Supporting Information

Preparation of a novel violet-excitable $Na_3YSi_2O_7:Eu^{2+}$ green phosphor via salt-flux assistance and its luminescence properties

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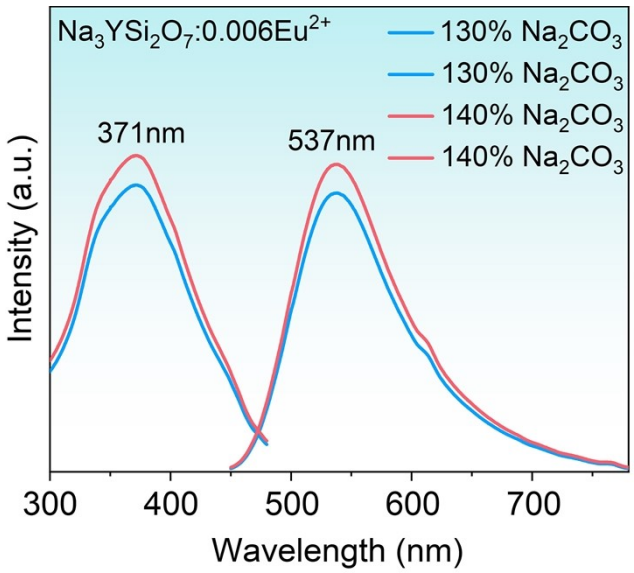

Fig. S1 Spectral comparison of the $Na_3YSi_2O_7$:0.006Eu^{2+} sample at the formulation of 130% and 140% Na_2CO_3.

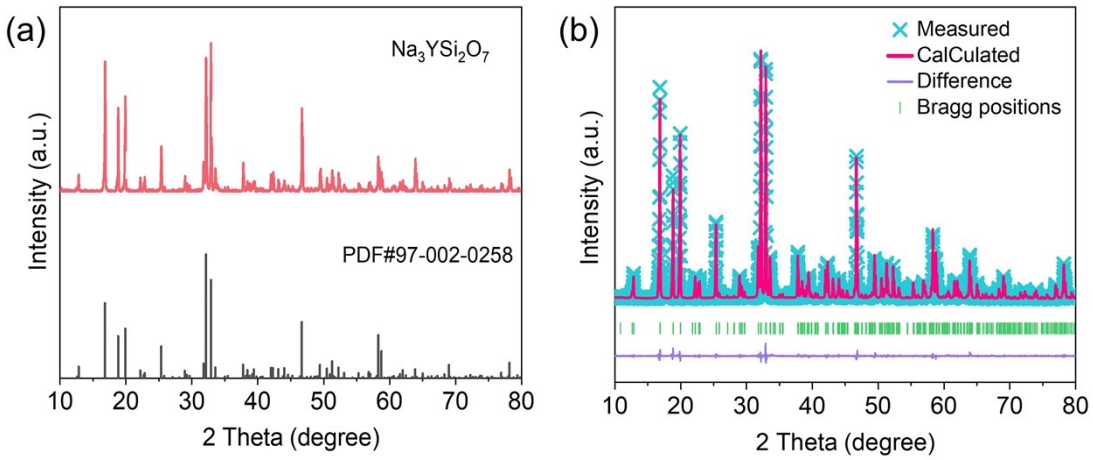

Fig. S2 XRD and Rietveld refinement patterns of the $Na_3YSi_2O_7$ matrix.

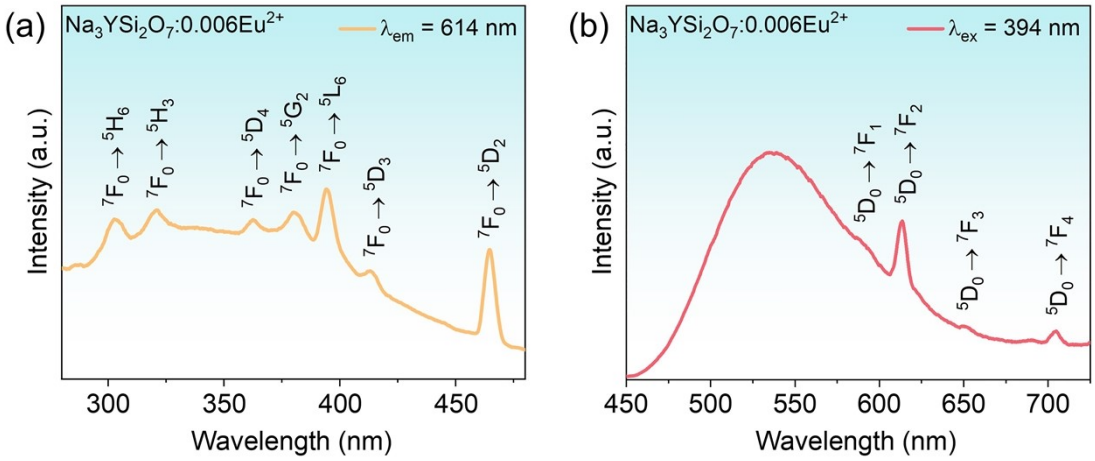

Fig. S3 (a) Excitation spectrum of the emission at 614 nm. (b) Emission spectrum of the excitation at 394 nm.

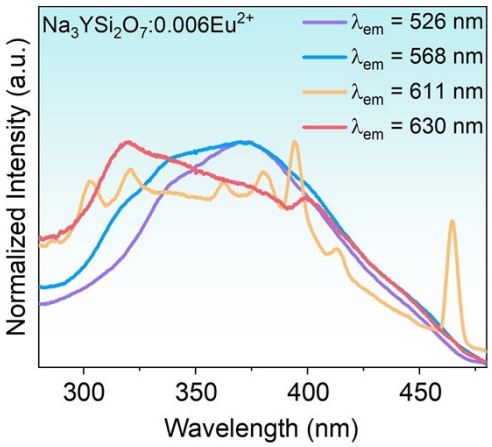

Fig. S4 Excitation spectra detected at 526, 568, 611 and 630 nm, respectively.

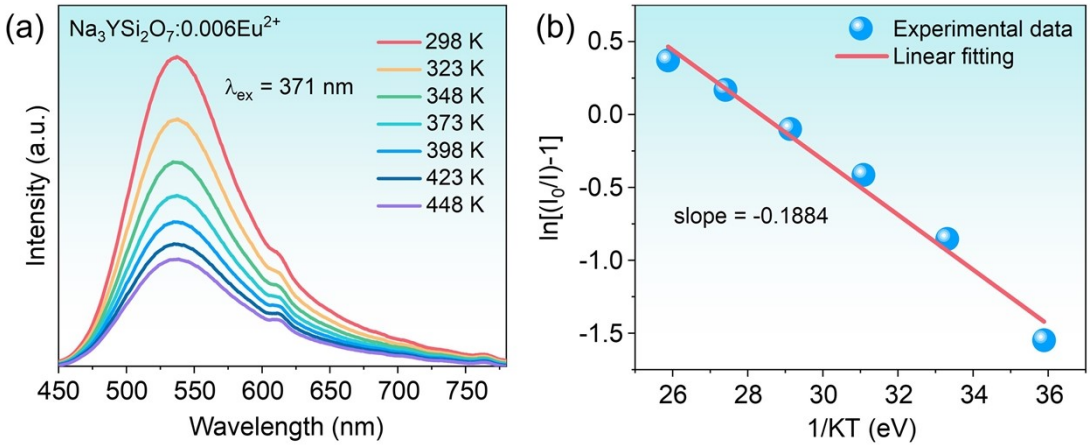

Fig. S5 (a) Temperature-dependent PL spectra of $Na_3YSi_2O_7$:0.006Eu^{2+} phosphor, (λ_{ex} = 371 nm). (b) Relationship of $ln((I_0/I)-1)$ versus $1/kT$.

Photoluminescence Quantum Yield

Photoluminescence Quantum Yield is an important parameter to evaluate the luminescence property of phosphors. The PLQY of the sample was measured using the fluorescence spectrophotometer (Hitachi F-7000), which additionally includes an integrating sphere (F-3018). According to the method described by L.A. Moreno.[S1] Briefly, the method allows determining the sample PLQY by measuring the ratio between the numbers of photons emitted (N_{em}) and the number of those absorbed (N_{abs}) by the sample using the relation:

$$PLQY = \frac{N_{em}}{N_{abs}} = \varphi_d - (1 - A_d)\varphi_i$$

Where φ_d is the measured internal quantum yield which refers to the ratio of the amount of fluorescence to that of the excitation beam absorbed by the sample, A_d is the measured absorbance which means the ratio of the amount of excitation beam absorbed by the sample, and φ_i is the quantum yield attributed to re-excitation. Based on this theory, the measured PLQY of $Na_3YSi_2O_7:Eu^{2+}$ phosphor is 18.5%.

References

S1 L. A. Moreno, J. Vis. Exp., 2012, **63**, 3066.