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Lithium ions doping triggered splendid quantum efficiency and thermal stability in Li_2SrSiO_4:$x$$Eu^{2+}$ phosphors for optical thermometer and high luminous efficiency white-LED

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Table S1. Lattice parameters of the Li_2SrSiO_4:0.05Eu^{2+}/0.02Li^+ phosphors obtained from the Rietveld XRD refinement.

Compounds	Li_2SrSiO_4:0.05Eu^{2+}/0.02Li^+
$a = b$ (Å)	5.029233
c (Å)	12.470967
V (Å^3)	273.17
$\alpha = \beta$	90°
γ	120°
Phase structure	Hexagonal phase
Z	3
R_{wp}	0.337
R_p	0.176

Table S2. CIE coordinates of the Li_2SrSiO_4:0.05Eu^{2+} and Li_2SrSiO_4:0.05Eu^{2+}/0.01Li^+ phosphors at diverse excitation wavelengths.

Compounds	λ_{ex} (nm)	*x*	*y*	CCT
Li_2SrSiO_4:0.05Eu^{2+}	419	0.511	0.484	2599 K
Li_2SrSiO_4:0.05Eu^{2+}/0.01Li^+	419	0.515	0.481	2541 K
Li_2SrSiO_4:0.05Eu^{2+}	449	0.512	0.484	2589 K
Li_2SrSiO_4:0.05Eu^{2+}/0.01Li^+	449	0.515	0.483	2553 K

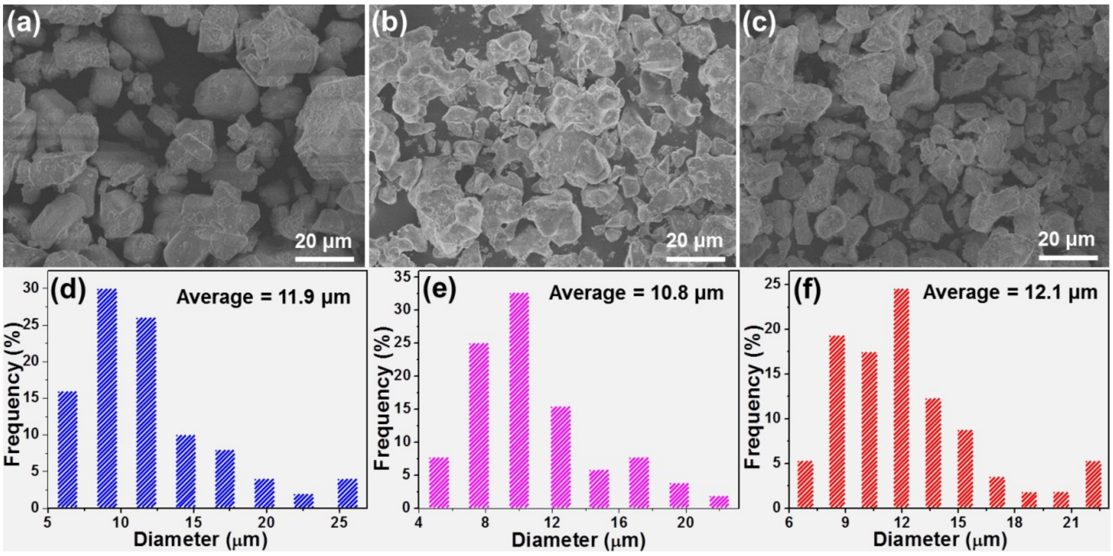

Figure S1. FE-SEM images of the (a) Li_2SrSiO_4:0.01Eu^{2+}, (b) Li_2SrSiO_4:0.05Eu^{2+} and (c) Li_2SrSiO_4:0.05Eu^{2+}/0.02Li^+ phosphors. Particle size distribution of (d) Li_2SrSiO_4:0.01Eu^{2+}, (e) Li_2SrSiO_4:0.05Eu^{2+} and (f) Li_2SrSiO_4:0.05Eu^{2+}/0.02Li^+ phosphors

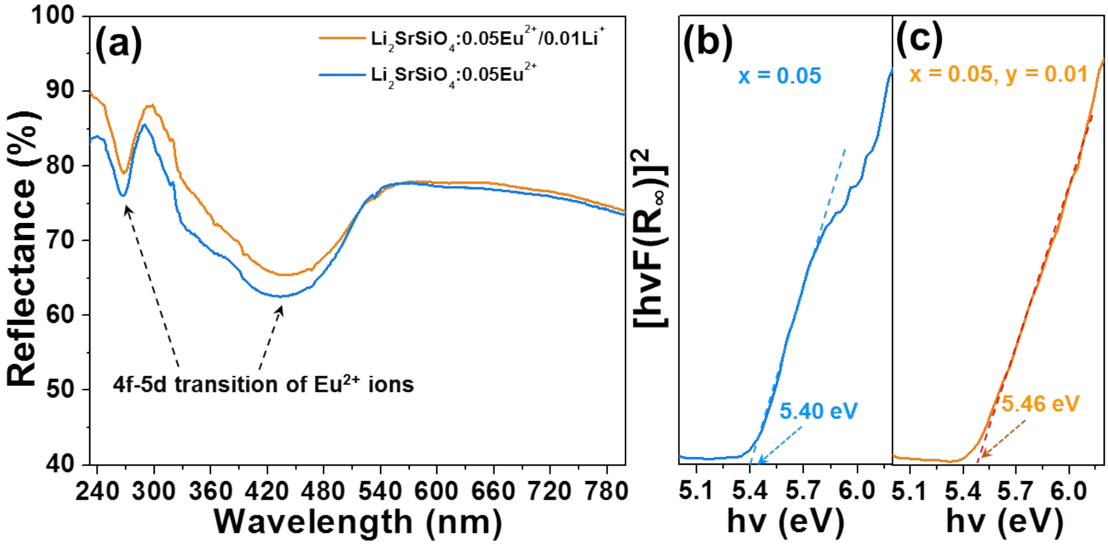

Figure S2. (a) Diffuse reflectance spectrum of the Li_2SrSiO_4:0.05Eu^{2+} phosphors and Li_2SrSiO_4:0.05Eu^{2+}/0.02Li^+ phosphors. Calculation of the optical band gap of the (b) Li_2SrSiO_4:0.05Eu^{2+} and (c) Li_2SrSiO_4:0.05Eu^{2+}/0.02Li^+ phosphor by using the Kubelka-Munk expressions.

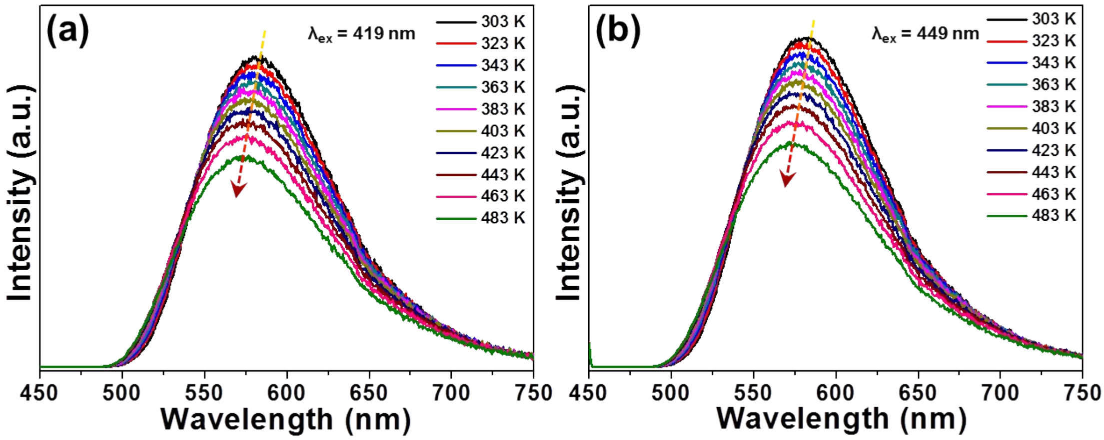

Figure S3. Emission spectra of the Li_2SrSiO_4:0.05Eu^{2+}/0.02Li^+ phosphors as a function of temperature excited at (a) 419 nm and (b) 449 nm.

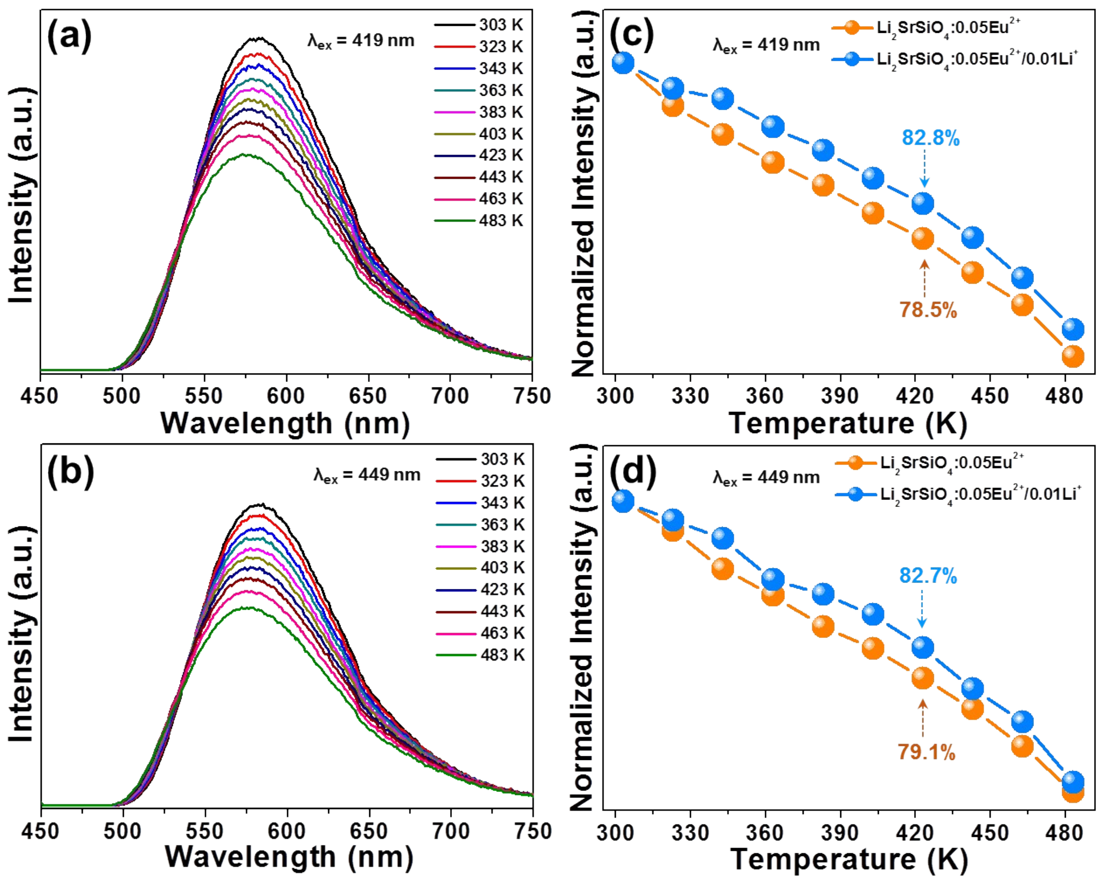

Figure S4. Emission spectra of the Li_2SrSiO_4:0.05Eu^{2+} phosphors as a function of temperature excited at (a) 419 nm and (b) 449 nm. Temperature-dependent normalized emission intensities of the Li_2SrSiO_4:0.05Eu^{2+} and Li_2SrSiO_4:0.05Eu^{2+}/0.02Li^+ phosphors excited at (c) 419 nm and (d) 449 nm.

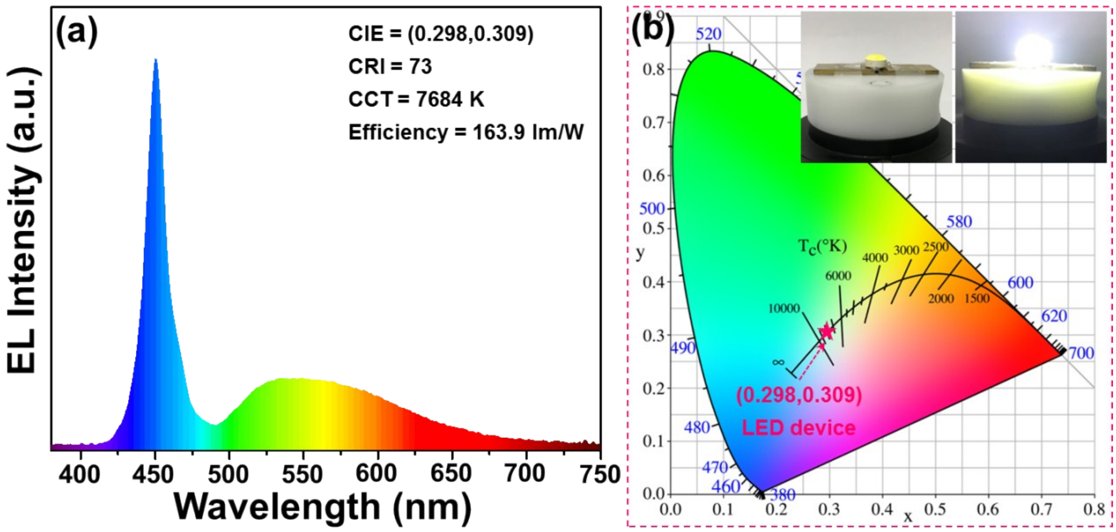

Figure S5. (a) EL emission spectrum of the packaged blue chip-based white-LED device by utilizing the commercial YAG:Ce^{3+} yellow phosphors. (b) CIE coordinate diagram of the packaged blue chip-based white-LED device. Inset shows the images of the packaged white-LED device without and with injection current of 50 mA.