

Electronic Supplementary Information

**White-emitting Orthosilicate Phosphor α -Sr₂SiO₄:Ce³⁺/Eu²⁺/K⁺: a Bimodal
Temperature Sensor with Excellent Optical Thermometric Sensitivity**

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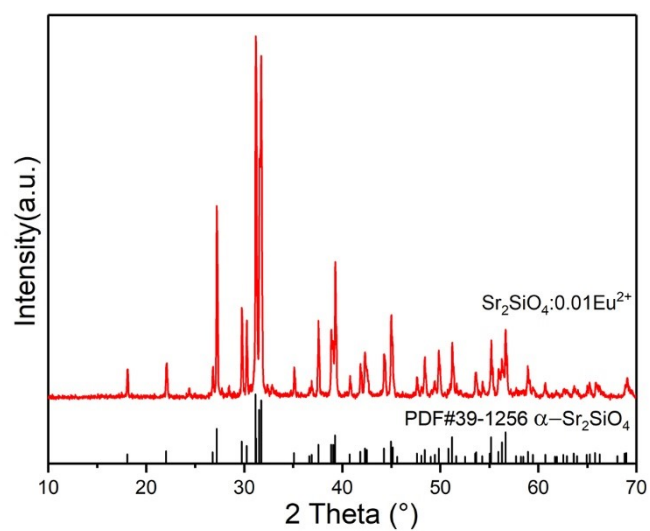


Figure S1. XRD patterns of $\text{Sr}_2\text{SiO}_4:0.01\text{Eu}^{2+}$ after calcination at 1250°C

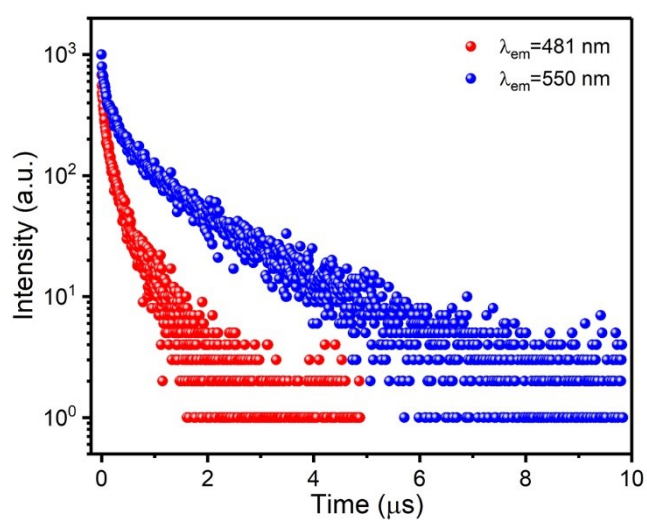


Figure S2. $\text{Sr}_2\text{SiO}_4:0.01\text{Eu}^{2+}$ fluorescence decay curves under excitation at 365 nm and monitoring at 481 nm and 550 nm

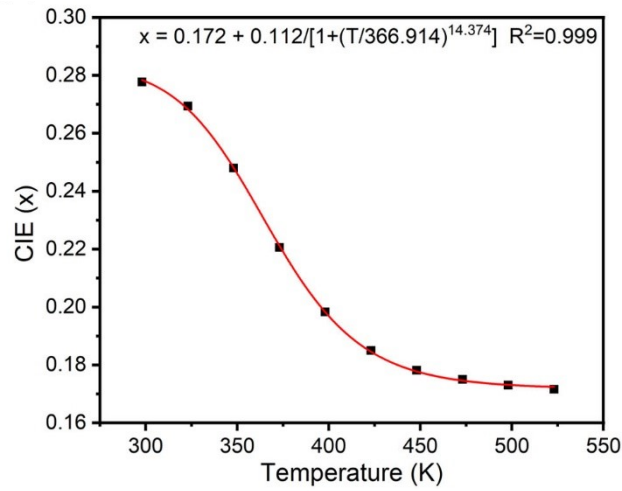


Figure S3. The change of chromaticity coordinate x as the function of temperature T in Kelvin.

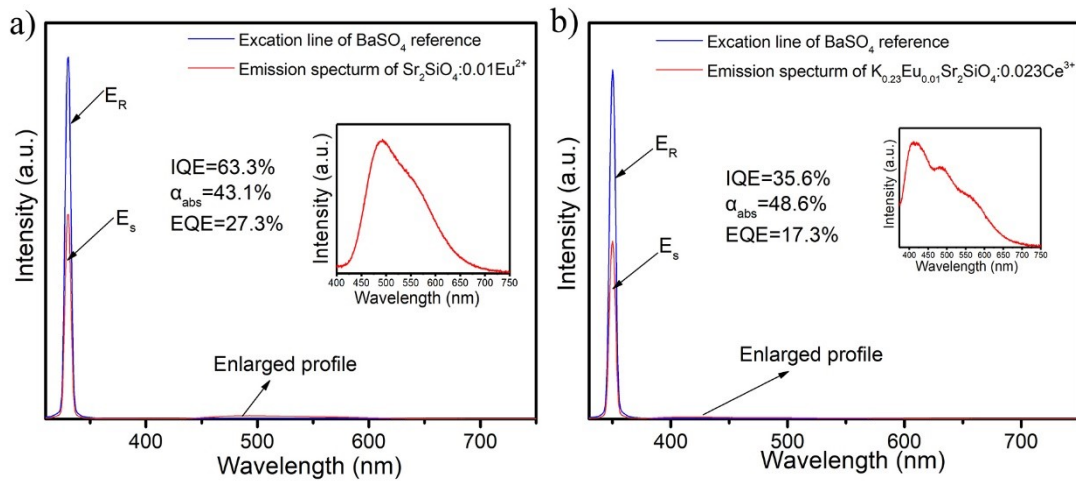


Figure S4. a) The quantum efficiency measurement of Sr₂SiO₄:0.01Eu²⁺ under the excitation of 320 nm; b) The quantum efficiency measurement of Sr₂SiO₄:0.01Eu²⁺/0.023Ce³⁺/0.023K⁺ under the excitation of 350 nm.

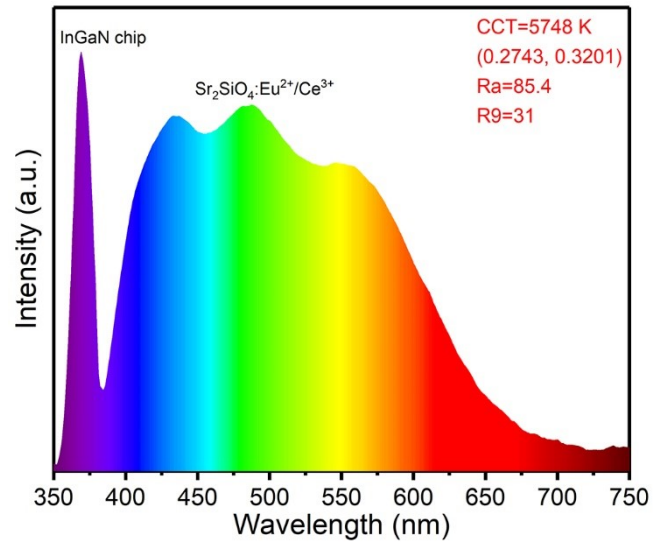


Figure S5. The electroluminescence spectrum and optoelectronic properties of the white LED device assembled with the phosphor $\text{Sr}_2\text{SiO}_4:y\text{Ce}^{3+}/y\text{K}^+/0.01\text{Eu}^{2+}$ ($y=0.023$).

Table S1. The fitted lifetime of Sr₂SiO₄:0.01Eu²⁺

	481 nm	550 nm
λ_{em}	481 nm	550 nm
y_0	3.25	5.13
A1	604.71	566.05
τ_1 (μ s)	0.0128	0.081
A2	334.39	303.39
τ_2 (μ s)	0.206	0.964
τ_{av} (μ s)	0.186	0.844

Table S2. The shift of CIE coordinate of Sr₂SiO₄:0.01Eu²⁺/0.023Ce³⁺/0.023K⁺ at the temperature range of 298-523K

Temperature (K)	x	y
298	0.2777	0.3306
323	0.2694	0.3214
348	0.248	0.2994
373	0.2206	0.2691
398	0.1983	0.2434
423	0.185	0.2244
448	0.1782	0.2096
473	0.175	0.1952
498	0.173	0.1777
523	0.1716	0.1611

Table S3. Calculated values of ΔE_c at different temperature ranges

Temperature range (K)	ΔE_c (10^{-3})
298-323	11
298-348	41
298-373	83
298-398	122
298-423	150
298-448	169
298-473	186
298-498	207
298-523	228