Electronic Supplementary Material (ESI) for RSC Advances.

Supporting information

Ceria Nanomaterials Containing Ytterbium: Low and High Concentration - Luminescence Analyzed in the Near Infrared Region

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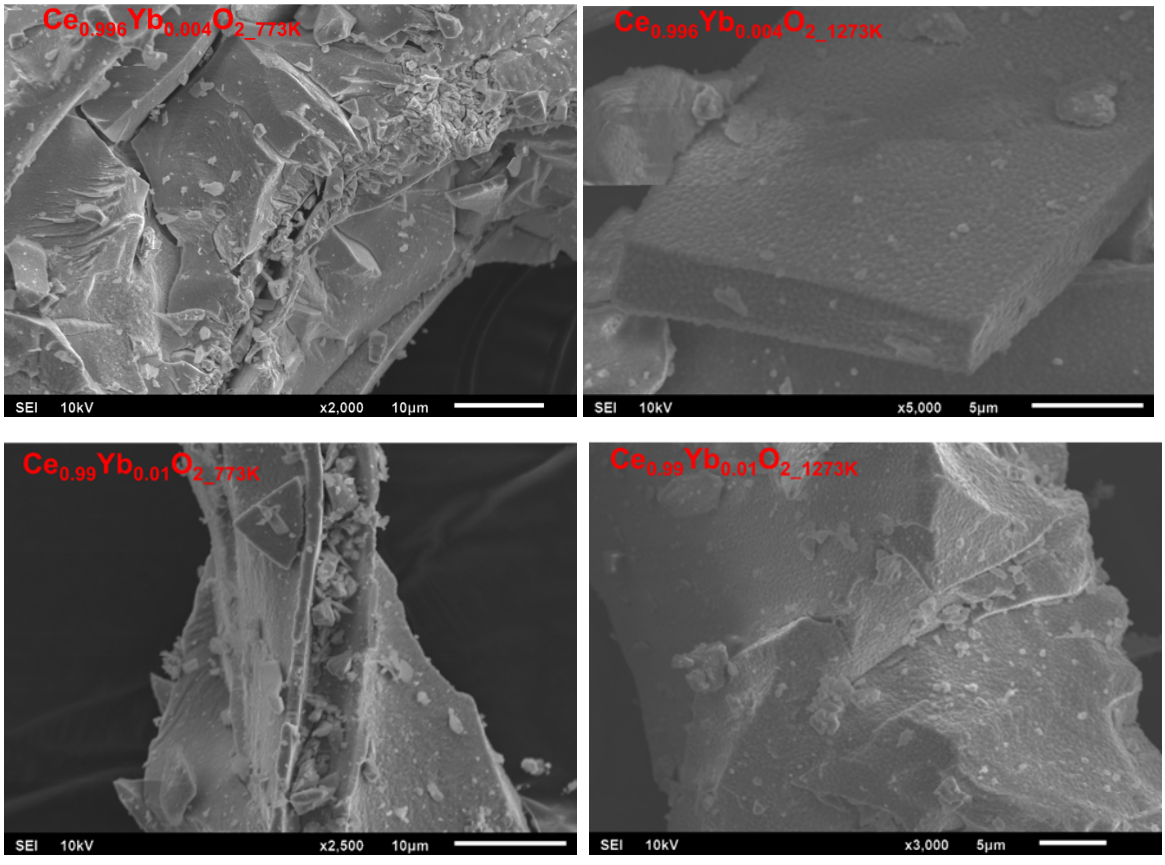


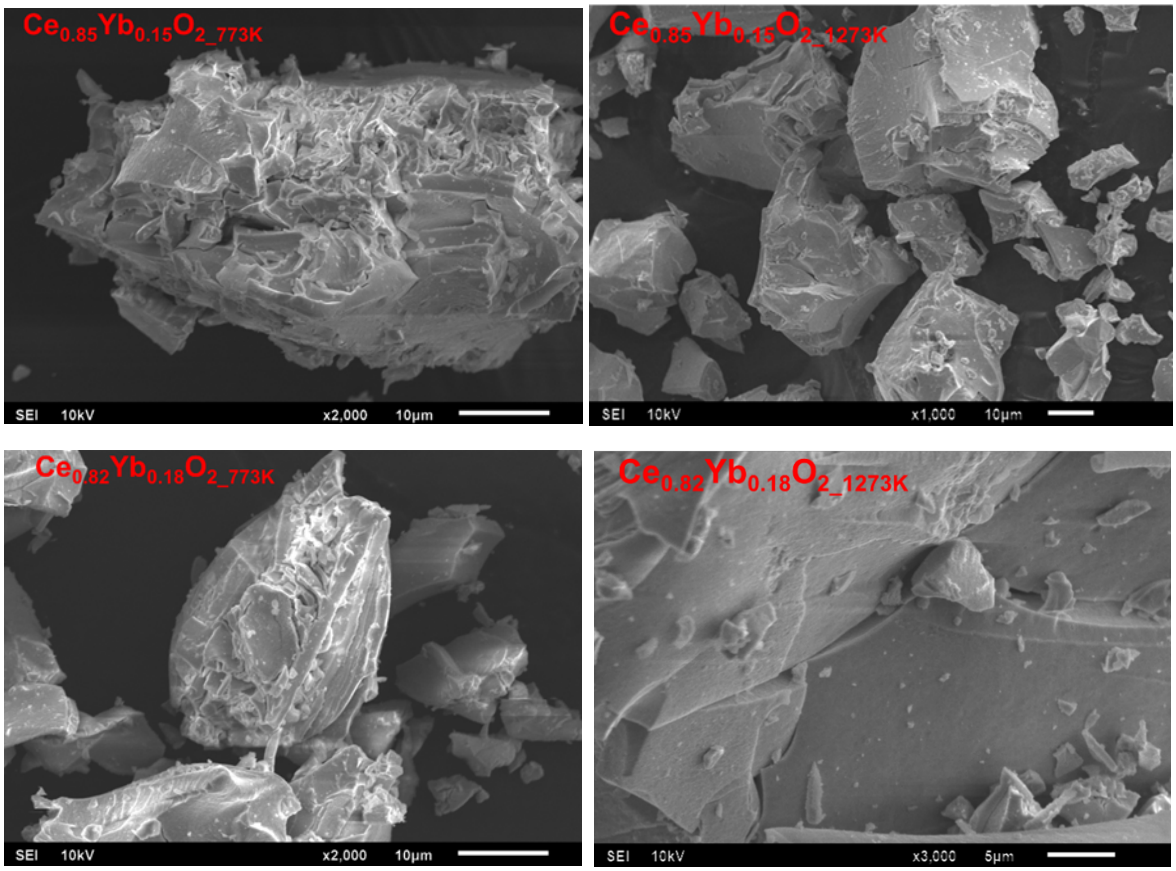
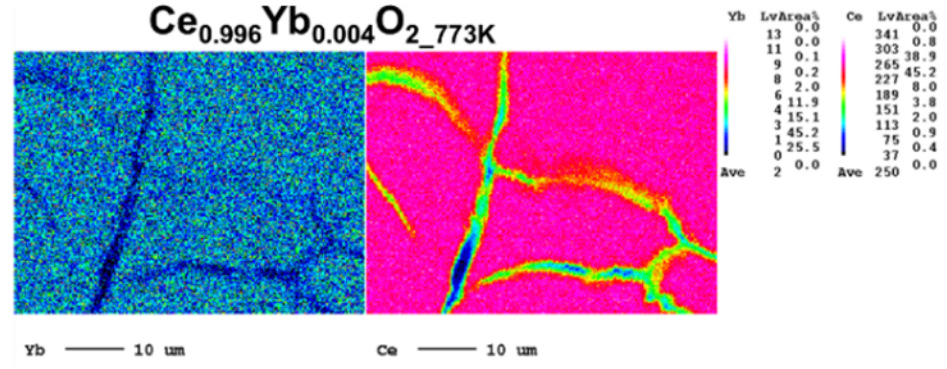
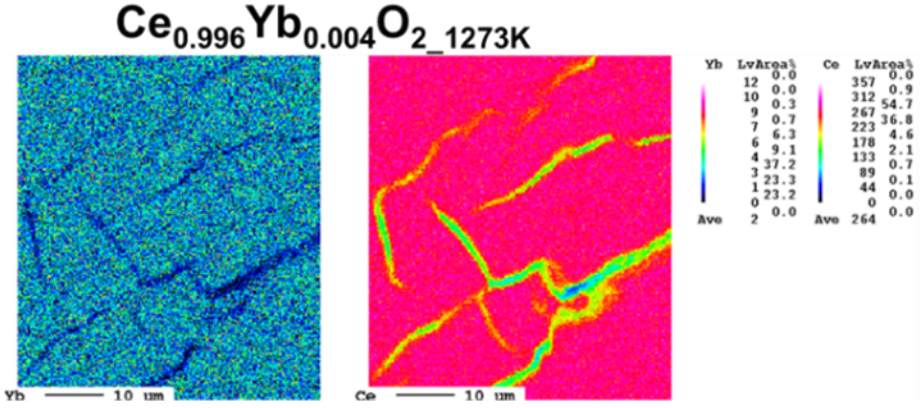


Fig. *SI*1. SEM micrographs of $Ce_{1-x}Yb_xO_2$ powders calcined at 773 K (left column) and 1273 K (right column).





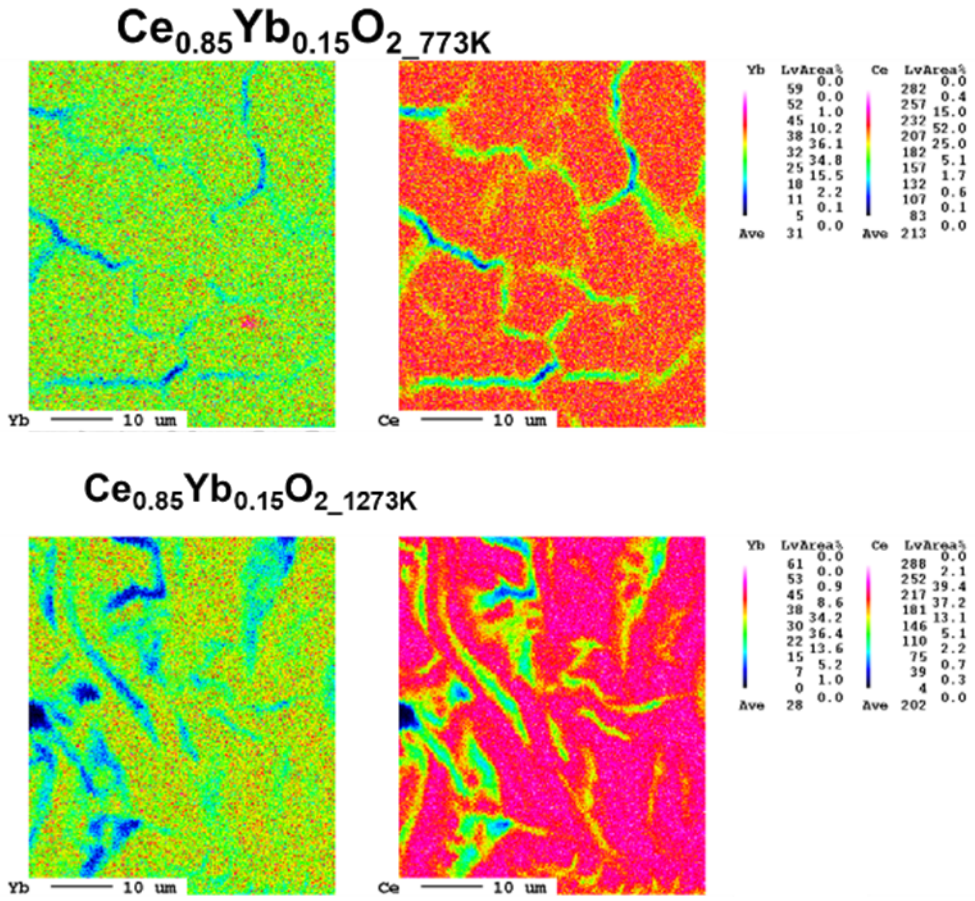


Fig. *SI*2. Elemental maps for $Ce_{0.996}Yb_{0.004}O_2$ and $Ce_{0.85}Yb_{0.15}O_2$ nanomaterials annealed at 773 K and 1273 K for 2 h.

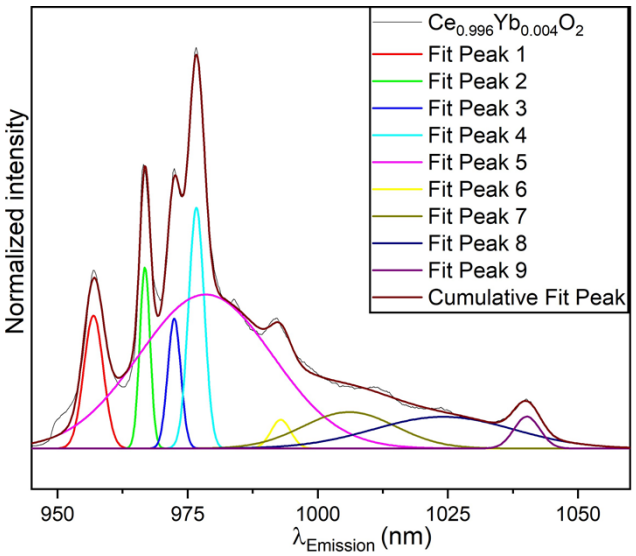


Fig. *SI*3 Gauss fit for $Ce_{0.996}Yb_{0.004}O_2$

Table SI1 Parameters from the Gauss fit for $Ce_{0.996}Yb_{0.004}O_2$

Peak position	FWHM (nm)	Normalized intensity
956,92±0,02	4,41±0,06	0,33±0
966,79±0,02	2,32±0,03	0,45±0,01
972,42±0,03	2,95±0,07	0,32±0,01
976,68±0,02	3,53±0,04	0,60±0
978,46±0,26	30,20±0,54	0,38±0
992,89±0,11	4,45±0,32	0,07±0
1006,06±1,026	20,97±2,95	0,09±0,03
1024,12±4,52	31,57±4,39	0,08±0,01
1040,17±0,11	5,87±0,32	0,08±0

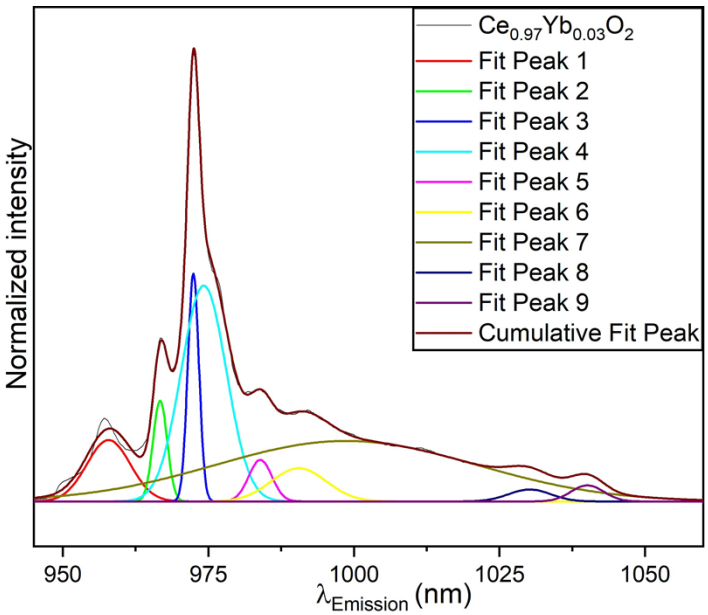


Fig. *SI*4 Gauss fit for $Ce_{0.97}Yb_{0.03}O_2$

Table SI2 Parameters from the Gauss fit for $Ce_{0.97}Yb_{0.03}O_2$

Peak position	FWHM (nm)	Normalized Intensity
957,867±0,04	8,80±0,14	0,14
966,71±0,02	2,86±0,04	0,22
972,42±0,01	2,25±0,02	0,51
974,21±0,026	9,13±0,06	0,48
983,92±0,06	4,67±0,19	0,09
990,53±0,27	11,16±0,61	0,07
998,67±0,44	52,60±0,66	0,13
1030,19±0,26	8,51±0,70	0,027
1040,11±0,18	6,61±0,39	0,04

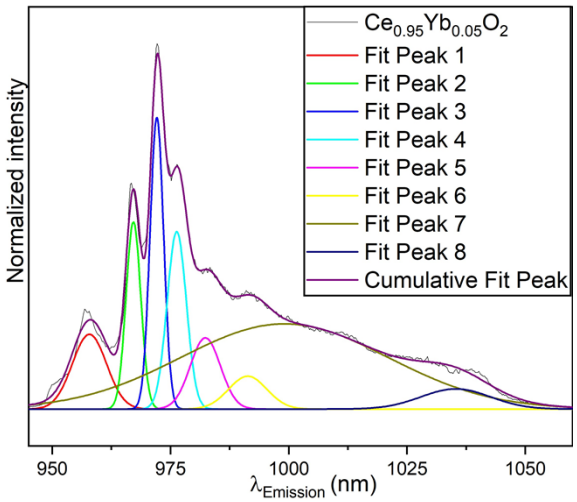


Fig. *SI*5 Gauss fit for $Ce_{0.95}Yb_{0.05}O_2$

Table SI3 Parameters from the Gauss fit for $Ce_{0.95}Yb_{0.05}O_2$

Peak position	FWHM (nm)	Normalized intensity
957,86±0,05	8,51±0,17	0,20
967,165±0,02	3,67±0,04	0,51
972,11±0,02	3,371±0,05	0,80±0,01
976,32±0,05	4,77±0,19	0,49±0,02
982,37±0,19	7,52±0,74	0,19±0,01
991,34±0,51	9,50±0,95	0,09±0,01
999,10±0,52	51,55±0,89	0,23
1035,30±0,26	17,29±0,92	0,05