Electronic Supplementary Information

Synthesis of Mesoporous LaPO₄ Nanostructures with Controllable Morphologies

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Preparation of La-TOPO

10.0 mmol of La(NO₃)₃·nH₂O was dissolved in 10.0 ml of deionized water. After dissolution, lanthanum ions were extracted from the La(NO₃)₃·nH₂O aqueous solution by 3.89 g of TOPO (~10 mmol). To reduce the viscosity of the organic phase containing TOPO and extracted lanthanum species, 7.0 ml of cyclohexane was added to dilute the organic phase, facilitating the separation of two phases and later transference by syringe. The extraction yield of lanthanum ions was about 60.0% in TOPO, and the final concentration of lanthanum was around 0.35 mol L⁻¹ in the TOPO-cyclohexane (denoted La-TOPO).

Preparation of H₃PO₄-EG

10.0 ml of 85% H₃PO₄ solution was mixed with 10.0 ml of EG, followed by stirring and heating at 100 °C for 10 h to remove water. As a result, a clear solution with a high concentration of around 7.0 mol L⁻¹ was obtained (denoted H₃PO₄-EG).

Synthesis of Eu³⁺ doped and Ce³⁺/Tb³⁺ codoped LaPO₄ nanostructures

LaPO₄:Ce,Tb: The synthetic procedure for the LaPO₄:Ce,Tb nanostructures was the same as that used for the synthesis of undoped LaPO₄ nanostructures, except that 1.14 ml of La-TOPO (0.35 M, ~0.4 mmol), 1.67 ml of Ce-TOPO (0.27 M, ~0.45 mmol), and 0.40 ml of Tb-TOPO (0.38 M, ~0.15 mmol) were used as the precursors in EG.

LaPO₄:Eu: The synthetic procedure for the LaPO₄:Eu nanostructures was also same as that used for the synthesis of undoped LaPO₄ nanostructures, except that 1.14 ml of La-TOPO (0.35 M, ~0.4 mmol) and 0.08 ml of Eu-TOPO (0.25 M, ~0.02 mmol) were used as the precursors in EG.
Fig. S1 SEM images of the obtained LaPO₄ nanostructures in a typical synthesis with different reaction time. a) 10 min b) 3 h

Fig. S2 SEM images of the obtained LaPO₄ nanostructures in a typical synthesis with different reaction temperature. a) 120 °C c) 180 °C
Fig. S3 XRD patterns of LaPO₄ nanostructures obtained in a typical synthesis with different molar ratio of La³⁺/H₃PO₄: (a) 1/2 (b) 1/20 (c) 1/100 (d) 1/200.

Fig. S4 SEM images obtained LaPO₄ nanostructures in a typical synthesis with different molar ratio of La³⁺/H₃PO₄: (a) 5/1 (b) 1/4 (c) 1/10 (d) 1/30 (e) 1/40 (f) 1/60.
Fig. S5  Fourier Transform Infrared spectra (FT-IR) of (a) as-obtained LaPO₄ nanostructures in a typical synthesis and (b) LaPO₄ nanoparticles prepared by adding phosphate acid (85%) into La(NO₃)₃ aqueous solution at room temperature.

Fig. S6  XRD patterns of doped LaPO₄ nanostructures obtained in a typical synthesis. a) LaPO₄:Eu, b) LaPO₄:Ce,Tb.
Fig. S7 SEM images of LaPO₄:Ce,Tb nanostructures synthesized in a typical synthesis with different molar ratio of La³⁺/H₃PO₄: a) 1/2 b) 1/20 c) 1/100 d) 1/200

Fig. S8 Room-temperature excitation and emission spectra of LaPO₄:Ce,Tb nanostructures synthesized in a typical synthesis with different molar ratio of La³⁺/H₃PO₄ a) 1/2 b) 1/20 c) 1/100 d) 1/200 (λ_ex = 273 nm and λ_em = 546 nm).