

Supporting Information

An Energy Self-Compensation Phosphosilicate Material Applied to Temperature Sensors

Jiang Chen,^{*ab1} Tiejun Li,^{a1} Zhijing Zhang,^{a1} Zhipeng Ci,^{abc*} Lili Han,^{abc*} Haiyan Jiao,^a Yuhua Wang^{abc}

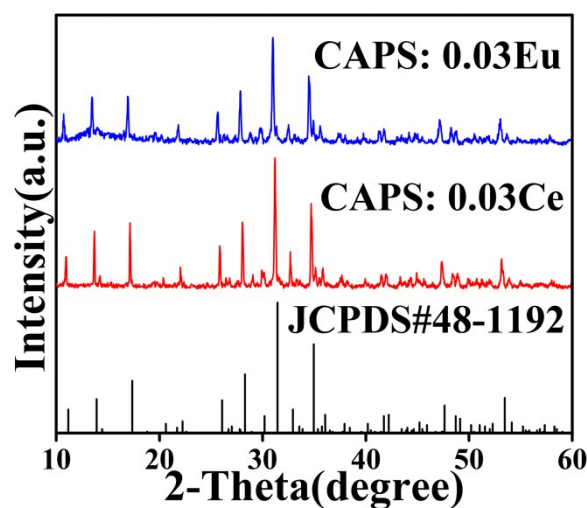


Figure S1. The XRD patterns of CAP and CAPS: 0.03Ce/Eu samples.

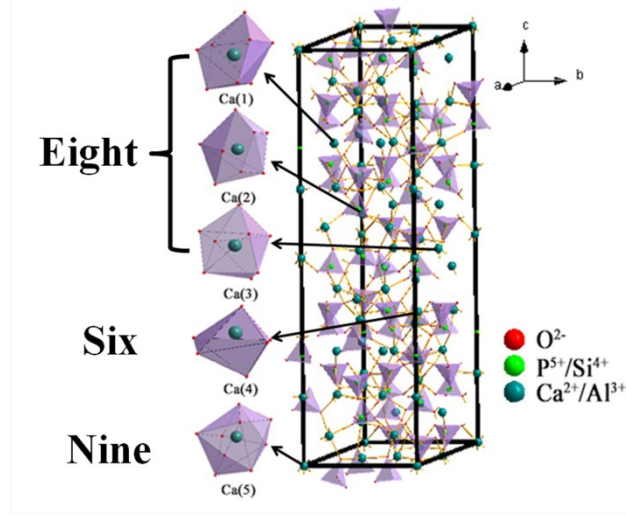


Figure S2. The structure diagram of CAPS.

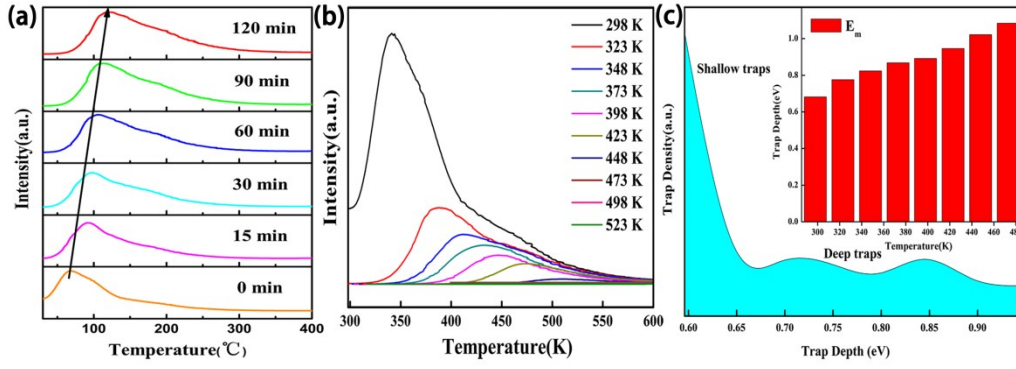


Figure S3. (a) TL curves of CAPS: 0.03Eu at the different delay times after irradiation by a UV lamp for 5min. (b) Excitation temperature dependent TL curves of CAPS: 0.03Eu by pre-exciting for 5 min and pre-heating for 10 min at different T_{exc} . (c) Trap density and depth distribution in CAPS: 0.03Eu.

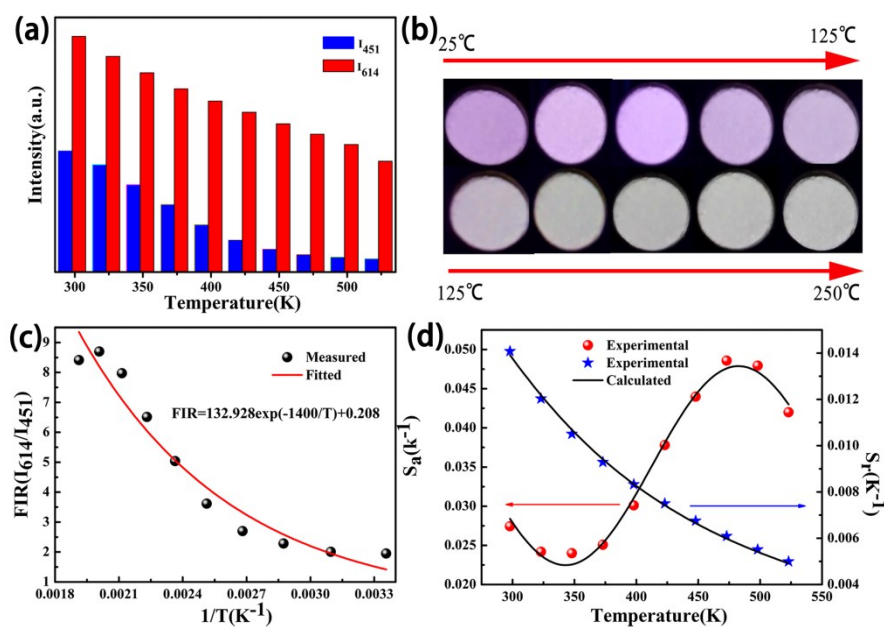


Figure S4. (a) Histogram displaying the luminescence intensity of Eu^{3+} (≈ 614 nm) and Eu^{2+} (≈ 451 nm) at various temperatures. (b) The photos of the sample at various temperatures under UV irradiation. (c) Experimental measured and Equation (8) fitted plots of FIR (I_{614}/I_{451}) versus temperature. (d) Absolute sensitivity S_a and relative sensitivity S_r versus temperature.

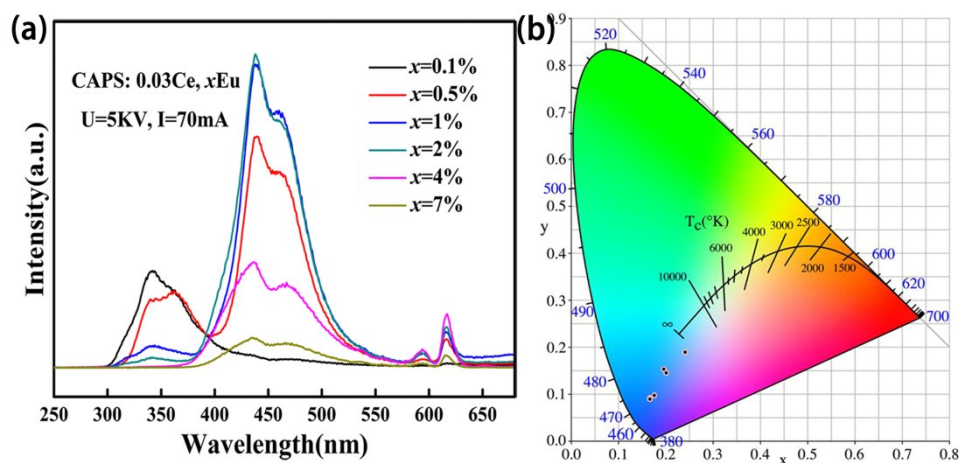


Figure S5. (a) The CL properties of CAPS: 0.03Ce, xEu and (b) The CIE chromaticity coordinates of the samples CAPS: 0.03Ce, xEu ($0.001 \leq x \leq 0.07$).

T(K)	1/T(K ⁻¹)	FIR	experimental value of S _a	experimental value of S _r	calculated value of S _a	calculated value of S _r
298	0.003356	0.21	0.00048	0.0023	0.00048	0.0024
323	0.003096	0.22	0.00061	0.0028	0.00060	0.0028
348	0.002874	0.23	0.00070	0.0031	0.00070	0.0030
373	0.002681	0.25	0.00081	0.0032	0.00081	0.0032
398	0.002513	0.27	0.00089	0.0032	0.00090	0.0032
423	0.002364	0.29	0.00098	0.0033	0.00097	0.0033
448	0.002232	0.32	0.00103	0.0032	0.00104	0.0033
473	0.002114	0.35	0.00112	0.0032	0.00113	0.0032
498	0.002008	0.38	0.00118	0.0032	0.00119	0.0031
523	0.001912	0.41	0.00120	0.0030	0.00120	0.0030

Table S1. The details of the calculation of FIR, S_a and S_r for CAPS: 0.03Ce, 0.005Eu.

T(K)	1/T(K ⁻¹)	FIR	experimental value of S _a	experimental value of S _r	calculated value of S _a	calculated value of S _r
298	0.003356	1.95	0.027	0.014	0.028	0.014
323	0.003096	2.01	0.025	0.012	0.024	0.012
348	0.002874	2.28	0.025	0.010	0.023	0.010
373	0.002681	2.70	0.025	0.009	0.025	0.009
398	0.002513	3.61	0.030	0.008	0.031	0.008
423	0.002364	5.04	0.038	0.008	0.038	0.008
448	0.002232	6.51	0.044	0.007	0.044	0.007
473	0.002114	7.97	0.048	0.006	0.047	0.006
498	0.002008	8.70	0.047	0.006	0.046	0.005
523	0.001912	8.41	0.042	0.005	0.043	0.005

Table S2. The details of the calculation of FIR, S_a and S_r for CAPS: 0.03Eu.

Sample composition (x)	CIE coordinates (x, y)
x=0.001	(0.282, 0.212)
x =0.005	(0.284, 0.201)
x =0.01	(0.243, 0.151)
x =0.02	(0.265, 0.167)
x =0.04	(0.209, 0.176)
x =0.07	(0.187, 0.201)

Table S3. Comparison of the CIE Chromaticity Coordinates (x, y) for CAPS: 0.03Ce, xEu excited at 265 nm.