Supplementary Information

Massive red-shifting of Ce^{3+} emission by Mg^{2+} and Si^{4+} doping of YAG:Ce transparent ceramic phosphors

Qiping Du[a,b,†], Shaowei Feng[a,b,†], Haiming Qin[b,*], Hui Hua[a,b], Hui Ding[b], Lin Jia[a], Zhijun Zhang[a,*], Jun Jiang[b], Haochuan Jiang[b,*]

[a] School of Materials Science and Engineering, Shanghai University, Shanghai 200072, China

[b] Ningbo Institute of Materials Technology and Engineering, Chinese Academy of Sciences, Ningbo 315201, China

Table S1. Main parameters determined with Rietveld refinements

Formula	YAG:Ce	$Y_3Mg_{0.5}Al_4Si_{0.5}O_{12}$:Ce	$Y_3MgAl_3SiO_{12}$:Ce	$Y_3Mg_2AlSi_2O_{12}$:Ce
space group	$Ia\bar{3}d$	$Ia\bar{3}d$	$Ia\bar{3}d$	$Ia\bar{3}d$
vol(Å^3)	1733.10	1739.52	1749.04	1762.44
unit cell dimens(Å)	a = b = c = 12.0146	a = b = c = 12.0243	a = b = c = 12.0454	a = b = c = 12.0750
Ce–O distances(Å)	d_1 = 2.311 d_2 = 2.448	d_1 = 2.308 d_2 = 2.453	d_1 = 2.303 d_2 = 2.457	d_1 = 2.3 d_2 = 2.461
Structure distortion[D]	27.9%	29.5%	31.3%	32.9%
reliability factors	R_{wp}=7.31% R_p=6.79% χ^2=6.65	R_{wp}=8.93% R_p=7.04% χ^2=6.48	R_{wp}=10.11% R_p=8.56% χ^2=7.44	R_{wp}=10.62% R_p=8.33% χ^2=8.35

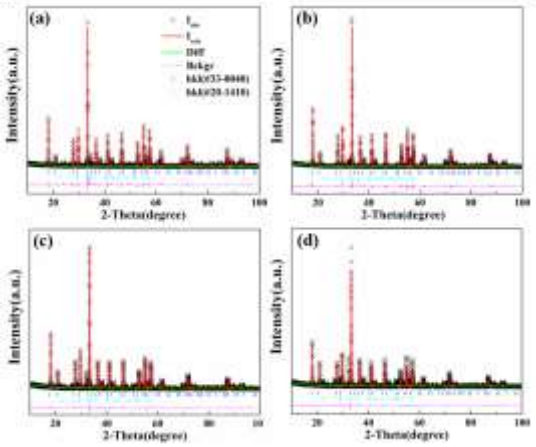

Fig. S1 X-ray Rietveld refinements for YMASG:Ce ceramics (a)x=0, (b)x=0.5, (c)x=1, (d)x=2

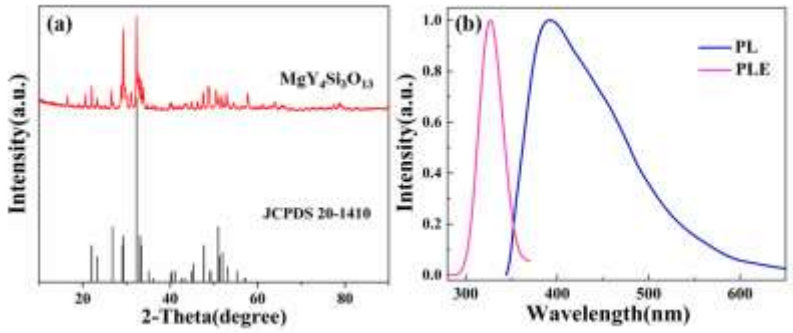

Fig. S2 (a) Diffraction peaks of the as prepared $MgY_4Si_3O_{13}$:Ce^{3+}powders and the standard diffraction of $MgY_4Si_3O_{13}$ (JCPDS 20-1410).(b)The PLE (λ_{em}=406 nm) and PL (λ_{ex}=327 nm) spectra of as prepared $MgY_4Si_3O_{13}$:Ce powders.