Electronic Supplementary Material (ESI) for CrystEngComm.

Supplementary materials for

Hierarchical macroparticles of ceria with tube-like shape – synthesis and properties.

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The details of the synthesis method.

In order to produce the material, the method of synthesis inspired by [M. Grun, K. Unger, A. Matsumoto, K. Tsutsumi, Micropor. Mesopor. Mater., 1999, 27, 207.] were used (Synthesis I in Table S1). It was noted that, a big part of cerium formate was not transformed into the CeO_2 during the synthesis process. The presence of $Ce(HCOO)_3$ was clearly visible in the XRD pattern collected from as-prepared sample (Fig.S1). In order to avoid biphasic sample, the amount of the base (NH_4OH) in the reaction mixture was doubled (Synthesis II in Table S1). In this case, only one phase (CeO_2) was visible on the XRD pattern of the as-prepared sample. It was one more attempt modifying the synthesis method (Synthesis III). In this case, the presence of CTAB was missing from the reaction mixture. As shown in Fig.S1, the presence of hexadecyltrimethylammonium bromide is necessary for the correct run of the synthesis. On the XRD pattern of sample prepared without CTAB, the strong peaks characteristic for the cerium formate near to CeO_2 ones were visible (despite the increased amount of base). In conclusion, only the synthesis procedure II was efficient and it was chosen for further syntheses of the hierarchical, tube-like $Ce_{1-x}Yb_xO_{2-y}$ (where $0 < x < 0.5$) materials which were studied in this work.

Table S1. Synthesis parameters.

		Synthesis I	Synthesis II	Synthesis III
Mixture I	$Ce(HCOO)_3$	0.25 g	0.25 g	0.25 g
	H2O	1 ml	1 ml	1 ml
	C2H5OH	0.5 ml	0.5 ml	0.5 ml
Mixture II	CTAB	0.125 g	0.125 g	-
	H2O	6 ml	4 ml	4 ml
	NH4OH	0.5 ml	2.5 ml	2.5 ml

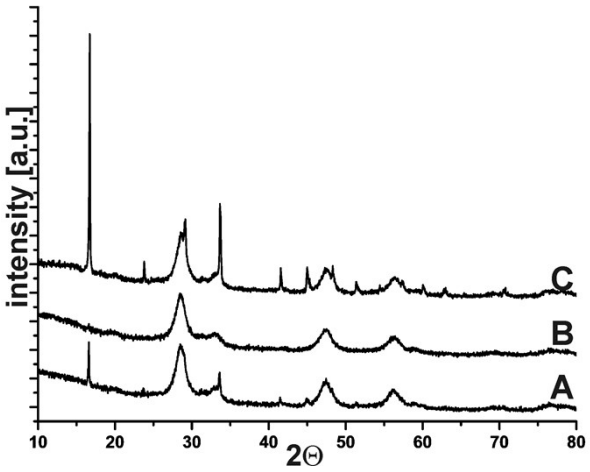

Fig.S1. XRD patterns of the CeO_2 samples prepared by the method (A) inspired by [M. Grun, K. Unger, A. Matsumoto, K. Tsutsumi, Micropor. Mesopor. Mater., 1999, 27, 207.] (synthesis I), (B) with double amount of base (synthesis II) and (C) without CTAB in the reaction mixture (synthesis III).

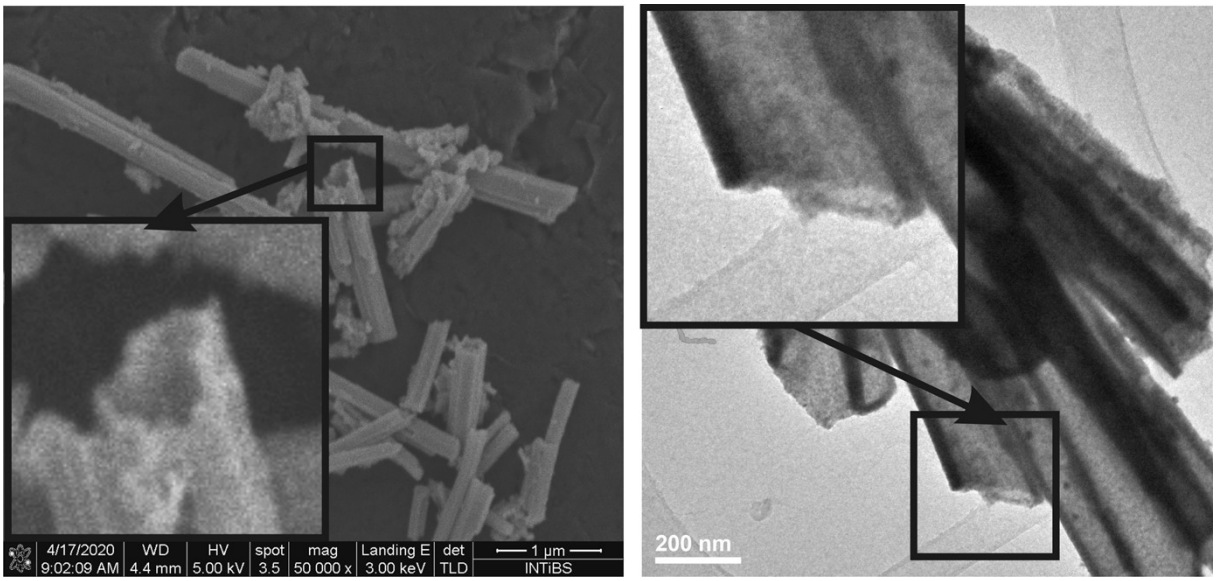

Fig.S2. SEM and TEM images of CeYb0_T_400 sample.

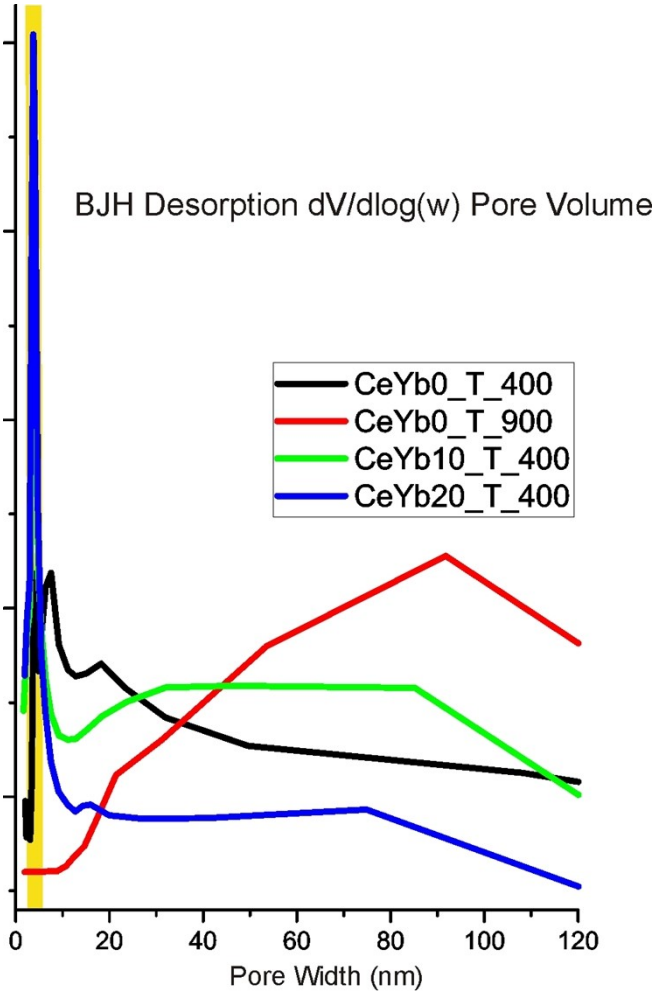

Fig.S3. The pore size distribution of the investigated samples.

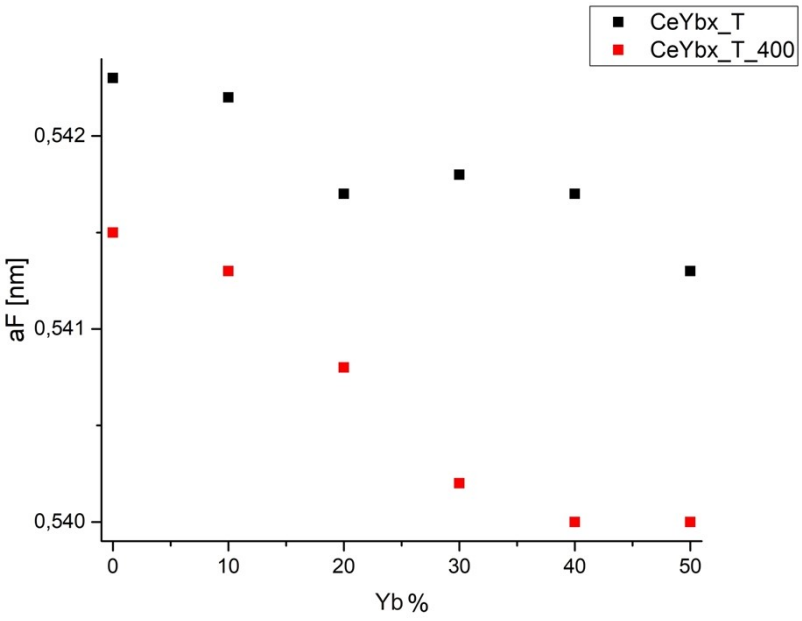

Fig.S4. Lattice parameters for CeYbx_T and CeYbx_T_400.

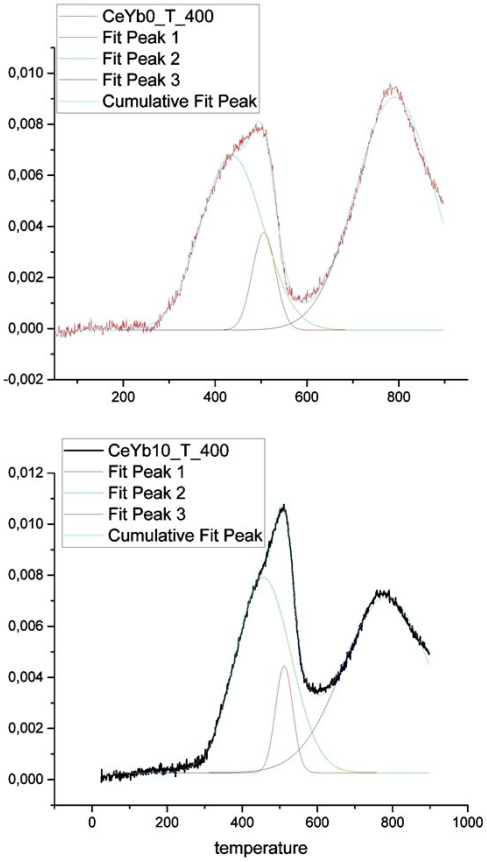

Fig.S5. H2-TPR profiles with peaks shown.