Electronic Supplementary Material (ESI) for RSC Advances.

Controlled synthesis and luminescent properties of $DyPO_4$: Eu Nanostructures

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Table 1: $DyPO_4$ nanocrystals obtained under different pH and temperature conditions.

samples	pH	temp (℃)	morphology	structure
Sample 1	2	120	nanorods	hexagonal $DyPO_4 \cdot 1.5H_2O$
Sample 2	4	120	nanorods	hexagonal $DyPO_4 \cdot 1.5H_2O$
Sample 3	6	120	nanoparticles /nanorods	hexagonal $DyPO_4 \cdot 1.5H_2O$
				tetragonal $DyPO_4$
Sample 4	8	120	nanoparticles /nanorods	hexagonal $DyPO_4 \cdot 1.5H_2O$
				tetragonal $DyPO_4$
Sample 5	2	180	nanorods	hexagonal $DyPO_4 \cdot 1.5H_2O$
Sample 6	4	180	nanorods	hexagonal $DyPO_4 \cdot 1.5H_2O$
				tetragonal $DyPO_4$
Sample 7	6	180	nanoparticles /nanorods	hexagonal $DyPO_4 \cdot 1.5H_2O$
				tetragonal $DyPO_4$
Sample 8	8	180	nanoparticles	tetragonal $DyPO_4$
Sample 9	2	200	nanorods	hexagonal $DyPO_4 \cdot 1.5H_2O$
Sample10	4	200	nanoparticles /nanorods	hexagonal $DyPO_4 \cdot 1.5H_2O$
				tetragonal $DyPO_4$
Sample11	6	200	nanoparticles	tetragonal $DyPO_4$
Sample12	8	200	nanoparticles	tetragonal $DyPO_4$

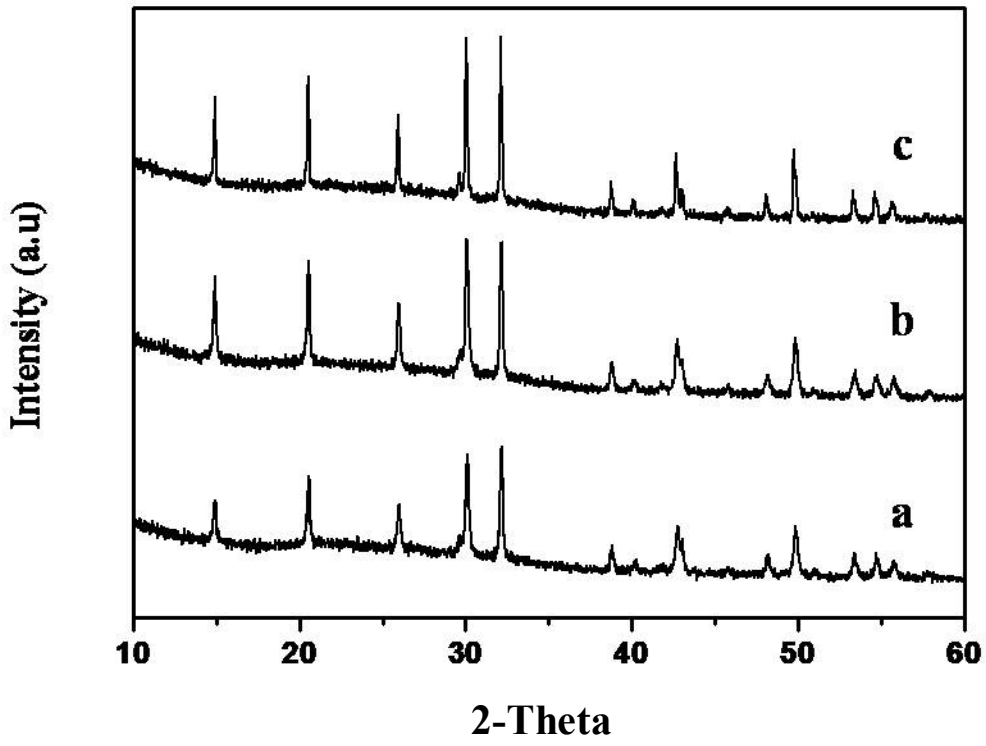

Figure S1 XRD pattern of $DyPO_4$ powders hydrothermally synthesized under hydrothermal treatment for at 120℃, pH= 2 with EDTA/Dy molar ratios of: (a) 1, (b) 3, (c) 9.

In low temperature and low pH conditions (120 °C and pH=2), the effect of EDTA on the polymorph selection behavior of $DyPO_4$ was also investigated. The XRD patterns of these products are shown in Supporting Information (Figures S1). It is found that at low temperature and low pH, the addition of EDTA is not beneficial for the transformation from hexagonal to tetragonal $DyPO_4$.

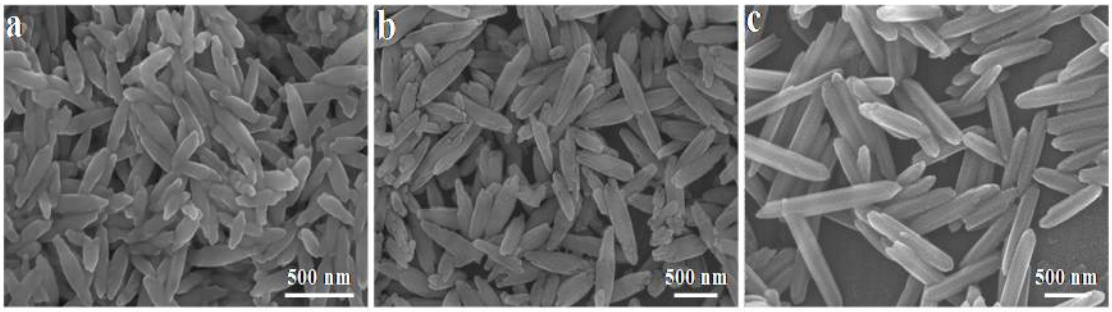

Figure S2 SEM images of $DyPO_4$ powders hydrothermally synthesized under hydrothermal treatment for at 120℃, pH= 2 with EDTA/Dy molar ratios of: (a) 1, (b) 3, (c) 9.

When hydrothermal treatment for at 120℃, pH= 2 , the effects of the EDTA/Dy molar ratios on the morphology, controlled experiments were carried out while other reaction conditions were constant. It can be seen clearly that these four samples all adopt nanorod shape. Furthermore, with the EDTA/Dy molar ratios from 1 to 9, the anisotropic growth tendency was also enhanced and the aspect radio of as-obtained nanorods was increased (Figure S2).

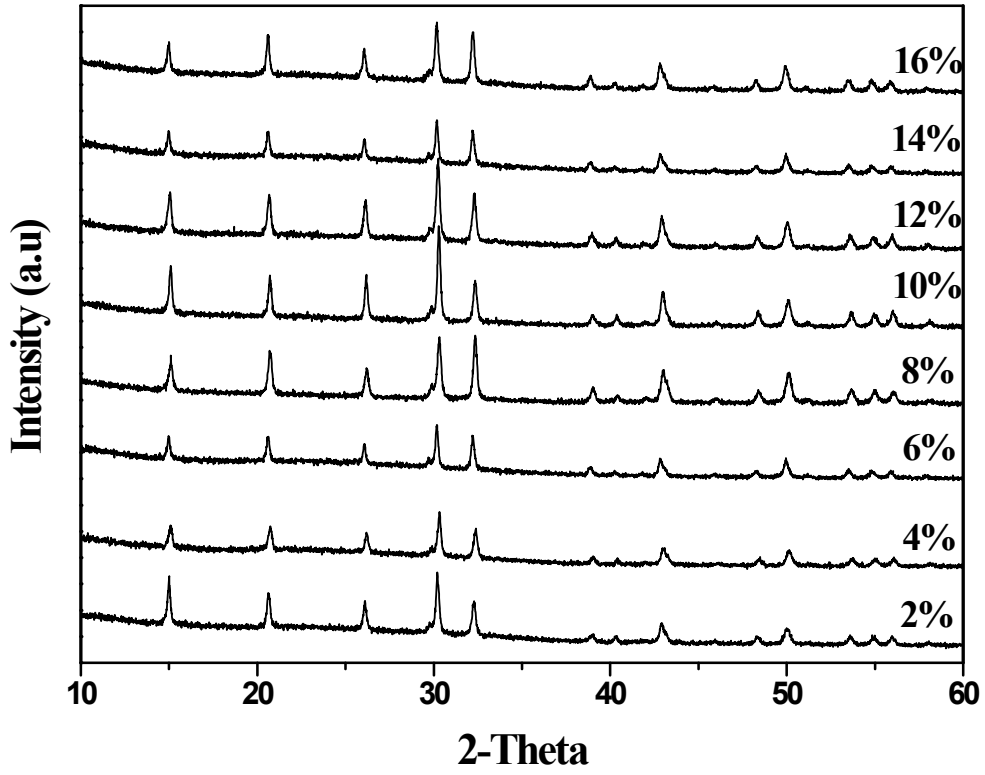

Figure S3 XRD patterns of $DyPO_4:Eu^{3+}$ crystals (obtained at 120℃, pH = 2) with different concentration of doped Eu^{3+}.

Figure S3 shows the XRD patterns of the as-prepared samples obtained with different concentration of Eu^{3+}. It can be seen that all the obtained samples with the same hexagonal structure.

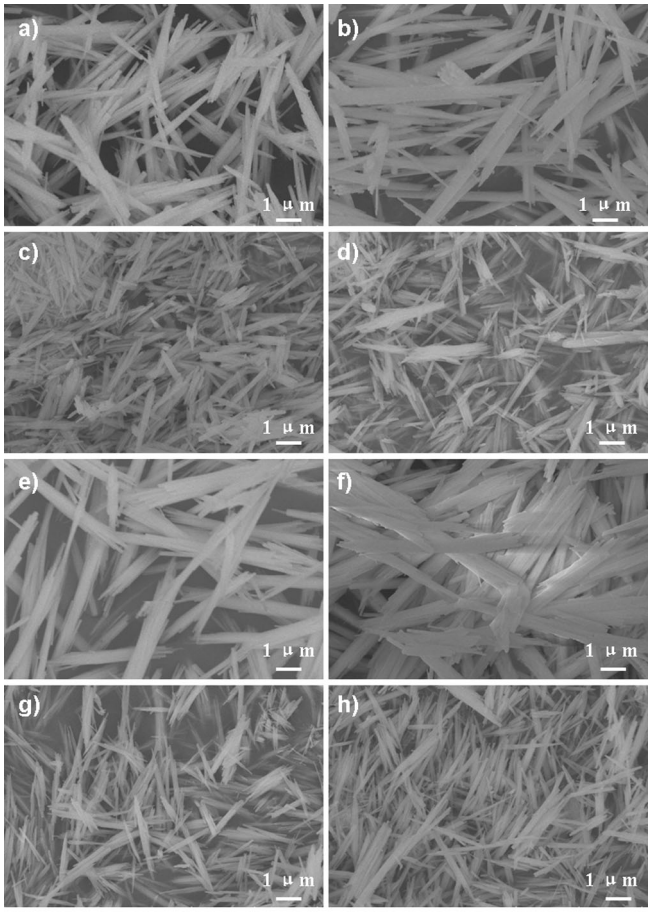

Figure S4. SEM images of $DyPO_4:Eu^{3+}$ prepared at 120℃ and pH = 2 with different Eu concentrations: (a) 2%, (b) 4%, (c) 6%, (d) 8%, (e) 10%, (f) 12%, (g) 14%, and (h) 16, respectively. From these pictures, one can observe that with increasing Eu concentration, all these obtained samples have similar nanorod shapes.

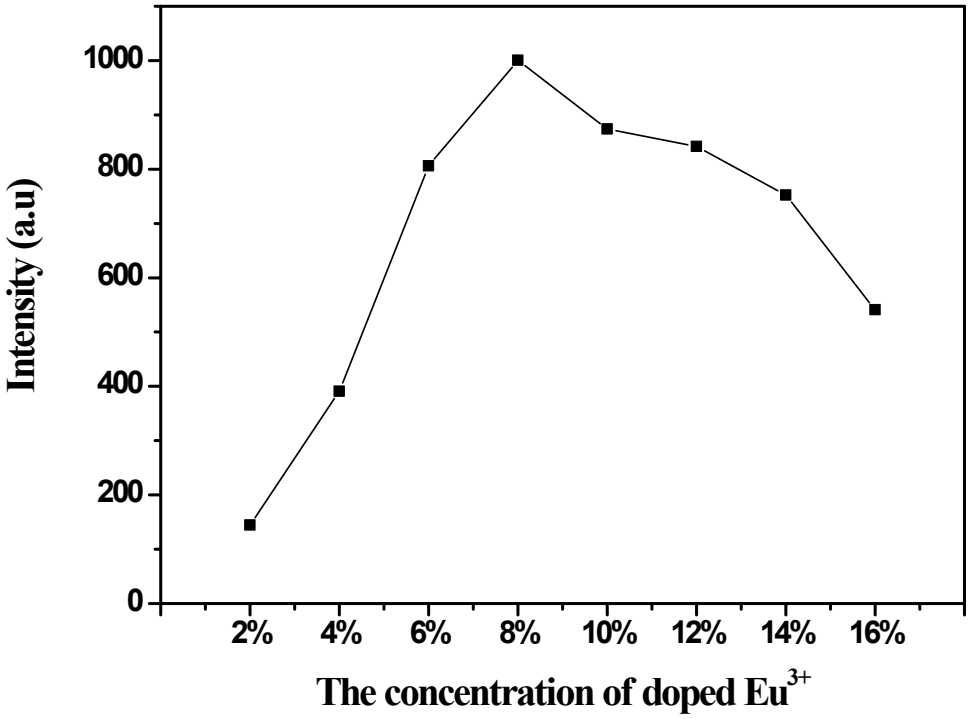

Figure S5. Dependence of Eu^{3+} emission intensities at 593 nm ($^5D_0 \rightarrow {}^7F_1$) on Eu^{3+} concentration in $DyPO_4$ nanocrystals obtained at 120℃, pH = 2. One can observe that when the Eu concentration is 8 mol %, the obtained sample has the highest emission intensity.