Supplementary materials for

Novel Sm^{3+} doped $La_3Ga_5MO_{14}$ (M = Si, Ge) phosphors for indoor illumination: effects of M cations on photoluminescence

Xiaohua Li[a], Jina Ding[b,*], Zhuo Tang[a], Xinyi Lin[a], Huan Dong[a], Anhua Wu[c], Linwen Jiang[a,*]

[a]School of Materials Science and Chemical Engineering, State Key Laboratory Base of Novel Functional Materials and Preparation Science, Ningbo University, Ningbo 315211, P. R. China

[b]State Key Laboratory for Managing Biotic and Chemical Threats to the Quality and Safety of Agro-products, Institute of Plant Virology, Ningbo University, Ningbo 315211, P. R. China

[c]Shanghai Institute of Ceramics, Chinese Academy of Sciences, Shanghai 201800, P. R. China

Tab. S1. The lattice parameters of $La_3Ga_5SiO_{14}$: $x Sm^{3+}$.

$(La_{1-X}Sm_X)_3Ga_5SiO_{14}$	a = b (Å)	c (Å)	V(Å^3)	α, β, γ	Density
0	8.14892	5.08145	292.23	α = β = 90°,γ = 120°	5.7808
0.01	8.13774	5.09491	292.2	α = β = 90°,γ = 120°	5.7814
0.02	8.13964	5.09221	292.18	α = β = 90°, γ = 120°	5.7818
0.03	8.14774	5.0777	291.93	α = β = 90°, γ = 120°	5.7867
0.04	8.14645	5.07878	291.9	α = β = 90°, γ = 120°	5.7873
0.05	8.13834	5.07107	290.87	α = β = 90°, γ = 120°	5.8077
0.06	8.13453	5.06643	290.87	α = β = 90°, γ = 120°	5.8185
0.07	8.1183	5.06241	288.95	α = β = 90°, γ = 120°	5.8464

Tab. S2. The lattice parameters of $La_3Ga_5GeO_{14}$: $x Sm^{3+}$.

$(La_{1-X}Sm_X)_3Ga_5GeO_{14}$	a = b (Å)	c (Å)	V (Å^3)	α, β, γ	Density
0	8.23262	5.09216	298.89	α = β = 90°, γ = 120°	5.8992
0.01	8.22489	5.09295	298.37	α = β = 90°, γ = 120°	5.9094
0.02	8.23159	5.07937	298.06	α = β = 90°, γ = 120°	5.9155
0.03	8.21166	5.09982	297.82	α = β = 90°, γ = 120°	5.9204
0.04	8.21567	5.09447	297.79	α = β = 90°, γ = 120°	5.9209
0.05	8.20588	5.10023	297.42	α = β = 90°, γ = 120°	5.9283
0.06	8.20426	5.09979	297.28	α = β = 90°, γ = 120°	5.9311
0.07	8.1962	5.09735	296.55	α = β = 90°, γ = 120°	5.9457

*Corresponding author.
E-mail addresses: dingjina@nbu.edu.cn (Jina Ding), jianglinwen@nbu.edu.cn (Linwen Jiang).

Tab. S3. Comparisons of the quantum yield between this work and other Sm^{3+}-doped phosphors under different excitation and emission.

Activator	Compound	λ_{ex}(nm)	λ_{em}(nm)	QY	Ref.
$0.09Sm^{3+}$	$Ca_2NaMg_2V_3O_{12}$	365	497	18.9%	[1]
$0.04Sm^{3+}$	$Sr_{2-2x}Na_xP_2O_7$	402	599	19.8%	[2]
$0.5Sm^{3+}$	CaAlSi	403	591	25.66%	[3]
$0.03Sm^{3+}$	BiOCl	408	598	2.12%	[4]
$0.03Sm^{3+}$	LGSi	403	599	27.14%	This work
$0.02Sm^{3+}$	LGGe	403	599	56.07%	This work

References：

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2. S. s. Liu, D. c. Zhu, L. x. Yang, C. Zhao and Y. Pu, *J. Mater. Sci-Mater. El.*, 2018, **29**, 18781-18790.
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Tab. S4. The CCT and chromaticity coordinates at different Sm^{3+} doping concentrations of LGSi.

NO.	$(La_{1-x}Sm_x)_3GaSiO_{14}$	CIE (x, y)	CCT (K)
1	0.01	(0.5763, 0.4198)	1813
2	0.02	(0.5763, 0.4202)	1814
3	0.03	(0.5770, 0.4197)	1811
4	0.04	(0.5739, 0.4221)	1829
5	0.05	(0.5732, 0.4227)	1834
6	0.06	(0.5735, 0.4224)	1832
7	0.07	(0.5688, 0.4260)	1864

Tab. S5. The CCT and chromaticity coordinates at different Sm^{3+} doping concentrations of LGGe.

NO.	$(La_{1-x}Sm_x)_3GaGeO_{14}$	CIE (x, y)	CCT (K)
1	0.01	(0.5824, 0.4153)	1783
2	0.02	(0.5827, 0.4153)	1782
3	0.03	(0.5810, 0.4166)	1790
4	0.04	(0.5801, 0.4174)	1794
5	0.05	(0.5763, 0.4205)	1815
6	0.06	(0.5712, 0.4245)	1848
7	0.07	(0.5693, 0.4261)	1862

Tab. S6. CCT, CRI, color coordinates, lm and luminous efficiency of prepared white-LEDs as a function of current.

Current	CCT	CRI	CIE *x*	CIE y	lm	luminous efficiency
20 mA	6108 K	87.17	0.31	0.35	0.30	5.08
40 mA	6154 K	86.46	0.32	0.36	0.72	5.95
60 mA	6286 K	86.44	0.31	0.36	1.20	6.52
80 mA	6212 K	87.40	0.31	0.35	1.61	6.49
100 mA	6206 K	87.71	0.31	0.35	2.03	6.42

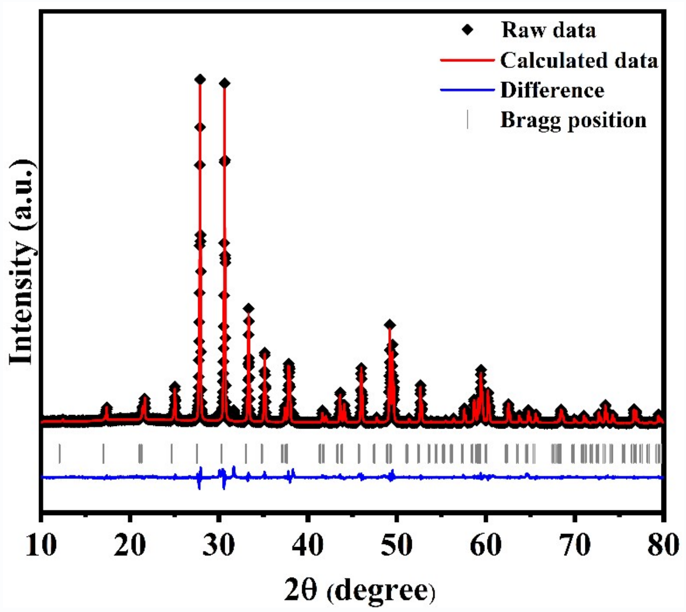

Fig. S1 XRD Rietveld refinement pattern of LGG: $0.02Sm^{3+}$.

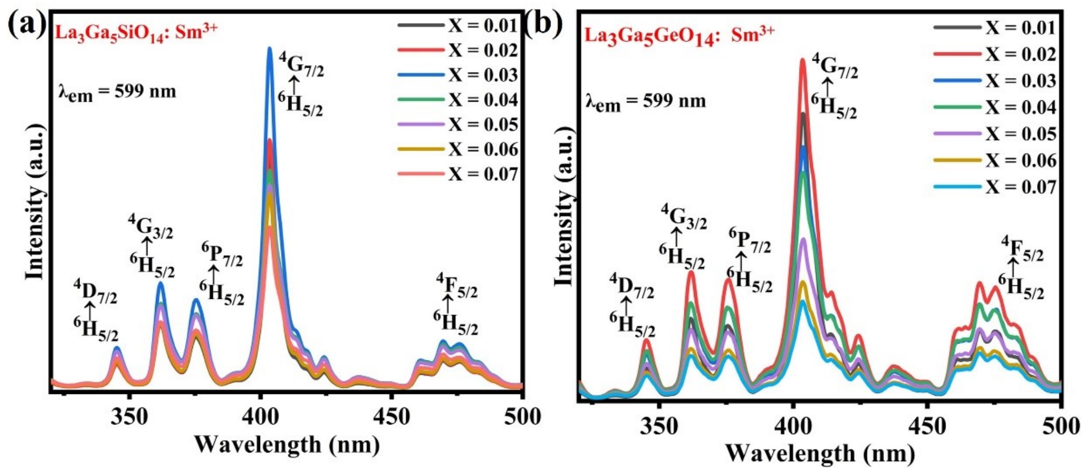

Fig. S2 The excitation spectra of (a) LGSi: $x\text{Sm}^{3+}$ and (b) LGGe: $x\text{Sm}^{3+}$.

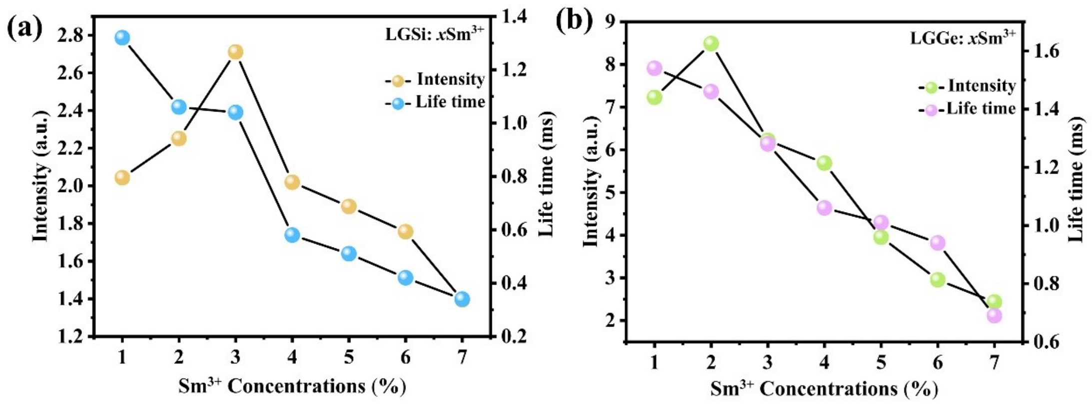

Fig. S3 The emission intensity (at 599 nm) and lifetimes in (a) LGSi: xSm^{3+} and (b) LGGe: xSm^{3+} at room temperature.

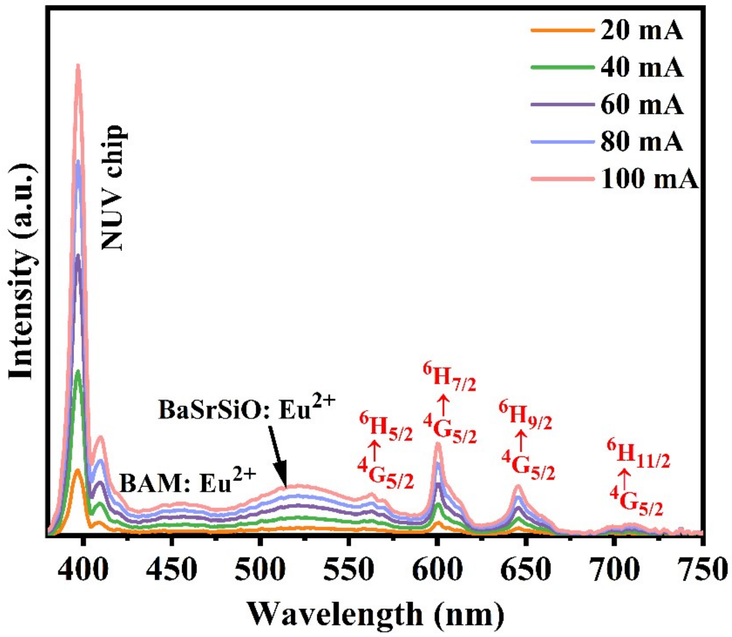

Fig. S4 The EL emission spectra of the developed w-LEDs under 20-100 mA injected current.