Supporting Information

Sacrificial conversion of layered rare-earth hydroxide (LRH) nanosheets into $(Y_{1-x}Eu_x)PO_4$ nanophosphors and investigation of photoluminescence

ZhihaoWang,[a] Ji-Guang Li,[*a,b] Qi Zhu,[a] XiaodongLi,[a] XudongSun[a]

[a]*Key Laboratory for Anisotropy and Texture of Materials (Ministry of Education), School of Materials and Metallurgy, Northeastern University, Shenyang, Liaoning 110819, China*

[b]*Advanced Materials Processing Unit, National Institute for Materials Science, Namiki 1-1, Tsukuba, Ibaraki 305-0044, Japan*

[*]Corresponding author

E-mail: LI.Jiguang@nims.go.jp

Table S1 Results of elemental analysis for the intended products of $(Y_{1-x}Eu_x)PO_4 \cdot nH_2O$.

x	0.03	0.05	0.08	0.10	0.12
Y	37.07%	34.00%	36.34%	33.16%	37.58%
Eu	2.04%	3.09%	5.47%	6.19%	8.62%
Eu:(Y+Eu) atomic ratio	0.0312:1	0.0505:1	0.0809:1	0.0985:1	0.1183:1

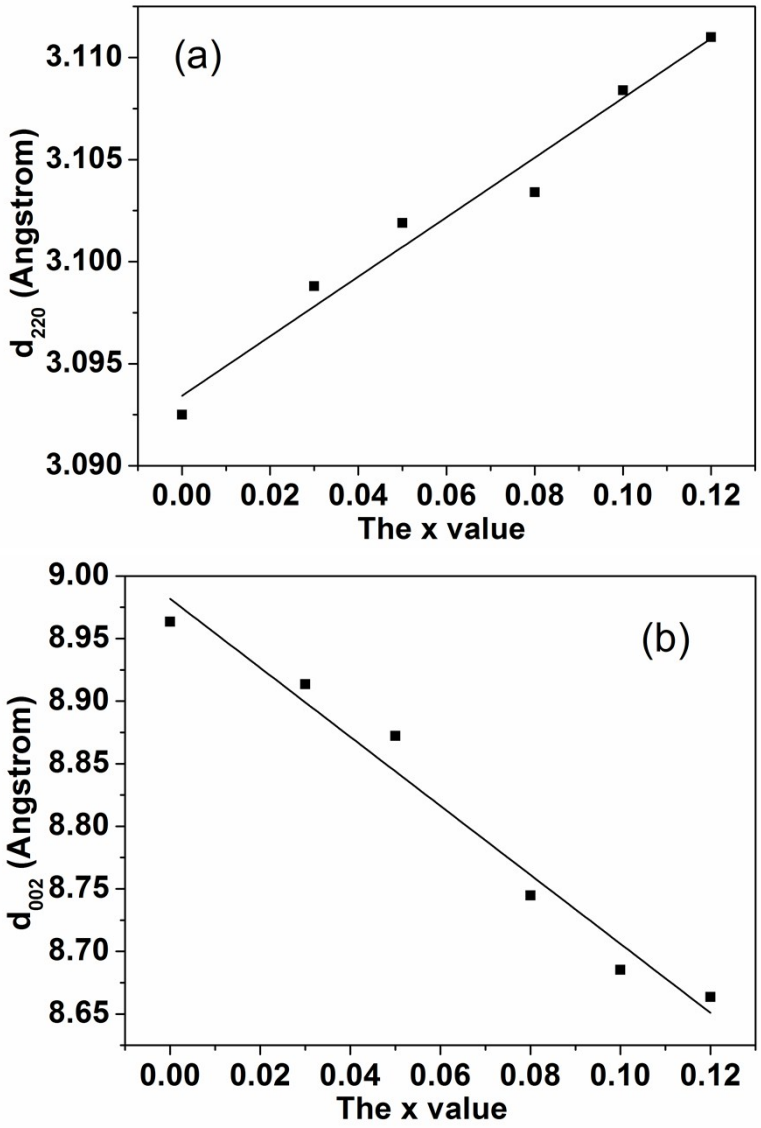

Fig. S1 Correlation of the 220 and 002 inter-plane spacing with the Eu^{3+} content (the x value) for the $(Y_{1-x}Eu_x)_2(OH)_5NO_3 \cdot nH_2O$ layered hydroxide.

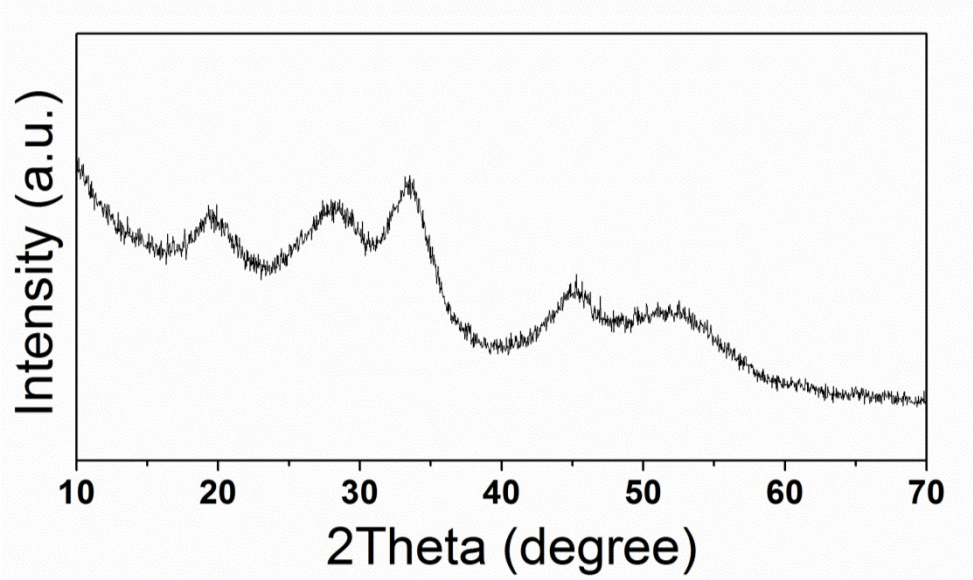

Fig. S2 XRD pattern of the phosphate-exchange product.

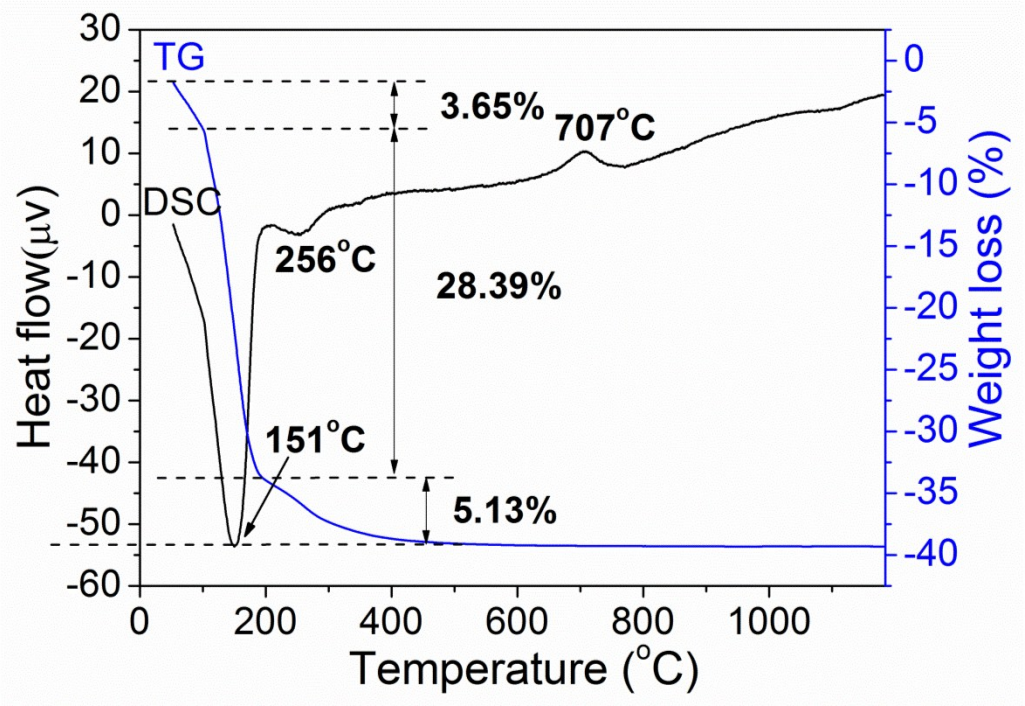

Fig. S3 TG/DSC curves for the phosphate-exchange product.

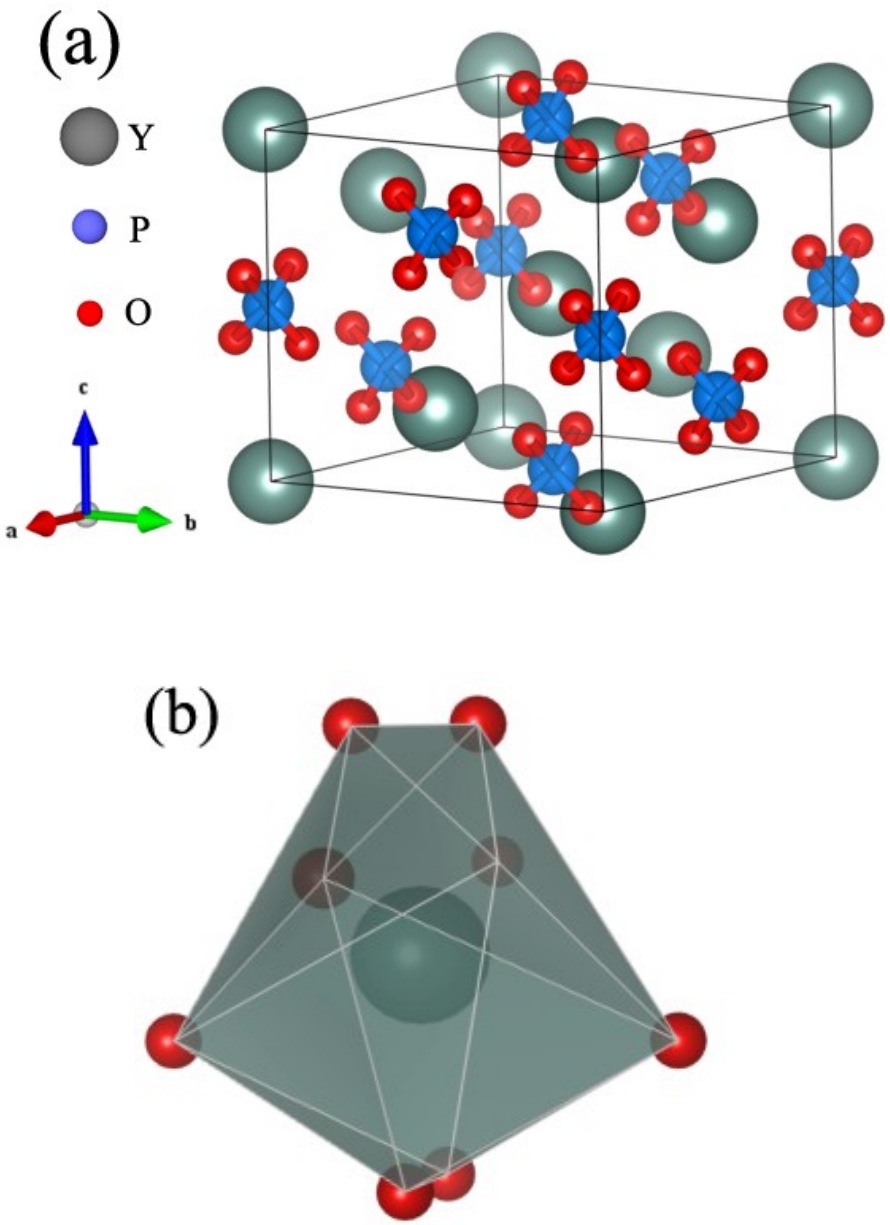

Fig. S4 Schemetic show of the crystal structure of tetragonal YPO_4 (a) and the yttrium ligand (b).

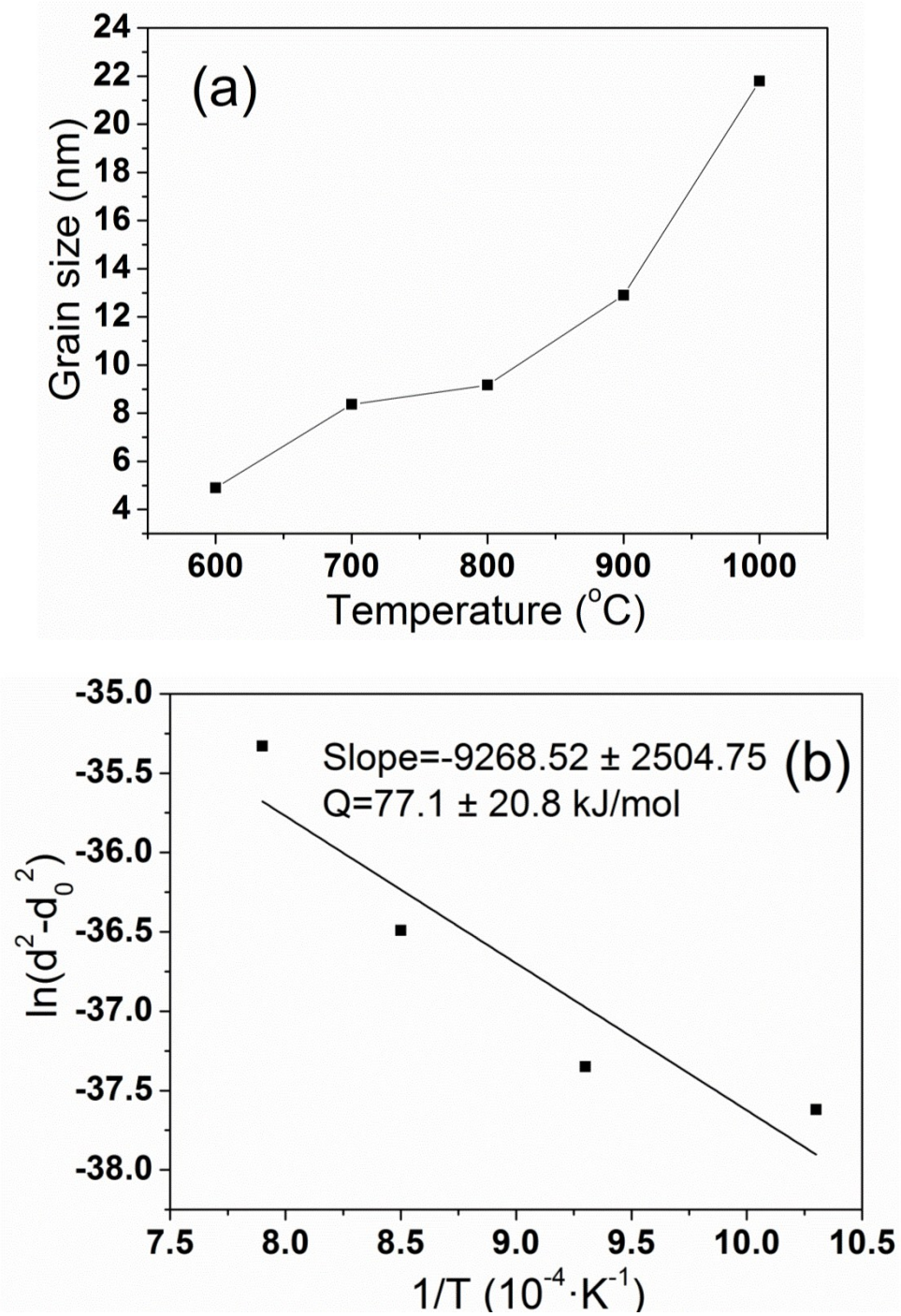

Fig. S5 Crystallite size of the $(Y_{0.9}Eu_{0.1})PO_4$ phosphor as a function of calcination temperature (a) and the derivation of activation energy for crystallite growth (b). The experimental data in (a) is better fitted with n=2 in (b) in this work.

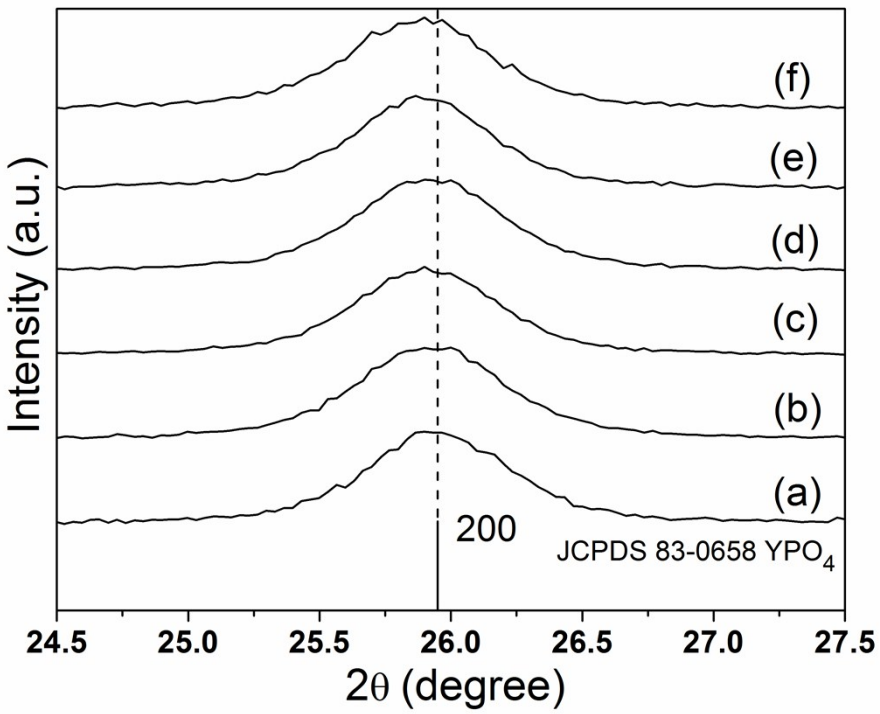

Fig. S6 Enlarged view of the (200) diffraction region of Figure 6 to show peak shiting with incrasing Eu^{3+} content in $(Y_{1-x}Eu_x)PO_4$, where x=0, 0.03, 0.05, 0.08, 0.10, and 0.12 for (a)-(f), respectively.

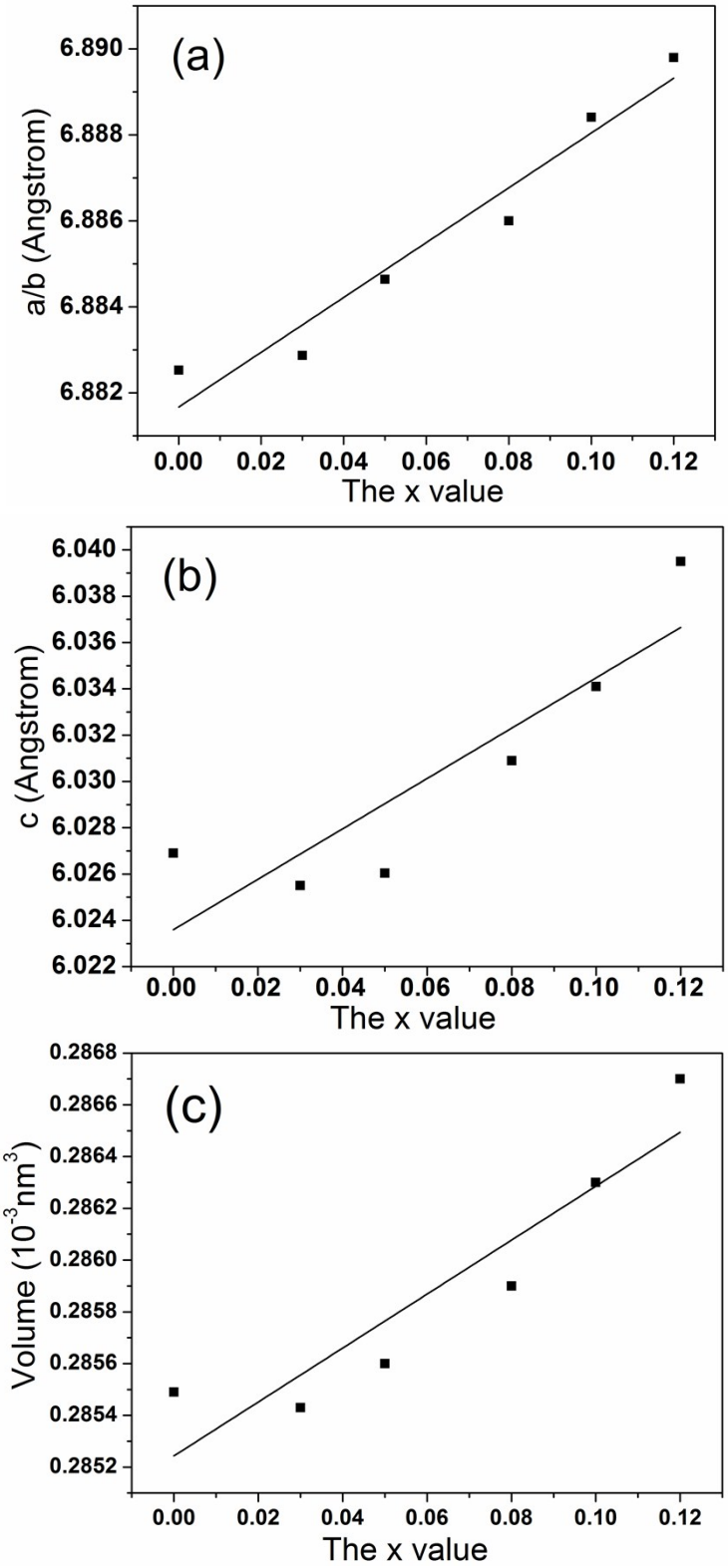

Fig. S7 Correlation of lattice parameters *a*/*b* (a, *a*=*b*) and *c* (b) and cell volume (c) with Eu^{3+} content for the $(Y_{1-x}Eu_x)PO_4$ phosphors calcined at 900 °C.

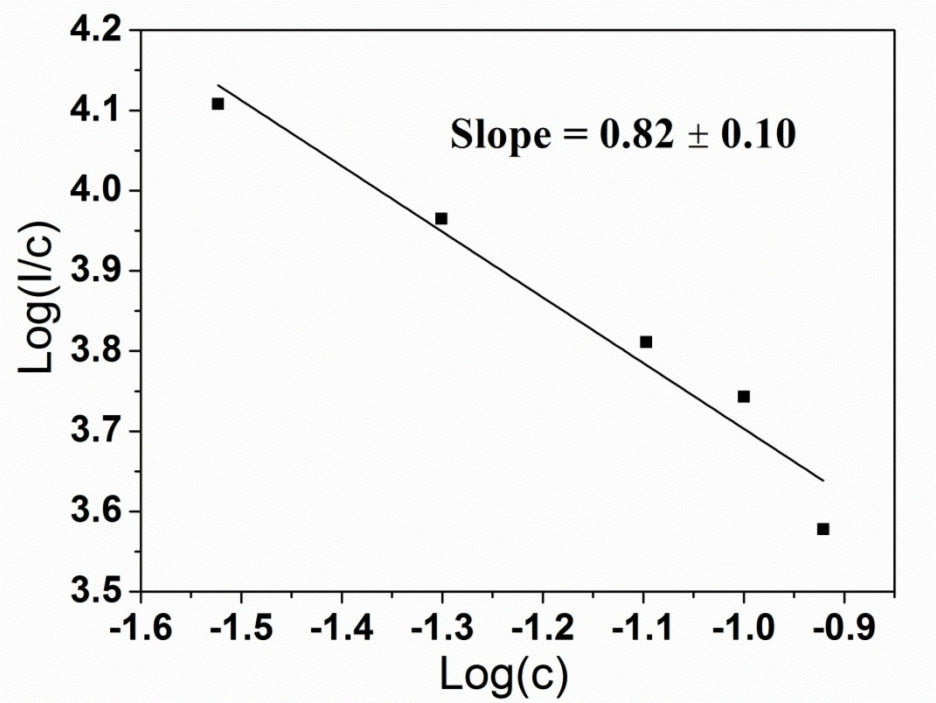

Fig. S8 The relationship between log(*I*/*c*) and log(*c*) for the $(Y_{1-x}Eu_x)PO_4$ phosphors (x=0.03-0.12) calcined at 900 °C.

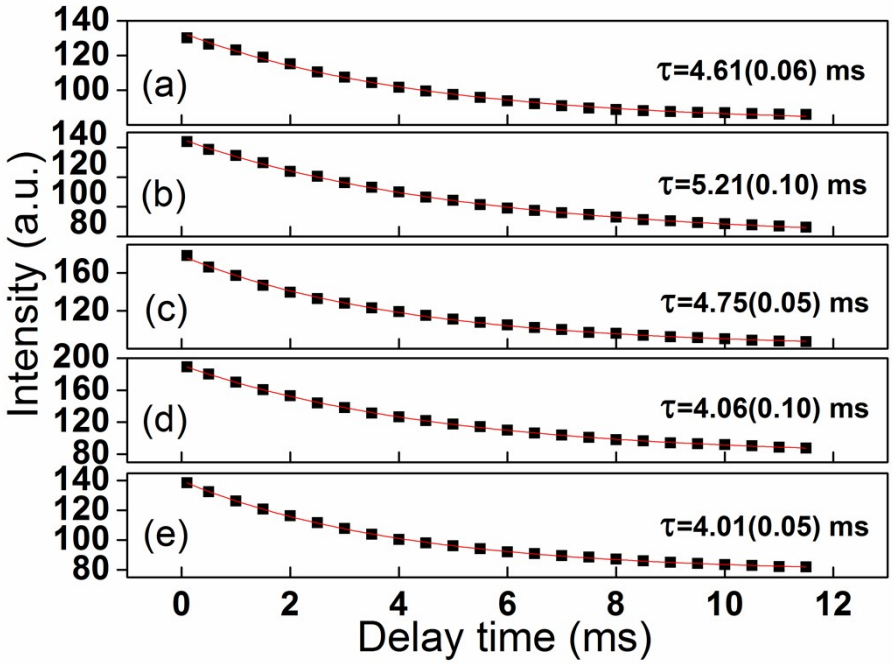

Fig. S9 Fluorescence decay curves for the 595 nm emissions of the $(Y_{1-x}Eu_x)PO_4$ phosphors calcined at 900 °C, with x=0.03 (a), 0.05 (b), 0.08 (c), 0.10 (d), and 0.12 (e).

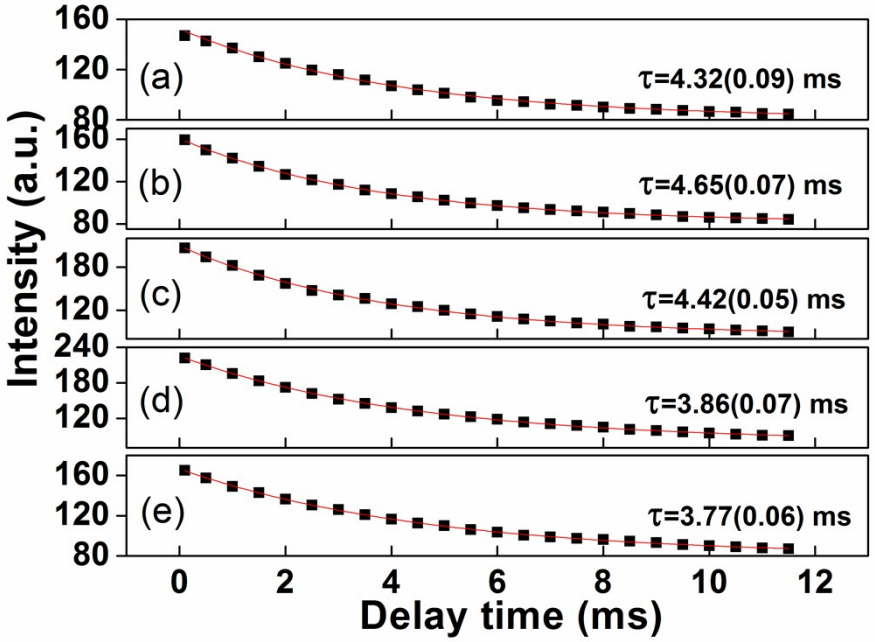

Fig. S10 Fluorescence decay curves for the 621 nm emissions of the $(Y_{1-x}Eu_x)PO_4$ phosphors calcined at 900 °C, with x=0.03 (a), 0.05 (b), 0.08 (c), 0.10 (d), and 0.12 (e).

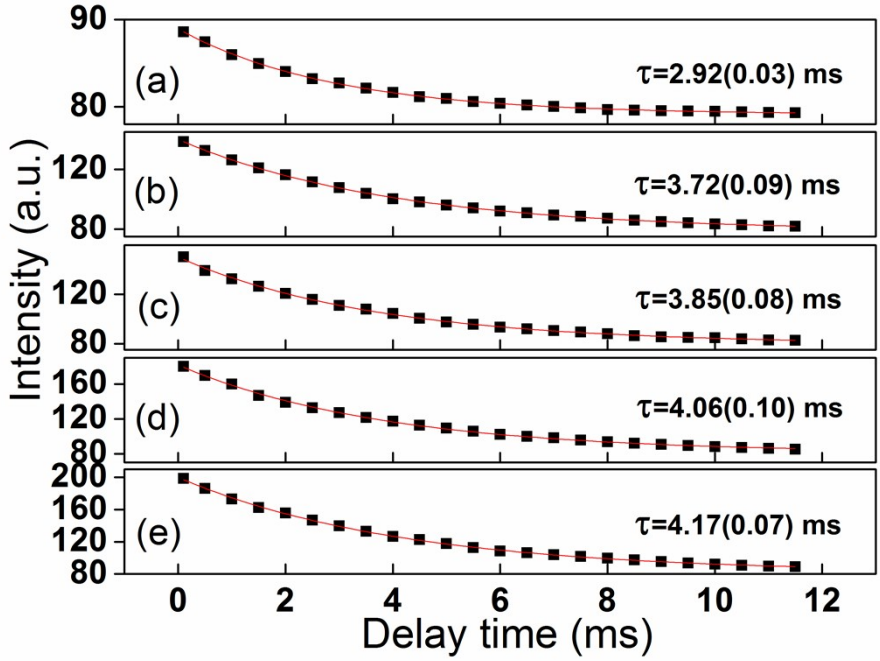

Fig. S11 Fluorescence decay curves for the 595 nm emissions of the $(Y_{0.9}Eu_{0.1})PO_4$ phosphors calcined at 600 (a), 700 (b), 800 (c), 900 (d), and 1000 °C (e).

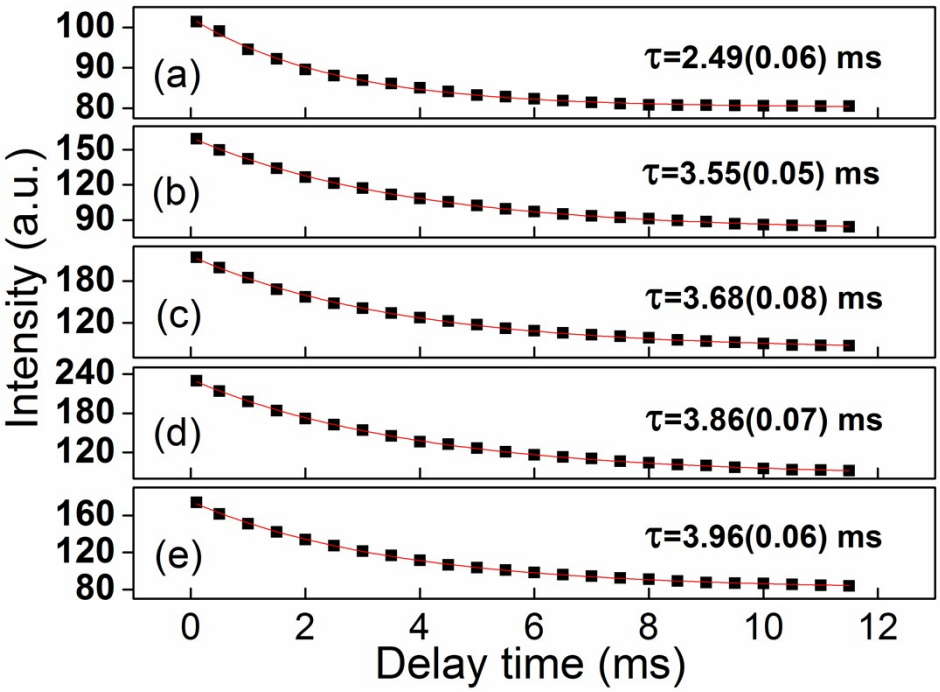

Fig. S12 Fluorescence decay curves for the 621 nm emissions of the $(Y_{0.9}Eu_{0.1})PO_4$ phosphors calcined at 600 (a), 700 (b), 800 (c), 900 (d), and 1000 ^{o}C (e).