Supporting Information

S Ⅰ Supporting figures

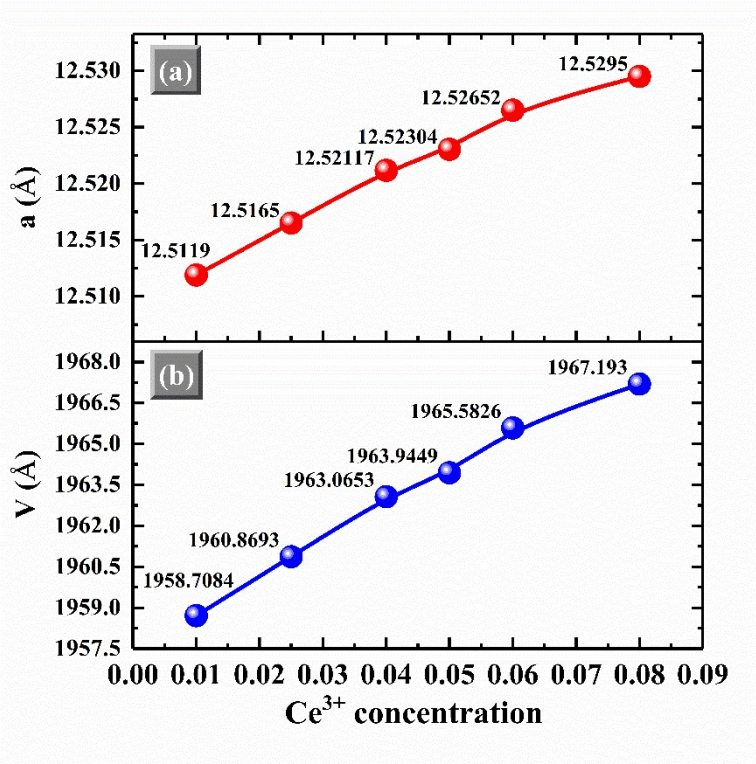

Figure S1 Dependence of (a) the unit lattice parameters and (b) unit cell volumes on the Ce^{3+} concentration in CSGO: $x$$Ce^{3+}$ phosphors.

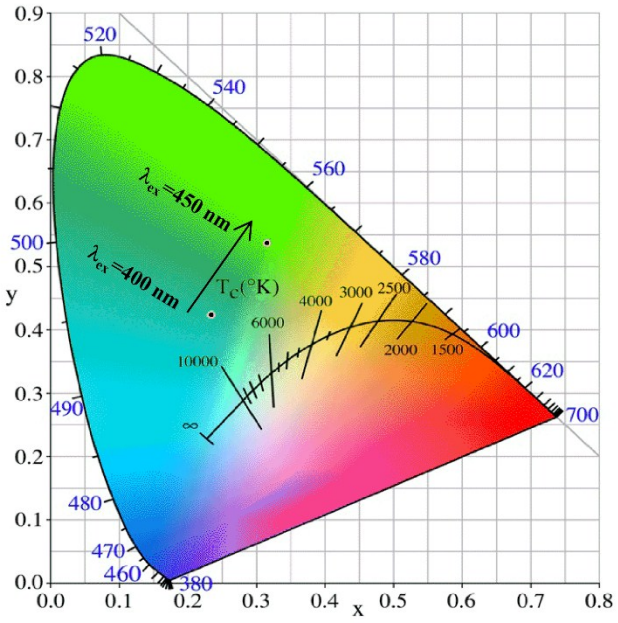

Figure S2 CIE coordinates of CSGO: $0.08Ce^{3+}$ sample excited upon 400 and 450 nm, respectively.

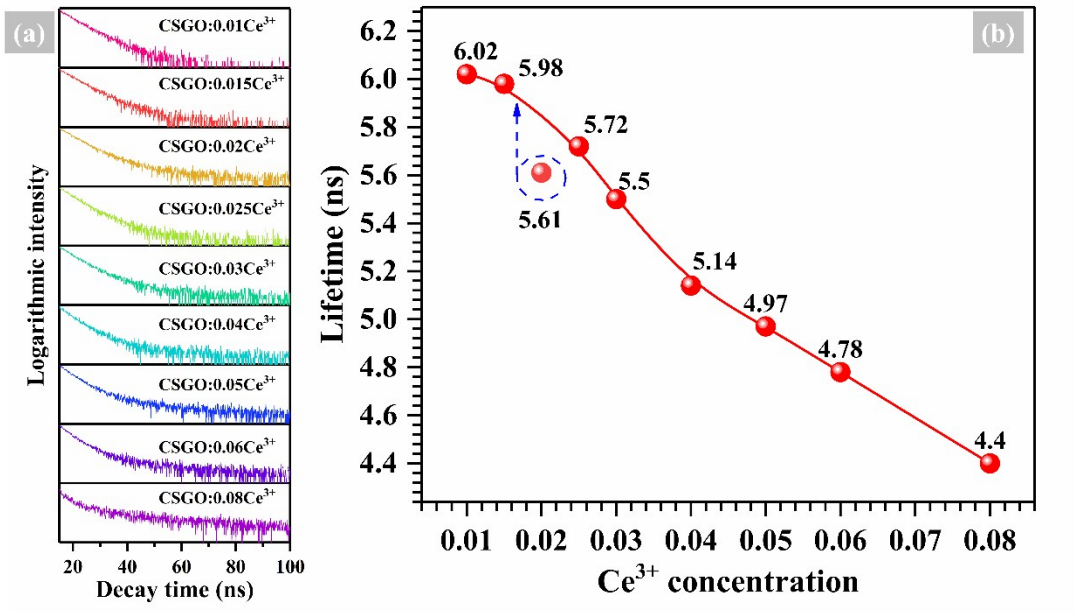

Figure S3 (a) Decay curves of CSGO: xCe^{3+} phosphors measured by monitoring 510 nm upon 425 nm excitation. (b) Dependence curve of lifetimes on Ce^{3+} concentration in CSGO: xCe^{3+} phosphors.

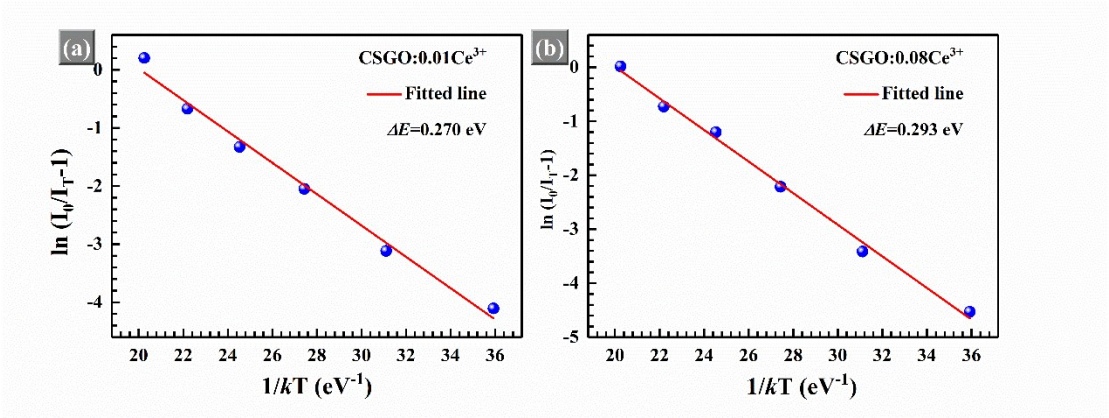

Figure S4 (a) Fitting plot of ln(I_0/I_T-1) against 1/Kt for (a) CSGO: 0.01Ce^{3+} and (b) CSGO: 0.08Ce^{3+} phosphors.

S Ⅱ Calculation of energy gap

The energy gap of CSGO host was calculated according to Kubelka−Munk equation:

$$[F(R_\infty)hv]^n = C(hv - E_g), \tag{S1}$$

where E_g is the value of the band gap; hv is the photon energy; C is a proportionality constant; and n = 1/2 indicates an indirect allowed transition, n = 2 indicates a direct allowed transition, n = 3/2 indicates a direct forbidden transition, or n = 3 indicates an indirect forbidden transition. The $F(R_\infty)$ can be described by the Kubelka–Munk

function: [1]

$$F(R_\infty) = (\frac{1 - R}{R}), \tag{S2}$$

where R is the reflectance parameter.

SⅢ Calculation of external and internal quantum efficiency

The IQE is calculated by the following equation: [2]

$$\eta_{IQE} = \frac{\varepsilon}{\alpha} = \frac{\int L_S}{\int E_R - \int E_S}, \tag{S3}$$

where ε is the number of photons emitted by the sample; α is the number of photons absorbed by the sample; L_S is the luminescence emission spectrum of the sample; E_S is the spectrum of the light without the sample in the sphere. All the spectra were collected using the sphere.

The EQE is calculated according to the following equation:

$$\eta_{EQE} = \eta_{IQE} \times \eta_{Abs}, \tag{S4}$$

η_{Abs} is the absorption rate of phosphor towards incident light.

1. B. Wang, Z. Wang, Y. Liu, T. Yang, Z. Huang, M. Fang, Journal of Alloys and Compounds, 2019, 776, 554-559.
2. L. Zhou, P. A. Tanner, L. Ning, W. Zhou, H. Liang and L. Zheng, The Journal of Physical Chemistry A, 2016, 120, 5539-5548.