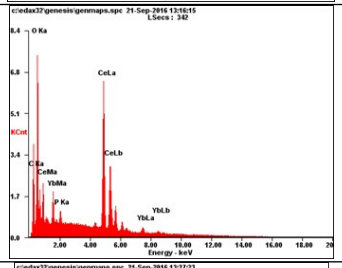
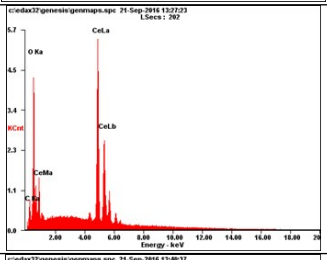
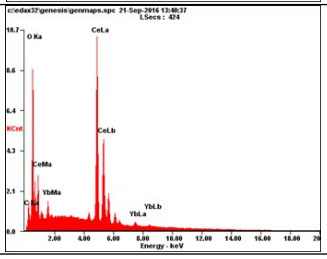
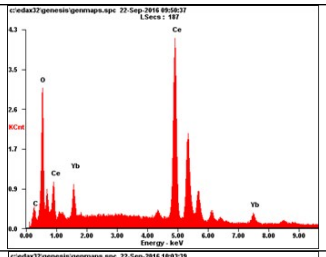
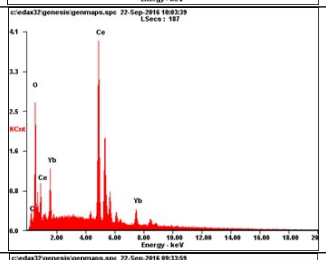
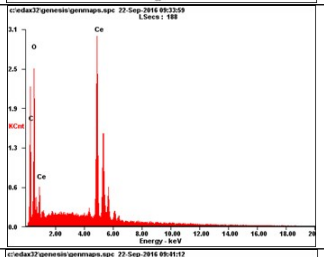
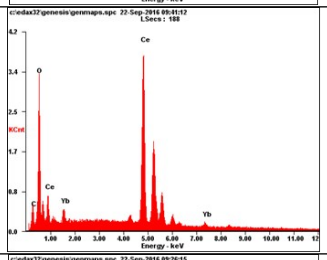
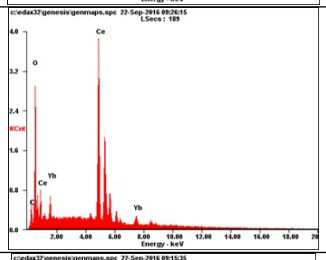
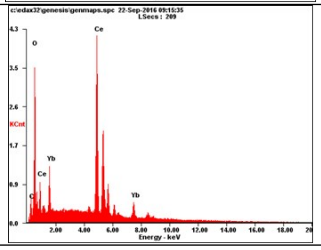


Fig.S4. SEM images of the octahedron-like $Ce_{1-x}Yb_xO_{2-(x/2)}$ samples with different Yb concentration: (A) x=0.05, (B) x=0.10, (C) x=0.15

Table S1. SEM-EDX measurements for investigated samples

Sample	Spectrum	Quantification
CeO_2 - octahedral		***Element*** | ***Wt%*** | ***At%*** ***OK*** | 21.22 | 69.61 ***PK*** | 00.66 | 01.12 ***CeL*** | 78.12 | 29.27 ***Matrix*** | Correction | ZAF
$Ce_{0.95}Yb_{0.05}O_{1.975}$ - octahedral		***Element*** | ***Wt%*** | ***At%*** ***OK*** | 20.92 | 70.07 ***CeL*** | 74.85 | 28.62 ***YbL*** | 04.23 | 01.31 ***Matrix*** | Correction | ZAF
$Ce_{0.90}Yb_{0.10}O_{1.950}$ - octahedral		***Element*** | ***Wt%*** | ***At%*** ***OK*** | 21.35 | 70.69 ***CeL*** | 72.59 | 27.45 ***YbL*** | 06.06 | 01.86 ***Matrix*** | Correction | ZAF
$Ce_{0.85}Yb_{0.15}O_{1.925}$ - octahedral		***Element*** | ***Wt%*** | ***At%*** ***OK*** | 29.45 | 77.74 ***PK*** | 01.29 | 01.75 ***CeL*** | 62.81 | 18.93 ***YbL*** | 06.45 | 01.57 ***Matrix*** | Correction | ZAF
CeO_2 - cubic		***Element*** | ***Wt%*** | ***At%*** ***OK*** | 23.75 | 73.18 ***CeL*** | 76.25 | 26.82 ***Matrix*** | Correction | ZAF
$Ce_{0.95}Yb_{0.05}O_{1.975}$ - cubic		***Element*** | ***Wt%*** | ***At%*** ***OK*** | 24.49 | 74.18 ***CeL*** | 71.04 | 24.56 ***YbL*** | 04.47 | 01.25 ***Matrix*** | Correction | ZAF

$Ce_{0.90}Yb_{0.10}O_{1.950}$ - cubic		**Element** / **Wt%** / **At%** **OK** 16.04 63.11 **CeL** 74.29 33.38 **YbL** 09.67 03.52 **Matrix** Correction ZAF
$Ce_{0.85}Yb_{0.15}O_{1.925}$ - cubic		**Element** / **Wt%** / **At%** **OK** 15.18 61.89 **CeL** 69.38 32.29 **YbL** 15.43 05.82 **Matrix** Correction ZAF
CeO_2 - nano		**Element** / **Wt%** / **At%** **OK** 19.17 67.50 **CeL** 80.83 32.50 **Matrix** Correction ZAF
$Ce_{0.95}Yb_{0.05}O_{1.975}$ - octahedral		**Element** / **Wt%** / **At%** **OK** 17.72 65.59 **CeL** 77.60 32.81 **YbL** 04.68 01.60 **Matrix** Correction ZAF
$Ce_{0.90}Yb_{0.10}O_{1.950}$ - nano		**Element** / **Wt%** / **At%** **OK** 17.11 64.91 **CeL** 73.03 31.63 **YbL** 09.86 03.46 **Matrix** Correction ZAF
$Ce_{0.85}Yb_{0.15}O_{1.925}$ - nano		**Element** / **Wt%** / **At%** **OK** 17.93 66.44 **CeL** 67.51 28.57 **YbL** 14.56 04.99 **Matrix** Correction ZAF

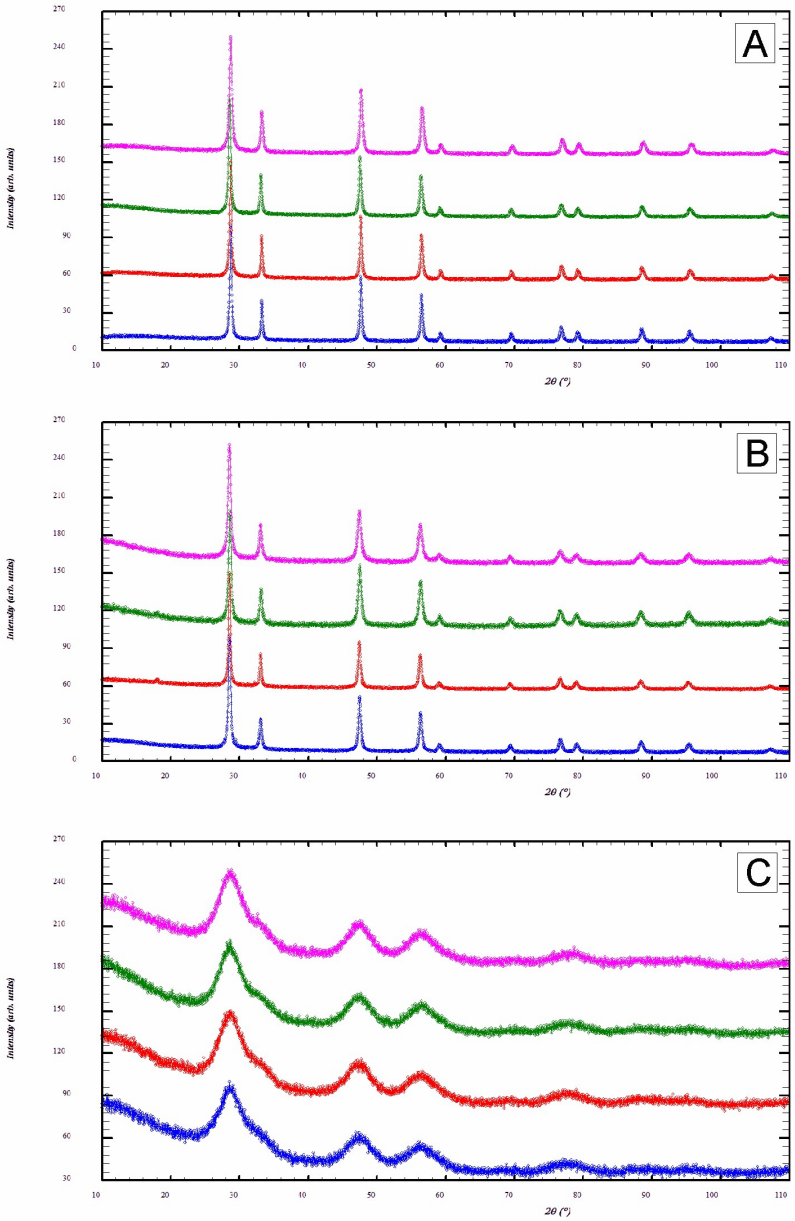


Fig.S5. XRD patterns measured for “as prepared” (A) cube-like, (B) octahedral-like and (C) nanoparticles of (blue) pure ceria, (red) $Ce_{0.95}Yb_{0.05}O_{1.975}$, (green) $Ce_{0.90}Yb_{0.10}O_{1.950}$, (pink) $Ce_{0.85}Yb_{0.15}O_{1.925}$