

Supporting Information

Table S1. Parameters of $\text{Ca}_{(1-x)}\text{Sr}_x\text{O}:\text{Eu}^{2+}$ ($x = 0-0.2$).

$x(\text{Sr}^{2+})$	U_{iso}	Cell parameters (\AA^3)	Cell Volume	R_{wp} (%), R_{p} (%), χ^2
0	0.0082	a/b/c=4.792	110.023	10.62, 7.82, 1.65
0.05	0.0092	a/b/c=4.808	111.17	9.52, 7.28, 1.42
0.1	0.0103	a/b/c=4.847	113.839	9.17, 7.24, 1.35
0.15	0.0134	a/b/c=4.857	114.61	7.22, 5.58, 1.19
0.2	0.0146	a/b/c=4.871	115.51	8.36, 6.32, 1.19

Table S2. Main parameters of Eu^{2+} activated NIR phosphors.

Compounds	λ_{ex} (nm)	λ_{em} (nm)	FWHM (nm)	IQE (%)	$I_{425\text{K}}$ (%)	Ref
$\text{Ba}_3\text{Lu}(\text{BO}_3)_3$	450	720	197	/	22.5%	[8]
$\text{K}_3\text{LuSi}_2\text{O}_7$	460	740	160	15%	59%	[21]
$\text{Ba}_{1.7}\text{Sr}_{0.3}\text{Ga}_4\text{O}_8$	450	775	230	20%	61%	[22]
$\text{SrBaSc}_{0.5}\text{Ga}_{1.5}\text{O}_5$	440	728	234	/	/	[24]
$\text{Sr}_{0.5}\text{Ba}_{0.5}\text{Y}_2\text{O}_4$	450	773	210	37%	90%	[25]
$\text{K}_3\text{ScSi}_2\text{O}_7$	465	735	170	/	70.4%	[26]
$\text{Ca}_3\text{Sc}_2\text{Si}_3\text{O}_{12}$	520	840	170	/	/	[28]
$\text{Ca}_{0.8}\text{Sr}_{0.2}\text{O}$	467	783	156	36.3	20.2%	This work

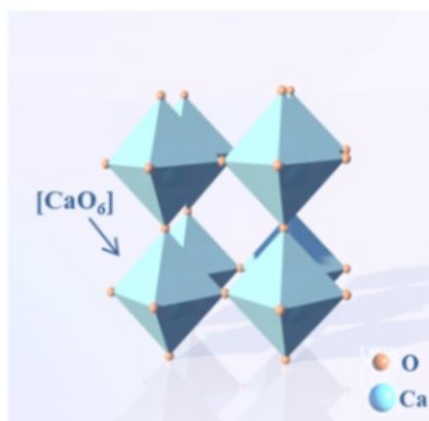


Figure S1. Crystal structure of CaO.

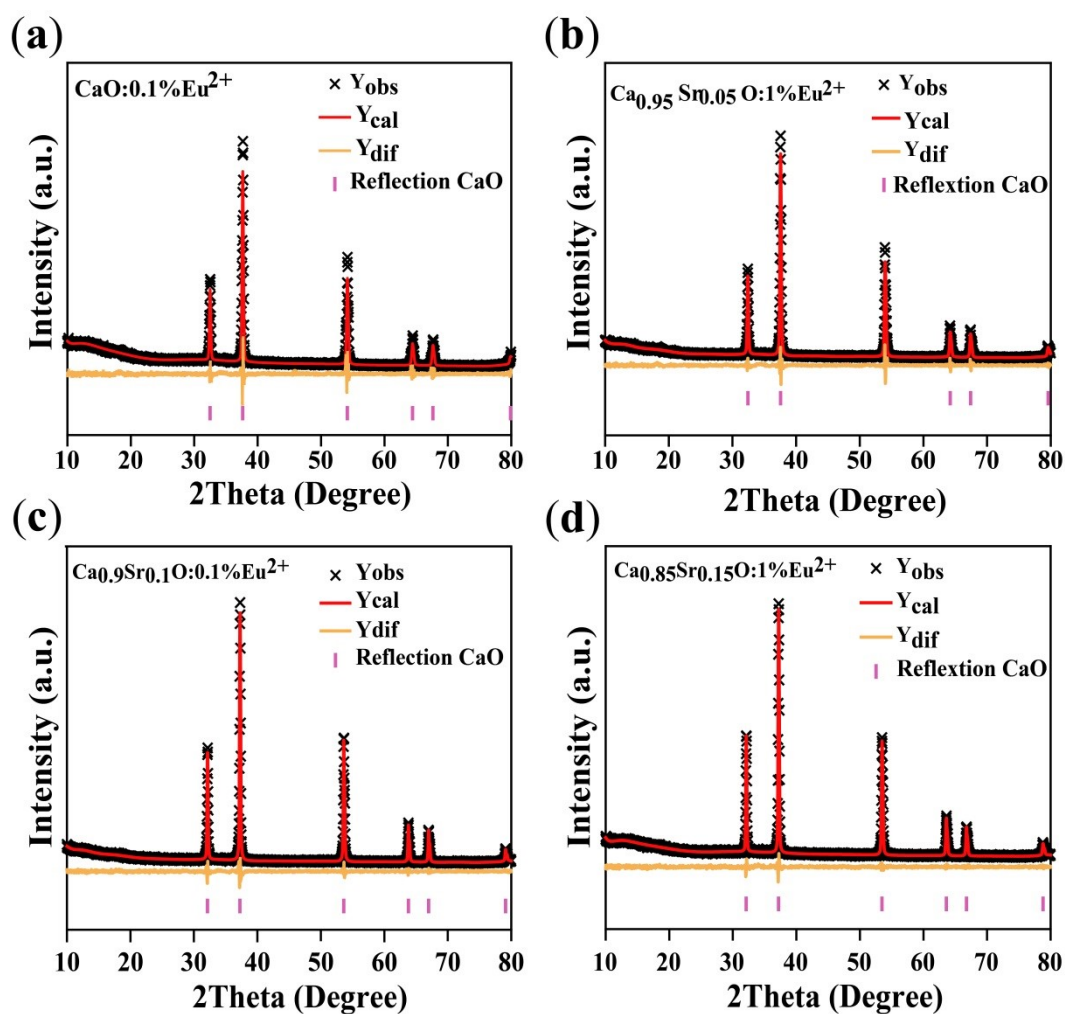


Figure S2. Difference Rietveld plot of $\text{Ca}_{(1-x)}\text{Sr}_x\text{O:0.1\%Eu}^{2+}$: (a) $x = 0$; (b) $x = 0.05$; (c) $x = 0.1$; (d) $x = 0.15$

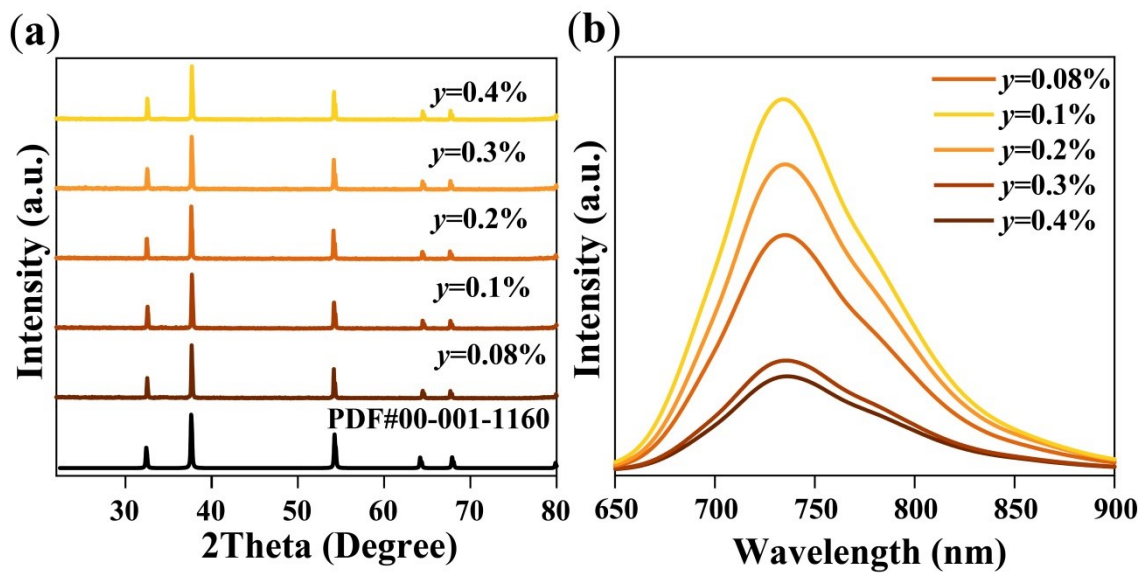


Figure S3.(a) XRD cards of $\text{CaO}:\text{yEu}^{2+}$ ($y = 0.08\%-0.4\%$). (b) PL spectra of $\text{CaO}:\text{yEu}^{2+}$

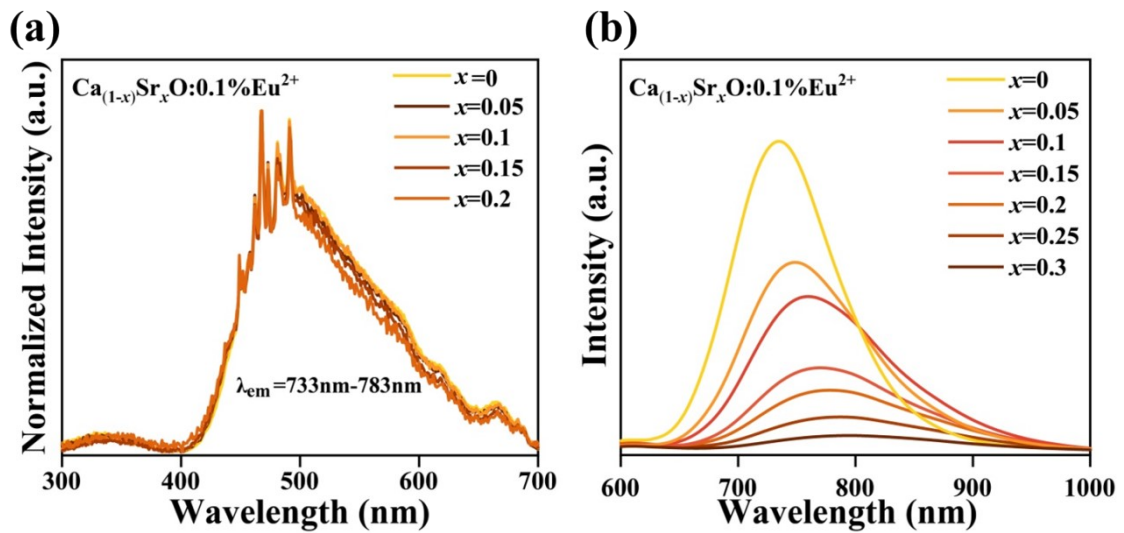


Figure S4. (a) Normalized PLE spectra of $\text{Ca}_{(1-x)}\text{Sr}_x\text{O}:\text{0.1\%Eu}^{2+}$. (b) PL spectra of $\text{Ca}_{(1-x)}\text{Sr}_x\text{O}:\text{0.1\%Eu}^{2+}$.

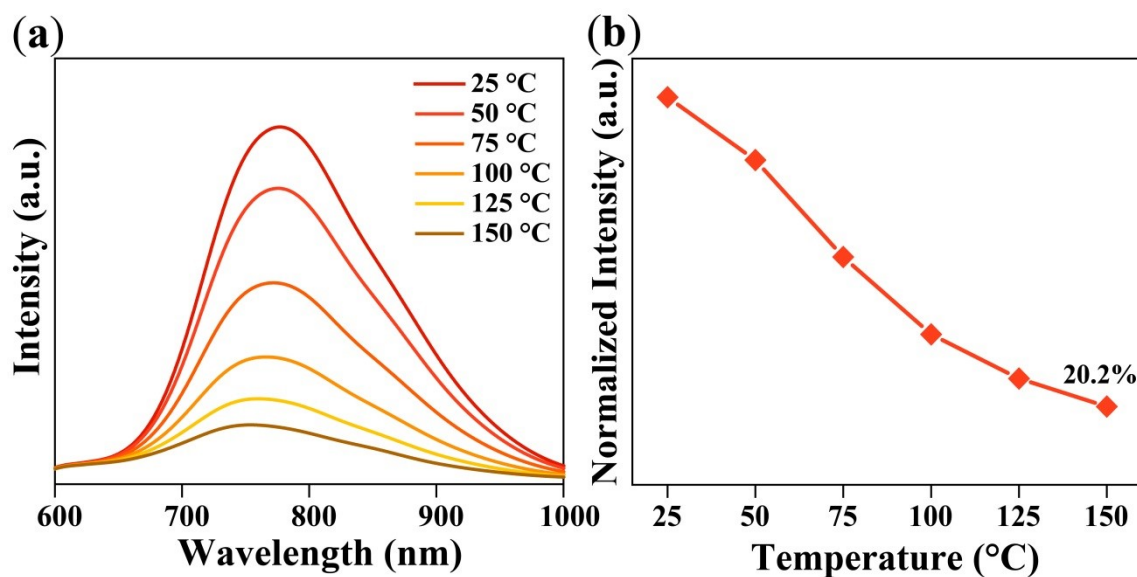


Figure S5. (a) Temperature-dependent PL spectra of $\text{Ca}_{0.8}\text{Sr}_{0.2}\text{O}:\text{0.1\%Eu}^{2+}$. (b) Temperature dependent normalized integrated PL intensities excited at 467nm.

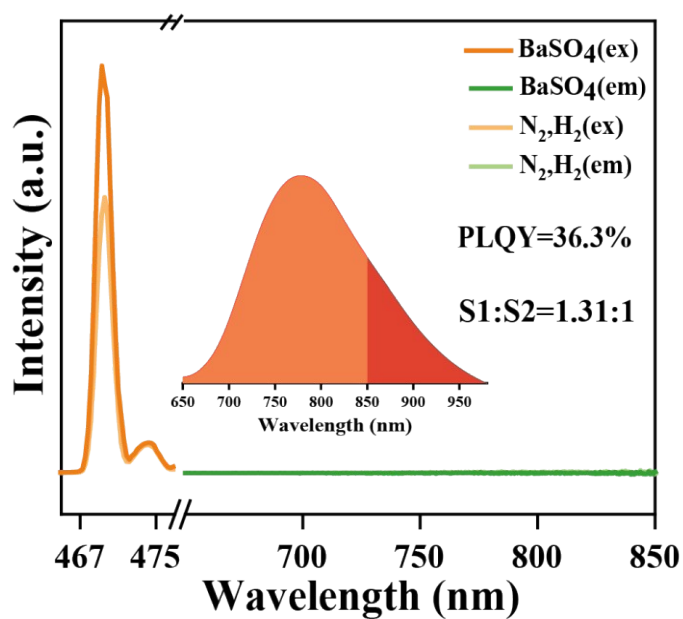


Figure S6. Integrated intensity of $\text{Ca}_{0.8}\text{Sr}_{0.2}\text{O}:\text{Eu}^{2+}$ for IQY measurements (Insert: The total integral area is S1 and the integrated area before 850nm is S2).

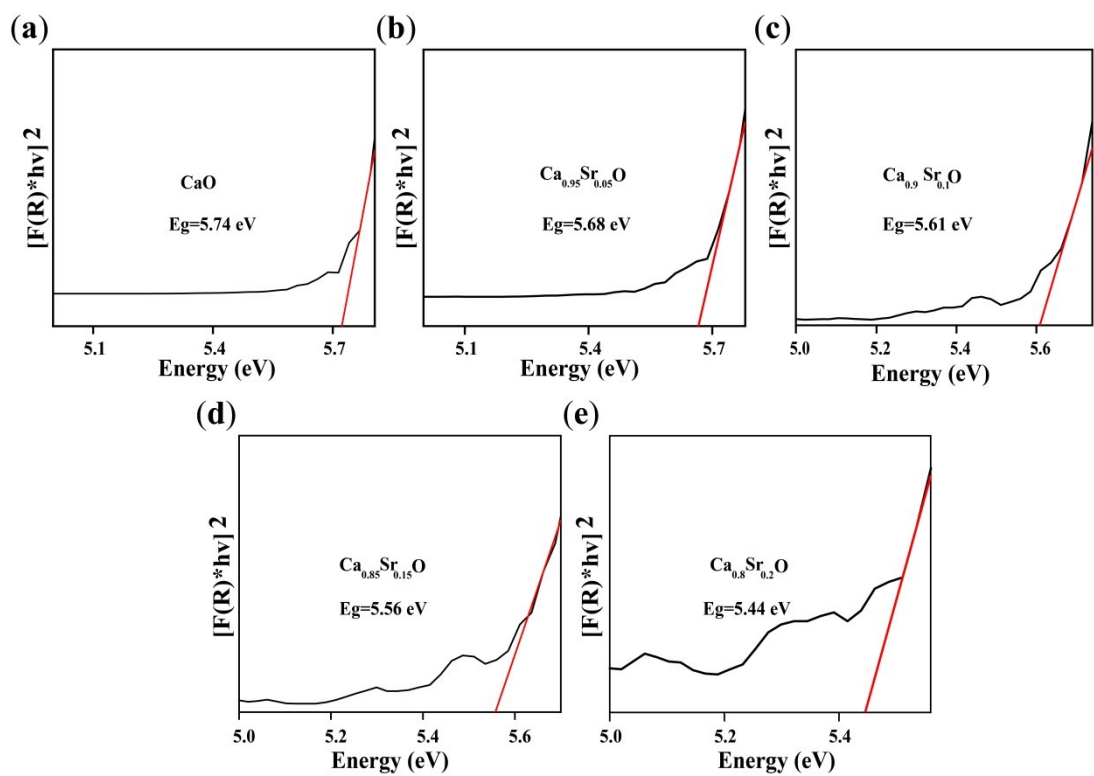


Figure S7. Band gap calculation for $\text{Ca}_{(1-x)}\text{Sr}_x\text{O}$ ($x = 0-0.2$). (a) $x = 0$; (b) $x = 0.05$; (c) $x = 0.1$; (d) $x = 0.15$. (e) $x = 0.2$.