Electronic supplementary information

Mixed-solvent strategy for solvothermal synthesis of well-dispersed $YBO_3:Ce^{3+},Tb^{3+}$ nanocrystals

Akihiro Nohara, Satoru Takeshita* and Tetsuhiko Isobe*

Department of Applied Chemistry, Faculty of Science and Technology, Keio University, 3-14-1 Hiyoshi, Kohoku-ku, Yokohama 223-8522, Japan

Additional figures

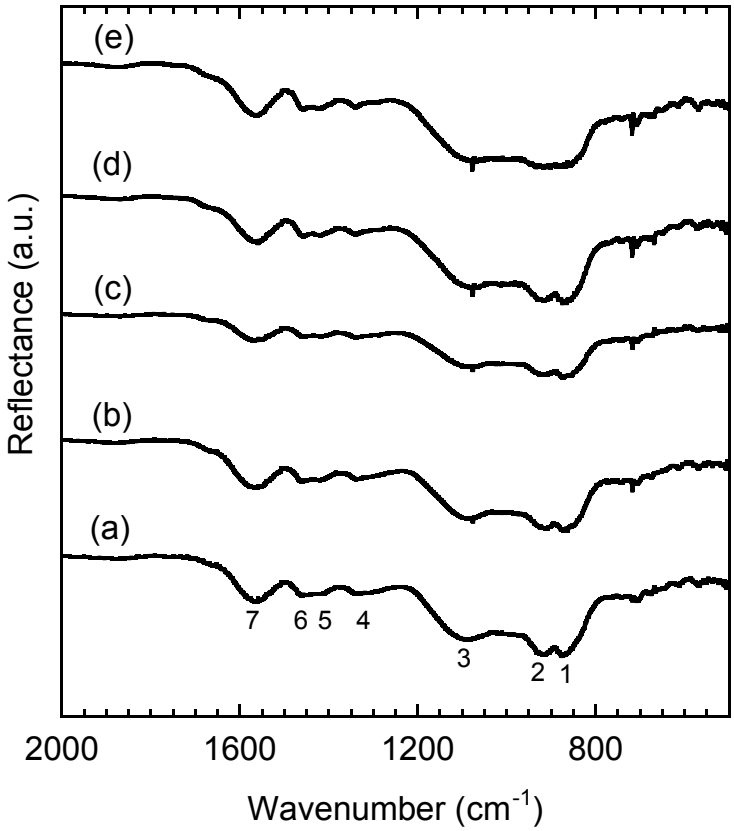

Fig. S1 FT-IR spectra of powdered samples prepared at different water contents: (a) W2.5, (b) W25, (c) W50, (d) W75, and (e) W100. The peaks 1–3 in the region of 800–1200 cm^{-1} are assigned to vibrations of borate anions in the vaterite-type YBO_3.[S1–S4] The peaks 4 and 6 at 1335 and 1460 cm^{-1}, respectively, are assigned to vibrations of CH_2 groups in 1,4-butanediol and/or acetate ions.[S4,S5] The peaks 5 and 7 at 1420 and 1563 cm^{-1}, respectively, are assigned to symmetric and asymmetric vibrations, respectively, of COO^- groups in acetate ions.[S4,S5]

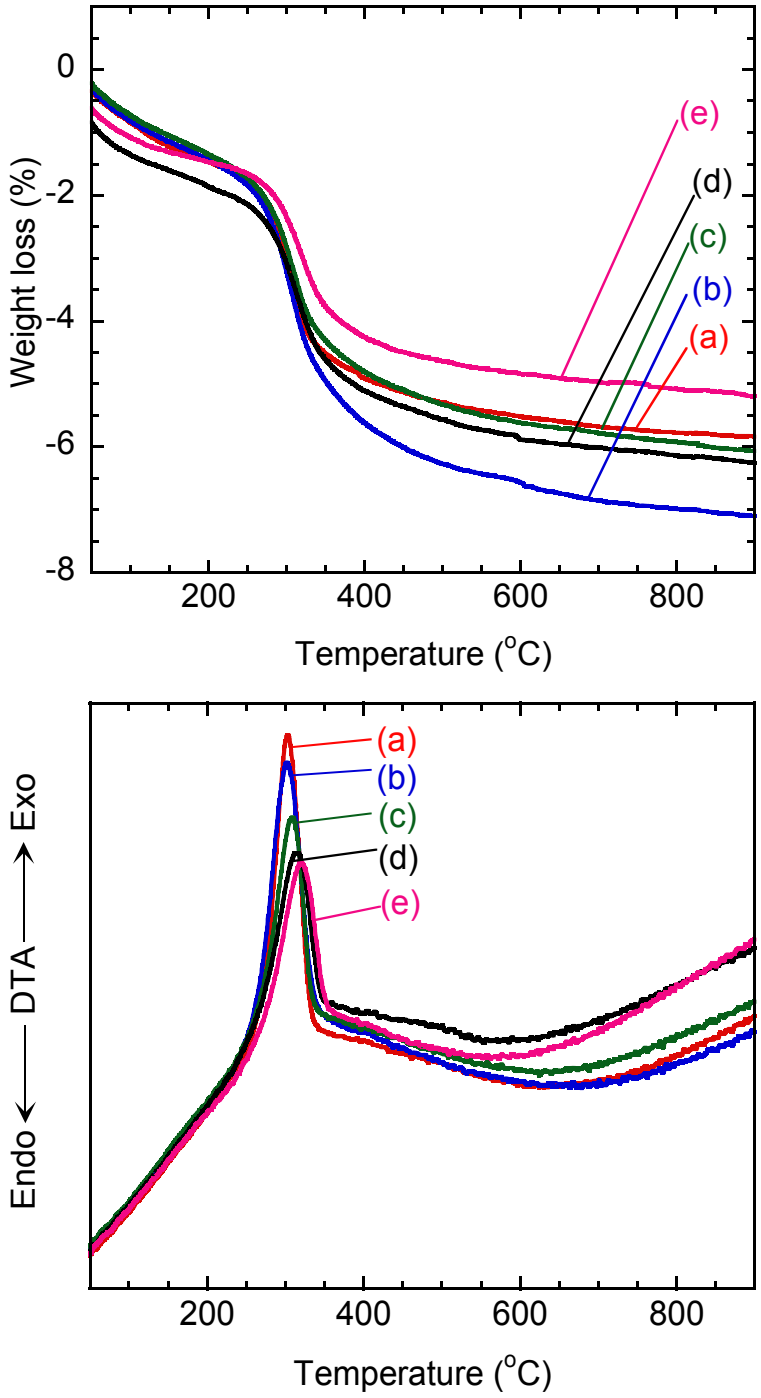

Fig. S2 TG (top) and DTA (bottom) profiles of powdered samples prepared at different water contents: (a) W2.5, (b) W25, (c) W50, (d) W75, and (e) W100. The exothermic weight loss at 250–400 °C corresponds to combustion of 1,4-butanediol and acetate ions.[S5]

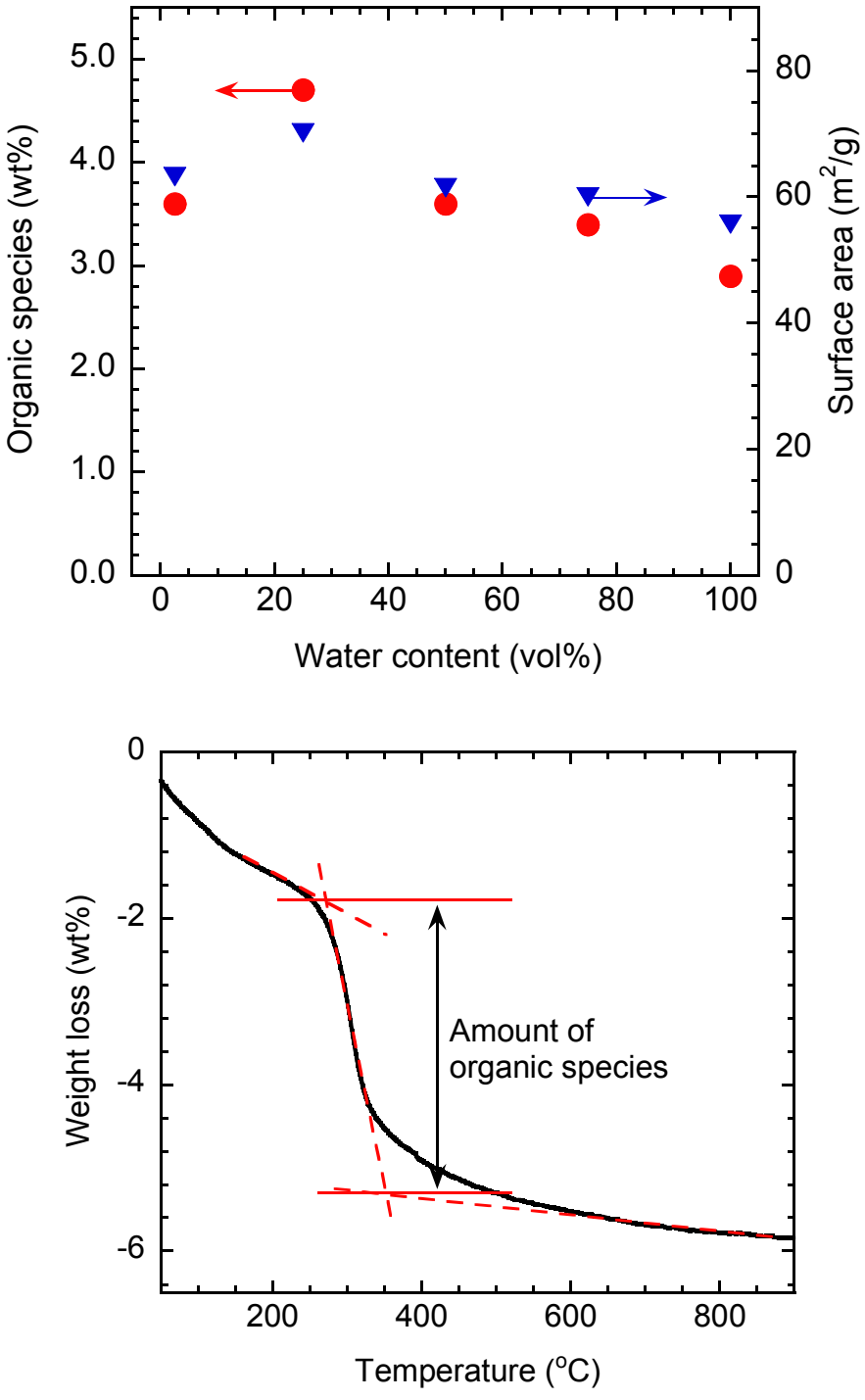

Fig. S3 Changes in amount of organic species (●) and specific surface area (▼) with water content. The amount of organic species shows a similar tendency with the specific surface area. Definition of the amount of organic species is also shown in the bottom illustration.

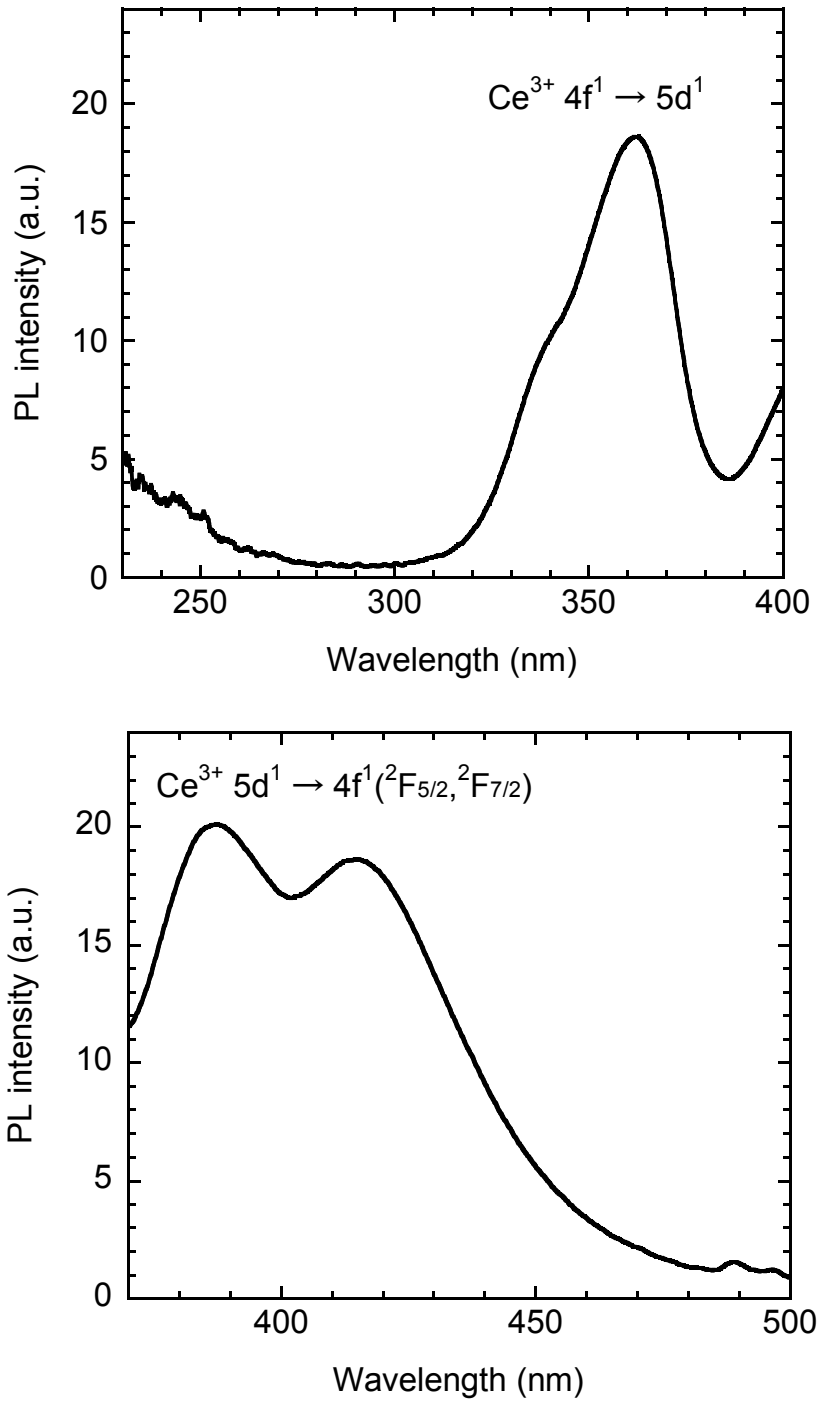

Fig. S4 PLE (top) and PL (bottom) spectra of powdered sample of Ce^{3+}-monodoped YBO_3. λ_{ex} = 360 nm and λ_{em} = 416 nm.

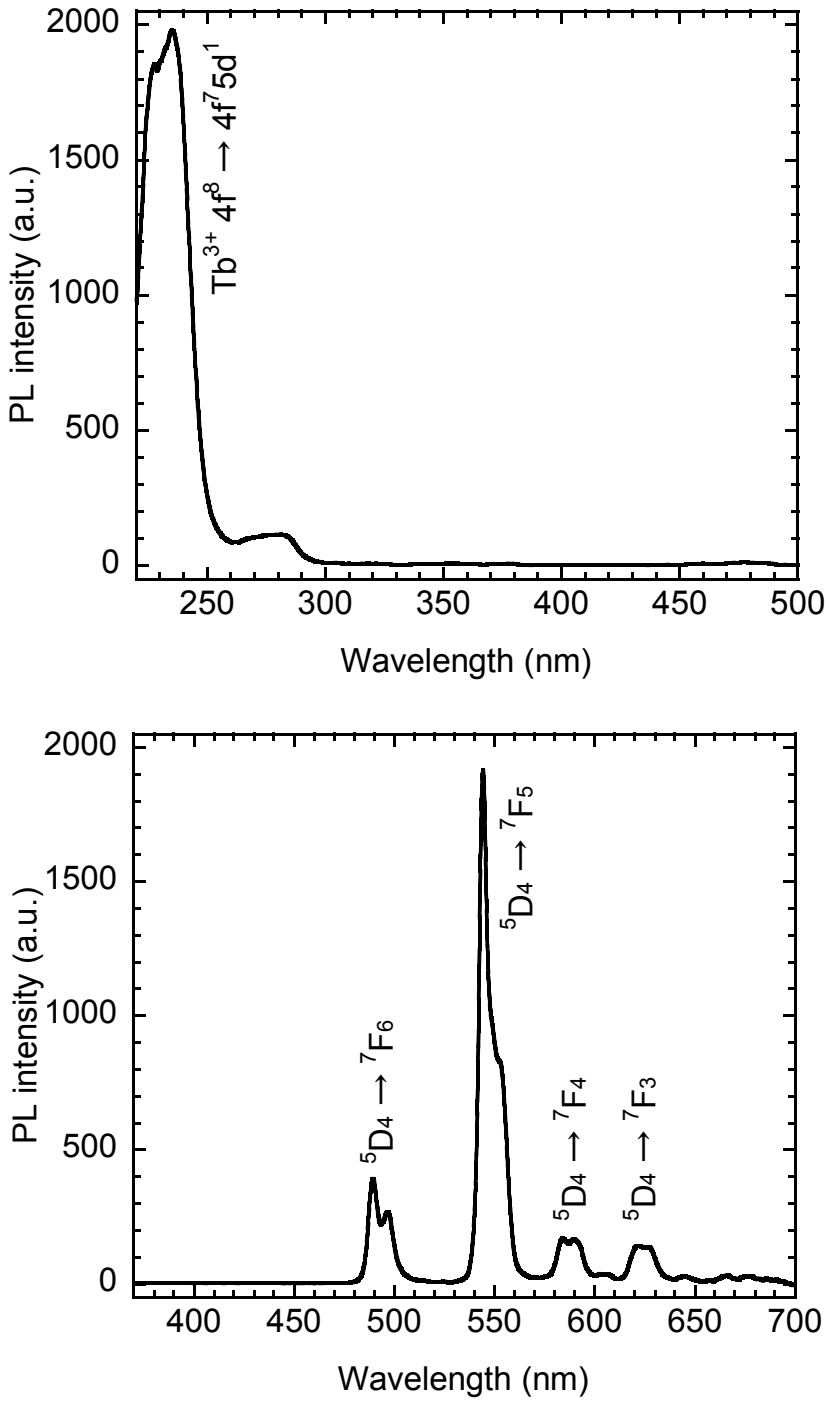

Fig. S5 PLE (top) and PL (bottom) spectra of powdered sample of Tb^{3+}-monodoped YBO_3. λ_{ex} = 235 nm and λ_{em} = 544 nm.

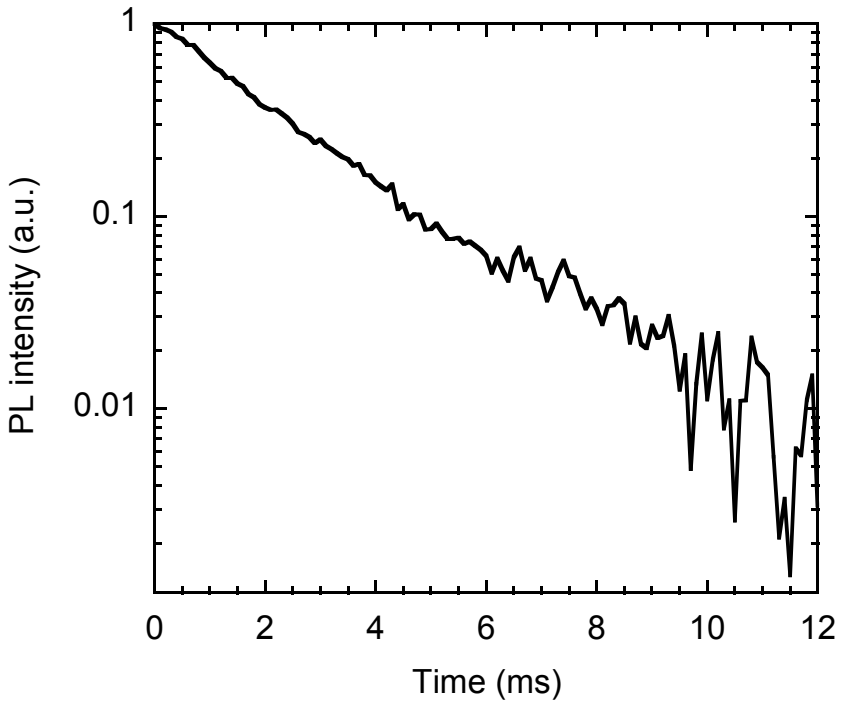

Fig. S6 PL decay curve for $^5D_4 \rightarrow {}^7F_5$ emission of powdered sample of W75. λ_{ex} = 360 nm and λ_{em} = 544 nm.

References

S1 G. Jia, P. A. Tanner, C.-K. Duan and J. Dexpert-Ghys, *J. Phys. Chem. C*, 2010, **114**, 2769–2775.

S2 Z. Wei, L. Sun, C. Liao, J. Yin, X. Jiang and C. Yan, *J. Phys. Chem. B*, 2002, **106**, 10610–10617.

S3 M. Tukia, J. Hölsa, M. Lastusaari and J. Niittykoski, *Opt. Mater.*, 2005, **27**, 1516–1522.

S4 H. Hara, S. Takeshita, T. Isobe, Y. Nanai, T. Okuno, T. Sawayama and S. Niikura, *J. Alloys Compd.*, 2013, **577**, 320–326.

S5 R. Kasuya, T. Isobe, H. Kuma and J. Katano, *J. Phys. Chem. B*, 2005, **109**, 22126–22130.