Electronic Supplementary Information

Template-free Synthesis of Mesoporous NaTbF$_4$ and NaTbF$_4$:Eu Nano-rice and Their Luminescence Properties

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Fig. S1 XRD patterns for NaTbF$_4$ product prepared at 110 °C for (a) 0.5 h, (b) 2 h and (c) 6 h, respectively.

Fig. S2 FT-IR spectrum of NaTbF$_4$ products obtained at 110 °C for 0.5 h.

Fig. S3 SEM images of mesoporous NaTbF$_4$:Eu nano-rice doped with a various amounts of Eu$^{3+}$.

Fig. S4 XRD patterns of NaTbF$_4$:Eu products doped with a various amounts of Eu$^{3+}$.

Fig. S5 EDX spectra of NaTbF$_4$:Eu products doped with a various amounts of Eu$^{3+}$. 
Fig. S1 XRD patterns for NaTbF$_4$ product prepared at 110 °C for (a) 0.5 h, (b) 2 h and (c) 6 h, respectively.
Fig. S2 FT-IR spectrum of NaTbF$_4$ products obtained at 110 °C for 0.5 h. The wide band at 3100 ~ 3600 cm$^{-1}$ was assigned to hydrogen-bonded O-H stretching vibrations, the band at ~ 3017 cm$^{-1}$ was assigned to the asymmetric ($\nu_{as}$) stretching vibrations of methylene (CH$_2$) in the EDTA. The band at ~ 1635 cm$^{-1}$ was assigned to $\nu_{as}$(OCO) asymmetric stretch vibrations. The band at ~ 1391 cm$^{-1}$ was assigned to C-N stretching modes, the bands at ~ 1314 cm$^{-1}$ can be assigned to $\delta$(C-H) bending vibrations.
Fig. S3 SEM images of mesoporous NaTbF₄:Eu nano-rice doped with various amounts of Eu³⁺: 95, 25, 10, and 2%, which were obtained in the solution with molar ratio of Tb³⁺ to Eu³⁺ at (a) 1/19, (b) 3/1, (c) 9/1 and (d) 49/1, respectively.
Fig. S4 XRD patterns of NaTbF₄:Eu products doped with various amounts of Eu³⁺: 2, 10, 25, and 95%.
Fig. S5 EDX spectra of (a) mesoporous NaTbF₄:Eu (95%) nano-rice with quantities of F, Na, Eu and Tb at a ratio of 63.39/18.75/16.95/0.91, (b) mesoporous NaTbF₄:Eu (25%) nano-rice with quantities of F, Na, Eu and Tb at a ratio of 62.84/19.43/4.42/13.31, (c) mesoporous NaTbF₄:Eu (10%) nano-rice with quantities of F, Na, Eu and Tb at a ratio of 64.10/18.98/1.54/15.38, and (d) mesoporous NaTbF₄:Eu (2%) nano-rice with quantities of F, Na, Eu and Tb at a ratio of 64.83/19.39/0.31/15.47, respectively.