

## Supplementary Information

# Molten salt synthesis of $\text{Eu}^{2+}$ -doped $\text{Sr}_5(\text{PO}_4)_3\text{Cl}$ in air atmosphere: Europium self-reduction and optical properties

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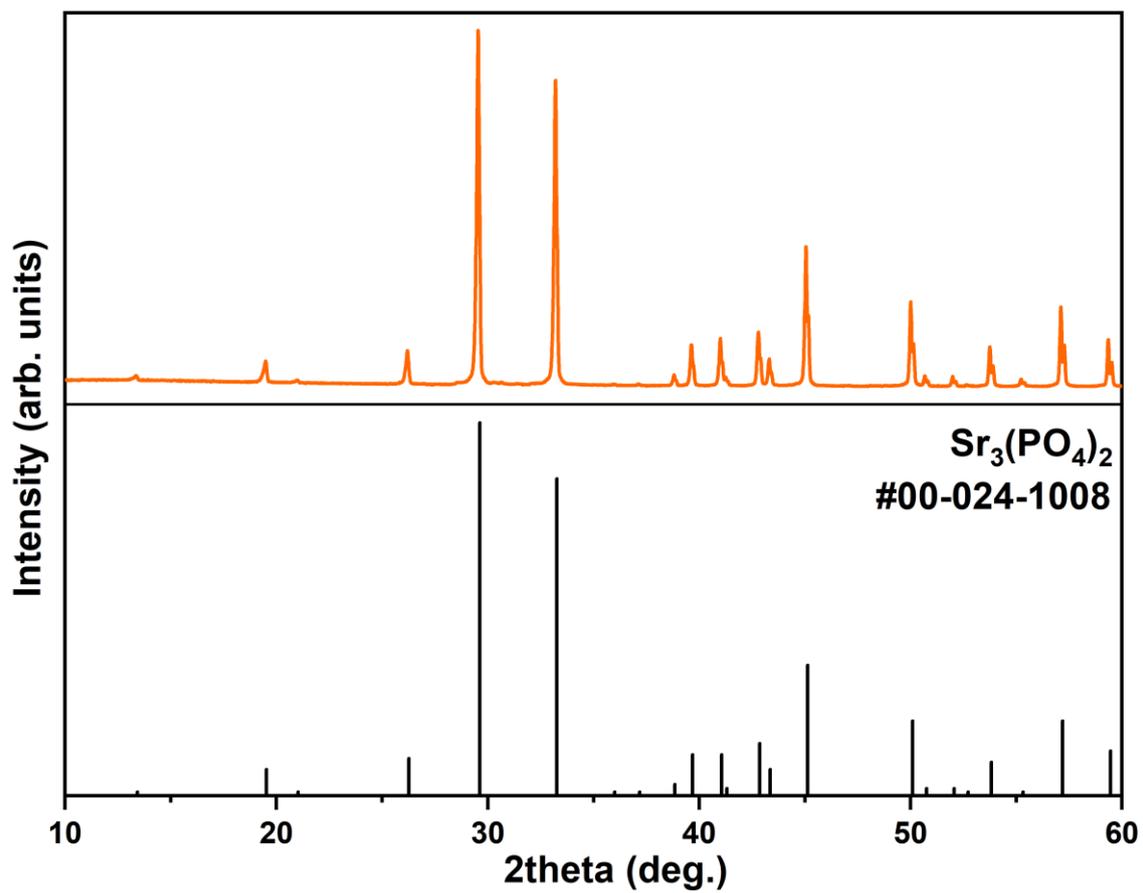
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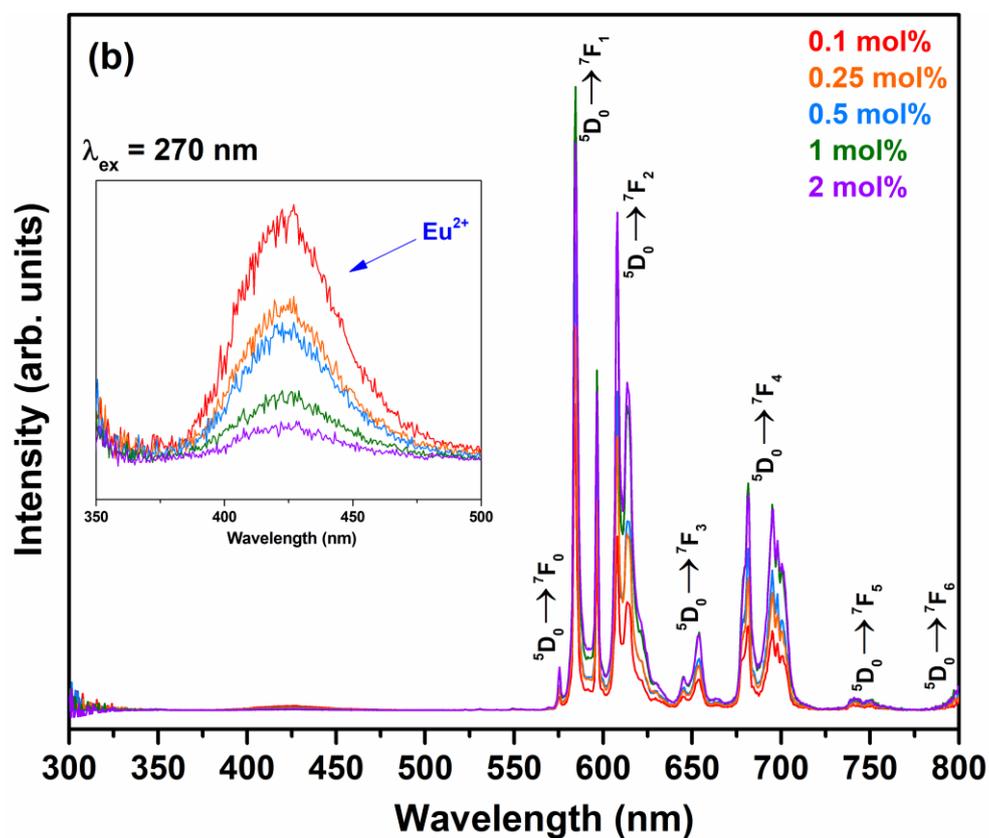
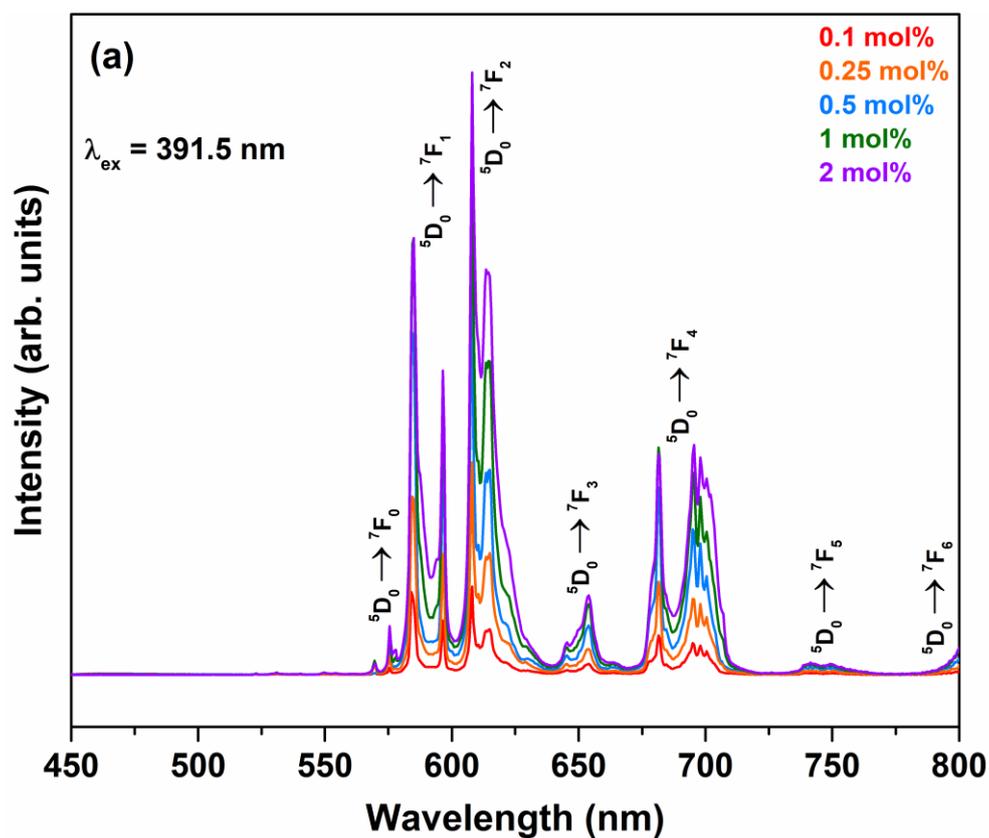
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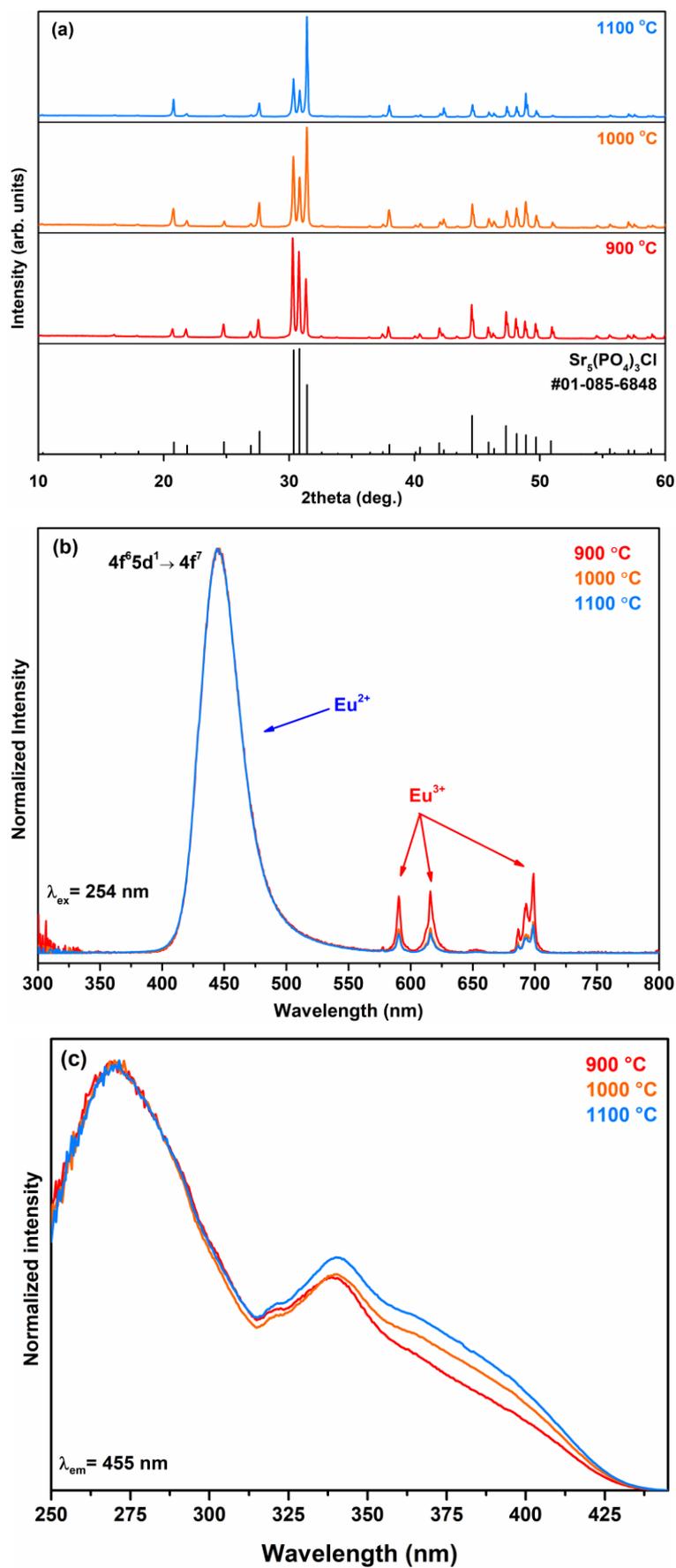
Aleksej Zarkov: e-mail: [aleksej.zarkov@chf.vu.lt](mailto:aleksej.zarkov@chf.vu.lt);



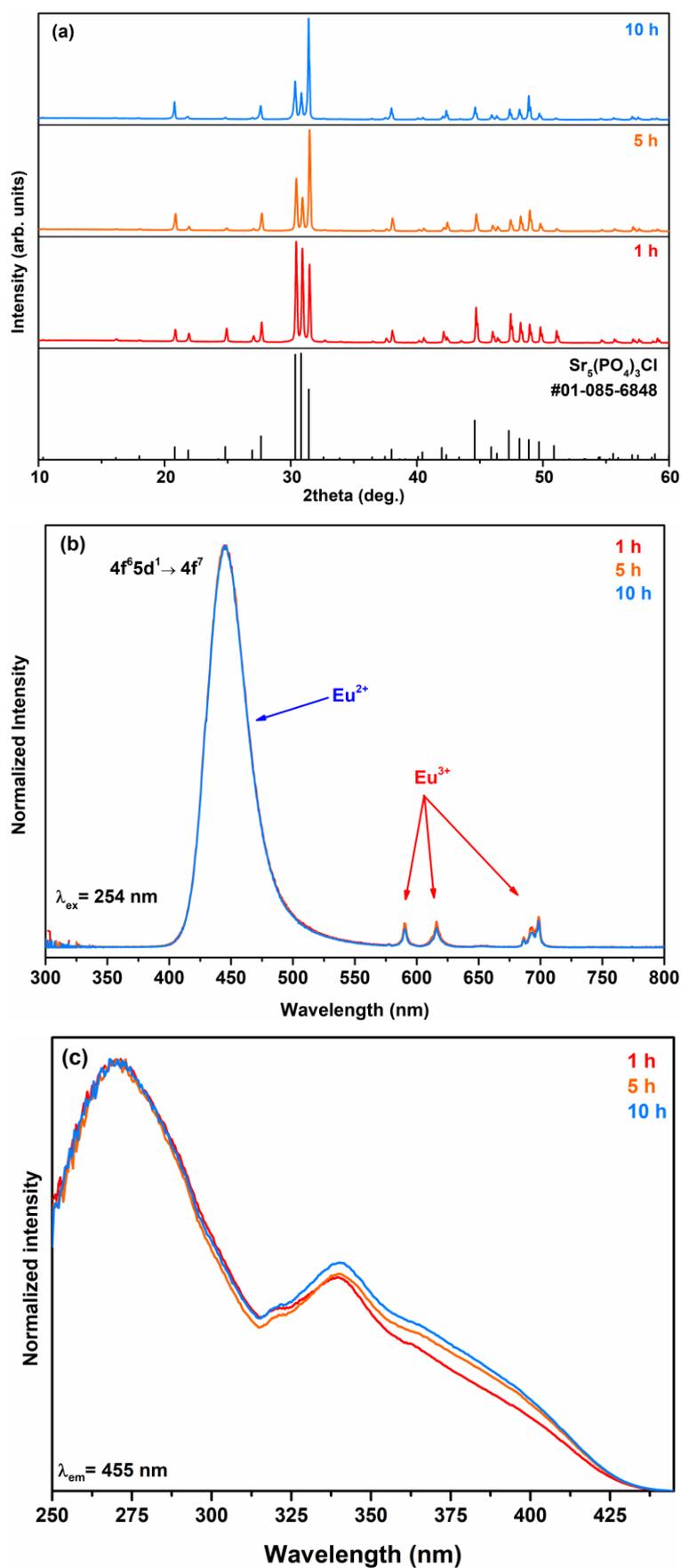
**Fig. S1.** XRD pattern of Sr<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub> doped with 1 mol% of Eu.



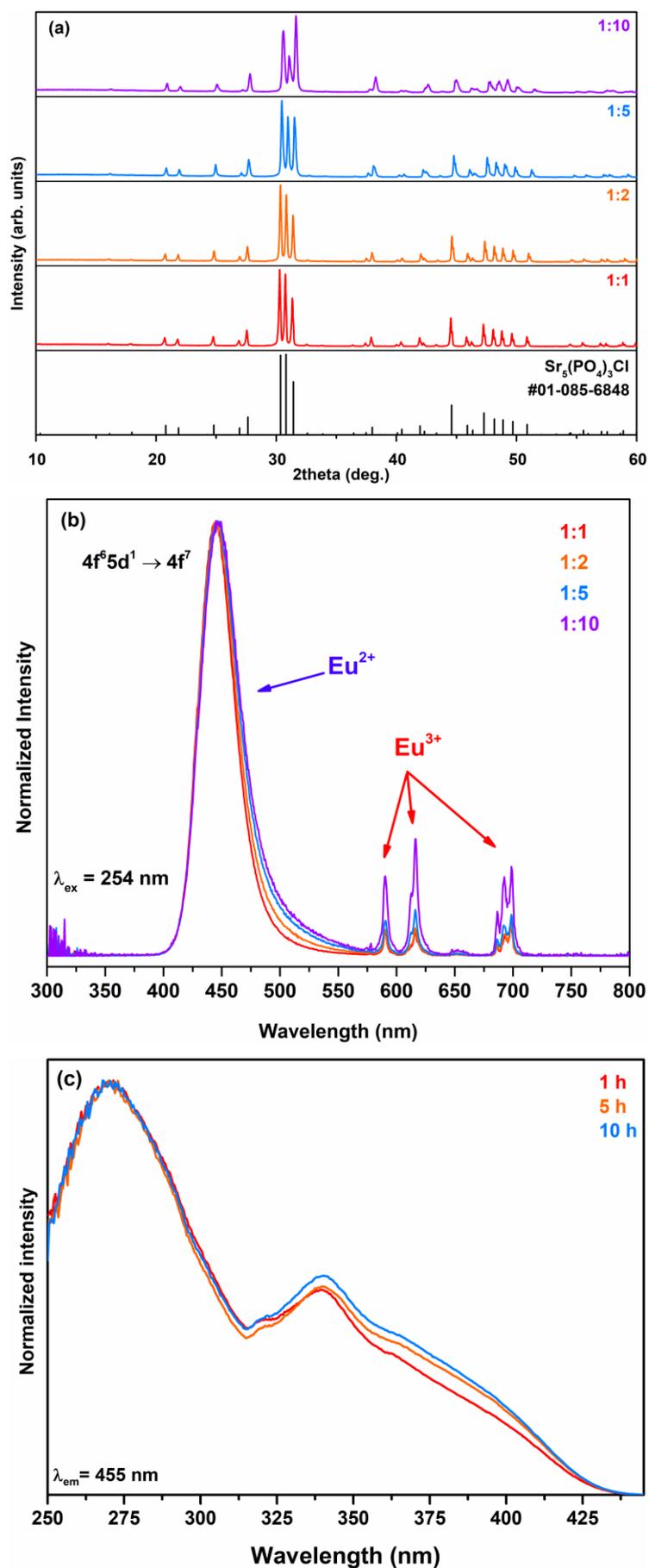
**Fig. S2.** PL spectra of  $\text{Sr}_3(\text{PO}_4)_2$  precursors doped with various amounts of Eu under 391.5 nm (a) and 270 nm (b) excitation wavelengths.



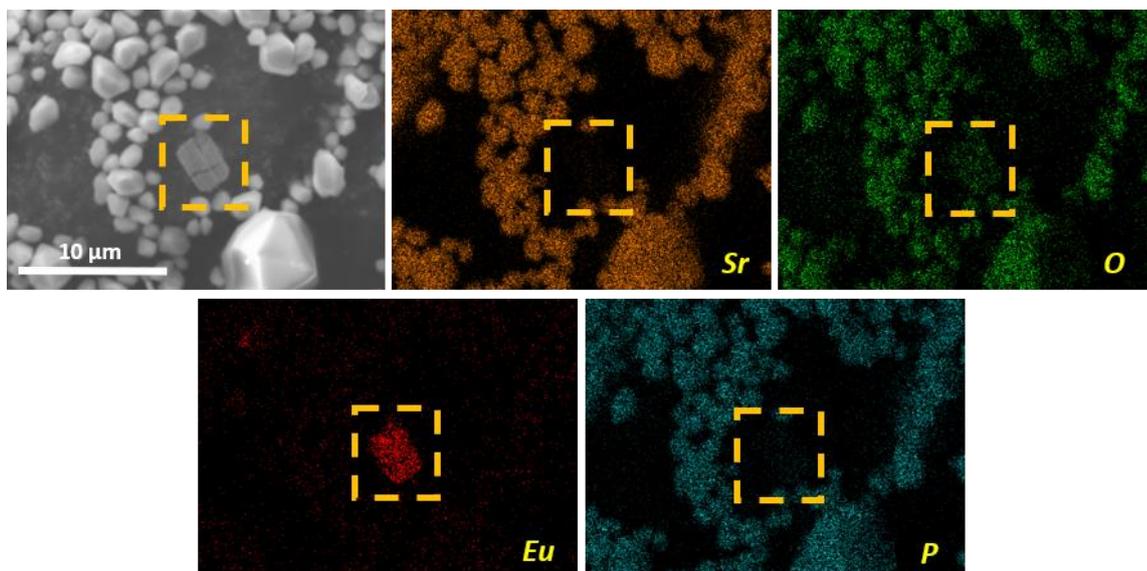
**Fig. S3.** XRD patterns (a), normalized PL (b), and PLE (c) spectra of  $\text{Sr}_5(\text{PO}_4)_3\text{Cl}:\text{Eu}$  samples synthesized at different temperatures ( $t = 5 \text{ h}$ ; precursor-to-flux ratio – 1:2).



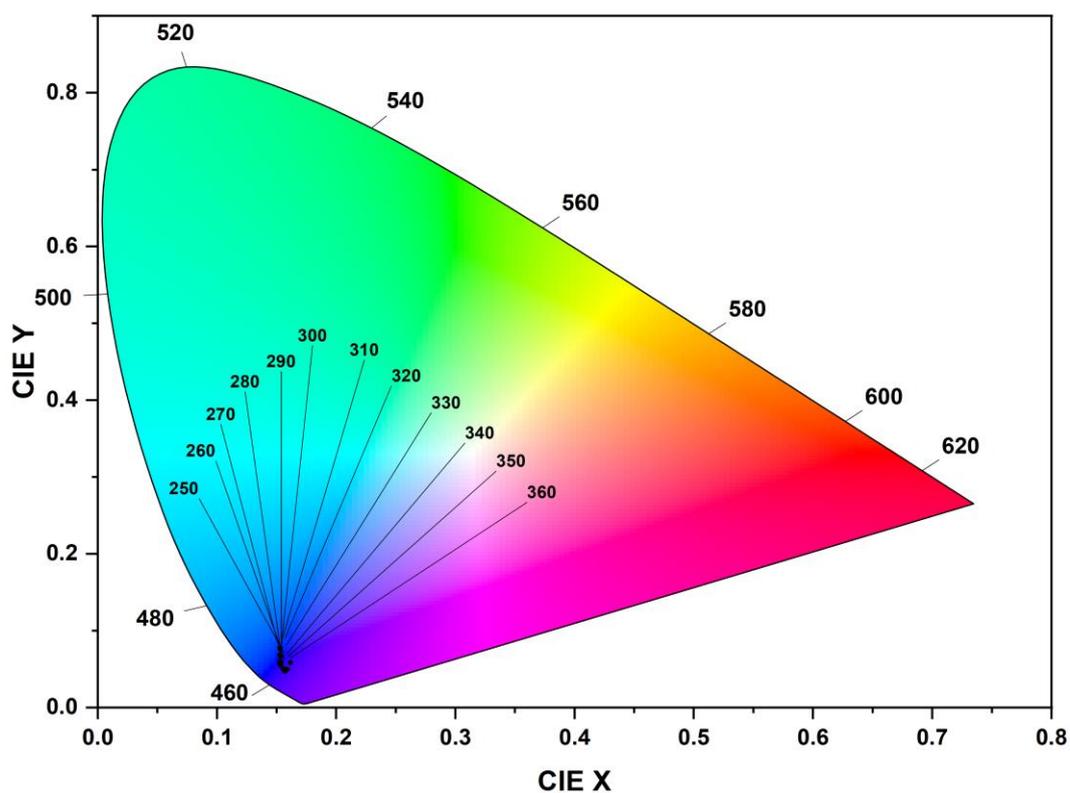
**Fig. S4.** XRD patterns (a), normalized PL (b), and PLE (c) spectra of  $\text{Sr}_5(\text{PO}_4)_3\text{Cl}:\text{Eu}$  samples synthesized for different periods of time ( $T = 1000^\circ\text{C}$ , precursor-to-flux ratio – 1:2).



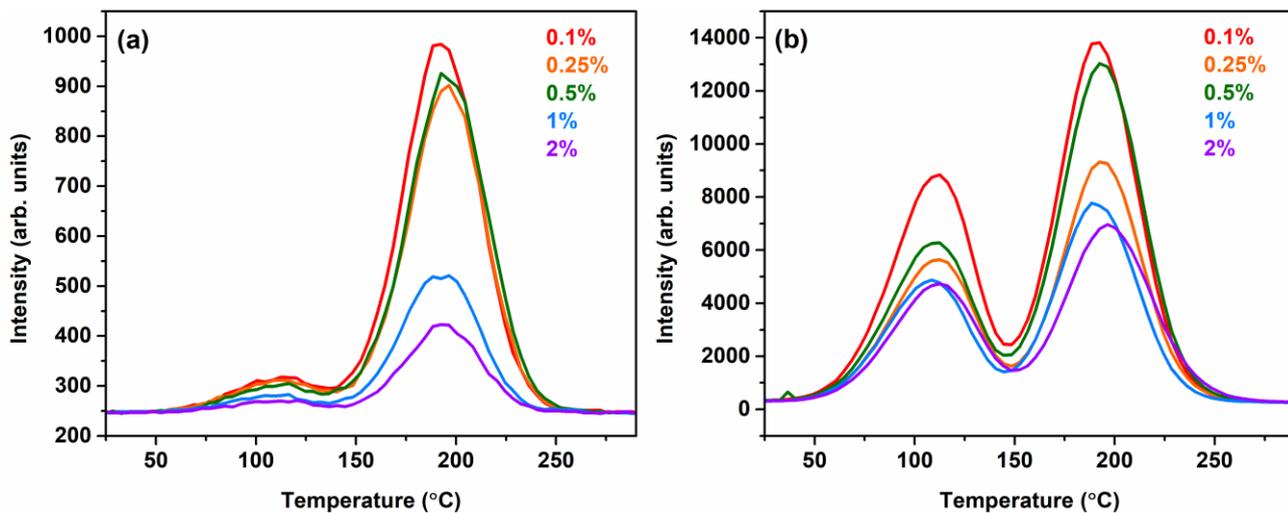
**Fig. S5.** XRD patterns (a), normalized PL (b), and PLE (c) spectra of  $\text{Sr}_5(\text{PO}_4)_3\text{Cl}:\text{Eu}$  samples synthesized with different precursor-to-flux ratios ( $T = 1000 \text{ }^\circ\text{C}$ ,  $t = 1 \text{ h}$ ).



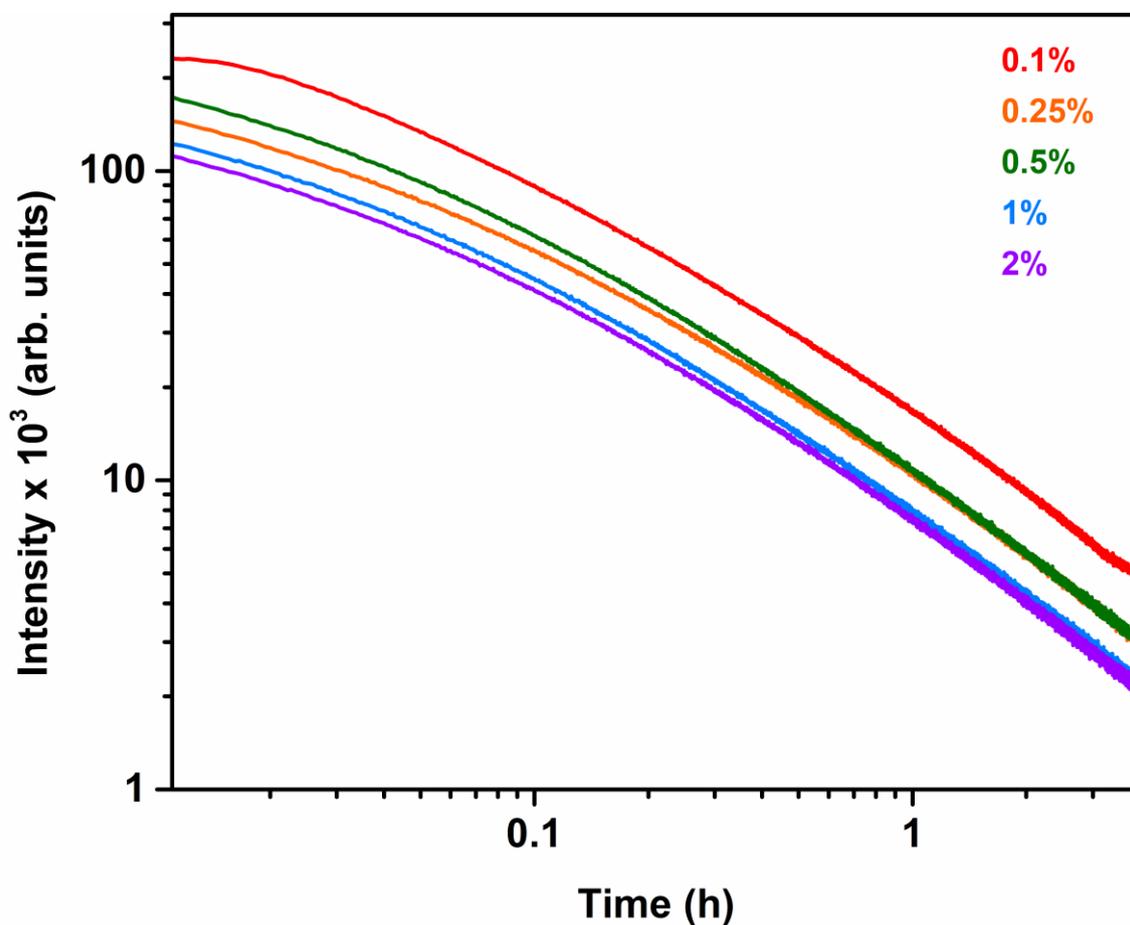
**Fig. S6.** SEM images and EDX mapping of  $\text{Sr}_5(\text{PO}_4)_3\text{Cl}:2\% \text{Eu}$  sample, demonstrating the presence of secondary phase.



**Fig. S7.** CIE 1931 chromaticity coordinates of  $\text{Sr}_5(\text{PO}_4)_3\text{Cl}:0.25\% \text{Eu}$  sample excited at different wavelengths.



**Fig. S8.** TSL glow curves of the  $\text{Sr}_5(\text{PO}_4)_3\text{Cl}:\text{Eu}$  samples after irradiation with UV (a) and X-rays (b) for 60 s.



**Fig. S9.** The persistent luminescence decay curves of the  $\text{Sr}_5(\text{PO}_4)_3\text{Cl}:\text{Eu}$  samples after 2 min irradiation with X-rays. Double-logarithmic plot.

**Table S1.** The calculated QY values for Sr<sub>5</sub>(PO<sub>4</sub>)<sub>3</sub>Cl:Eu samples.

<b>Sample</b>	<b>QY</b>
0.1% Eu	42%
0.25% Eu	36%
0.5% Eu	32%
1% Eu	13%
2% Eu	6%