Supporting Information

Photoluminescence spectra correlations with structural distortion in Eu^{3+}- and Ce^{3+}-doped $Y_3Al_{5-2x}(Mg,Ge)_xO_{12}$ (x = 0, 1, 2) garnet phosphors

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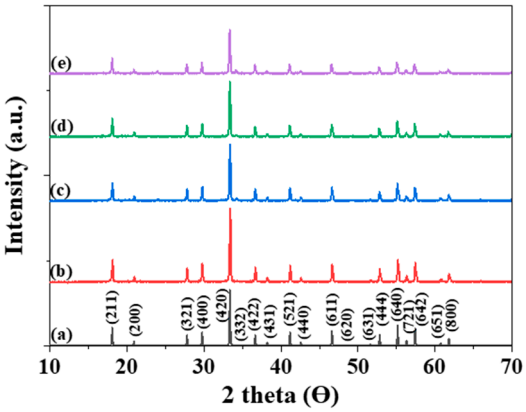
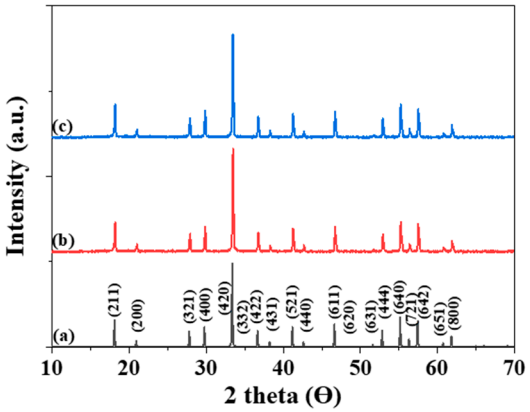
Figure S1. The X-ray diffraction patterns and excitation and emission spectra of Eu^{3+}- and Ce^{3+}-doped $Y_3Al_{5-2x}(Mg,Ge)_xO_{12}$ ((A) x = 0, (B) x =1, (C) x =2) phosphors.

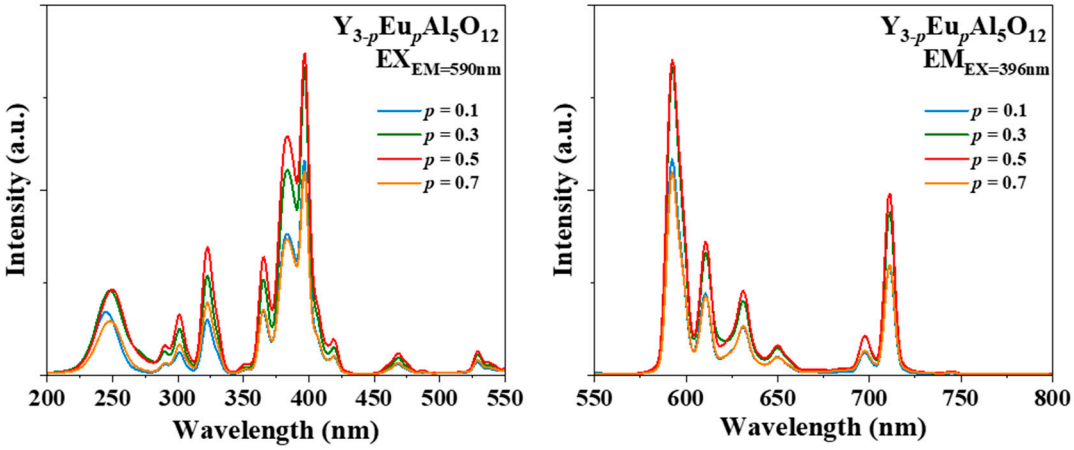
(A)



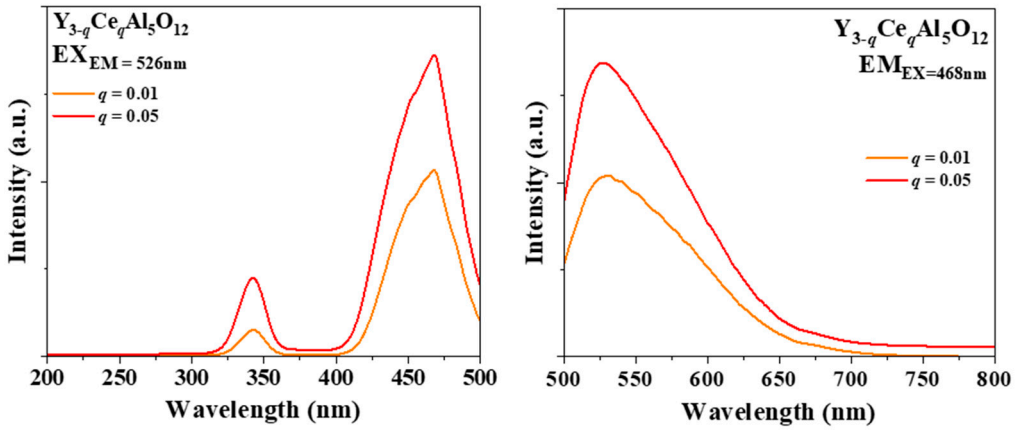
The calculated XRD patterns of $Y_3Al_5O_{12}$ (a) and obtained XRD patterns of $Y_{3-p}Eu_pAl_5O_{12}$ phosphors (b): p = 0.1, (c) p = 0.3, (d) p = 0.5, and (e) p = 0.7.



The calculated XRD patterns of $Y_3Al_5O_{12}$ (a) and obtained XRD patterns of $Y_{3-q}Ce_qAl_5O_{12}$ phosphors: (b) q = 0.01 and (c) q = 0.05

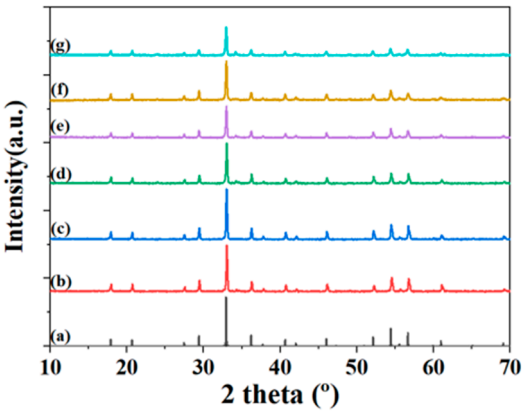


The excitation and emission spectra of $Y_{3-p}Eu_pAl_5O_{12}$ (p = 0.1-0.7).

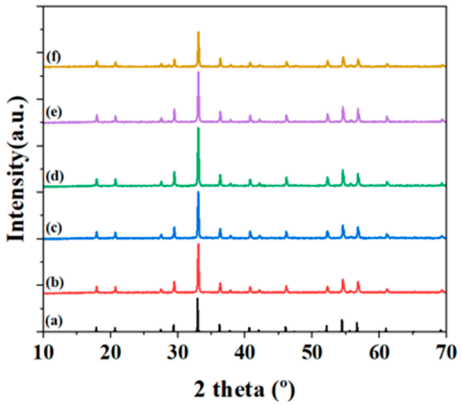


The excitation and emission spectra of $Y_{3-q}Ce_qAl_5O_{12}$ (q = 0.001-0.05).

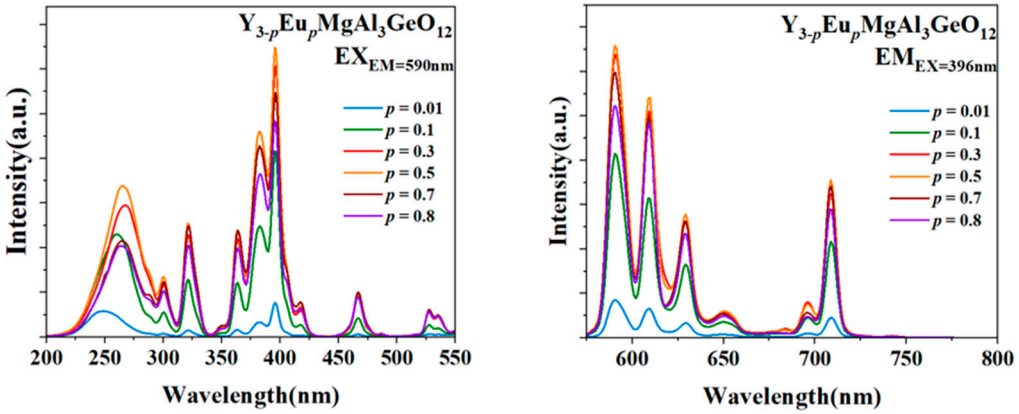
(B)



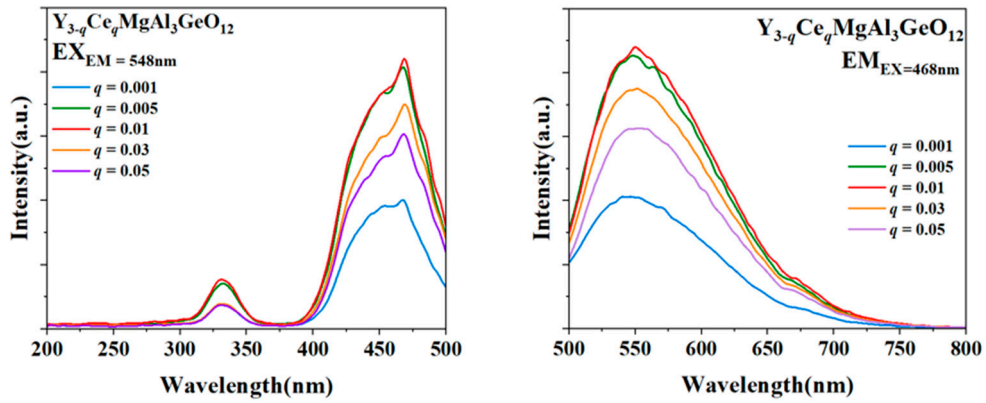
The calculated XRD patterns of $Y_3MgAl_3GeO_{12}$ (a) and obtained XRD patterns of $Y_{3-p}Eu_pMgAl_3GeO_{12}$ phosphors (b): p = 0.01, (c) p = 0.1, (d) p = 0.3, (e) p = 0.5, (f) p = 0.7, and (d) p = 0.8.



The calculated XRD patterns of $Y_3MgAl_3GeO_{12}$ (a) and obtained XRD patterns of $Y_{3-q}Ce_qMgAl_3GeO_{12}$ phosphors (b): q = 0.001, (c) q = 0.005, (d) q = 0.01, (e) q = 0.03, and (f) q = 0.05.

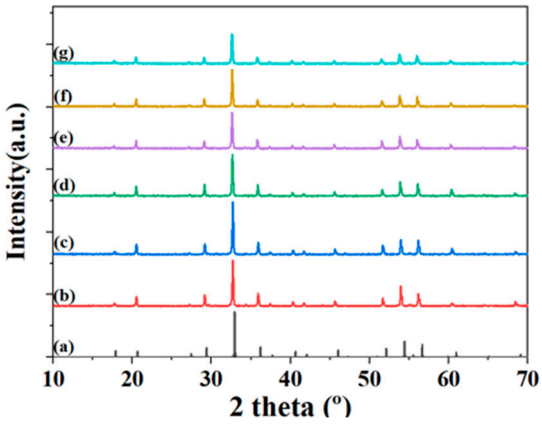


The excitation and emission spectra of $Y_{3-p}Eu_pMgAl_3GeO_{12}$ (p = 0.01-0.8).

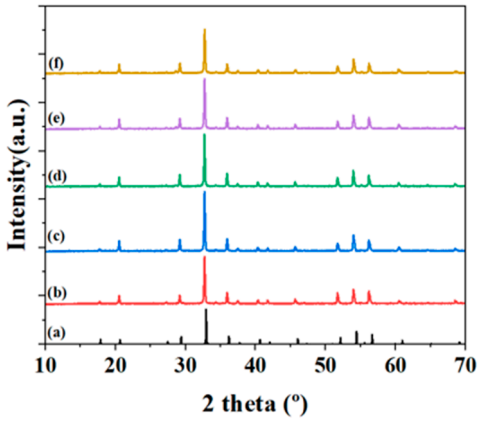


The excitation and emission spectra of $Y_{3-q}Ce_qMgAl_3GeO_{12}$ (q = 0.001-0.05).

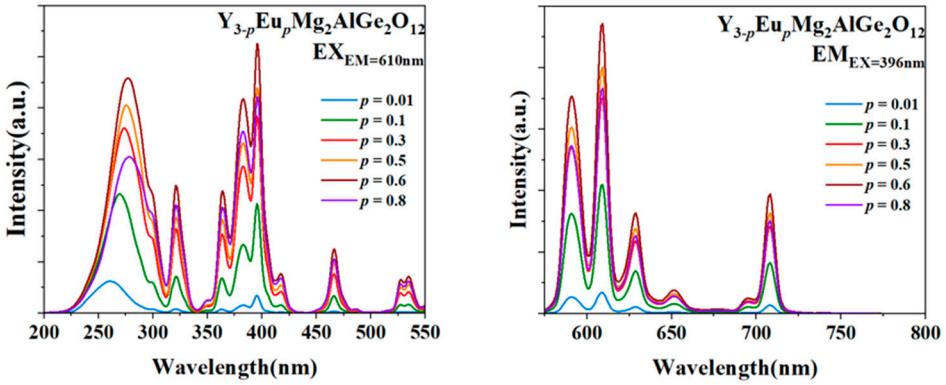
(C)



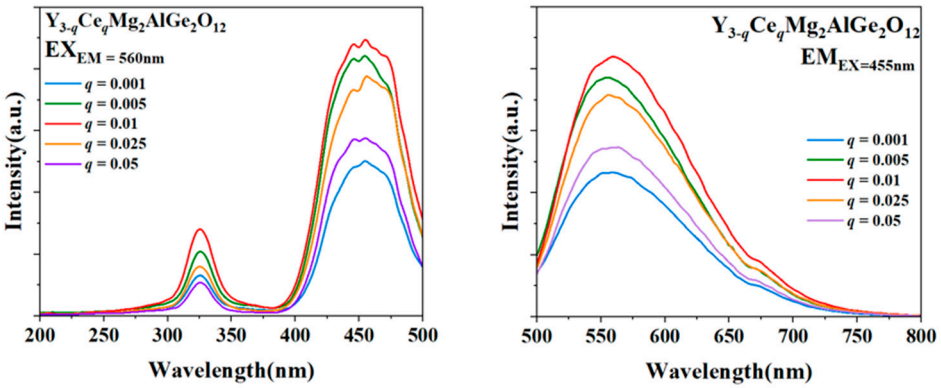
The calculated XRD patterns of $Y_3Mg_2AlGe_2O_{12}$ (a) and obtained XRD patterns of $Y_{3-p}Eu_pMg_2AlGe_2O_{12}$ phosphors (b): p = 0.01, (c) p = 0.1, (d) p = 0.3, (e) p = 0.5, (f) p = 0.6, and (d) p = 0.8.



The calculated XRD patterns of $Y_3Mg_2AlGe_2O_{12}$ (a) and obtained XRD patterns of $Y_{3-q}Ce_qMg_2AlGe_2O_{12}$ phosphors (b): q = 0.001, (c) q = 0.005, (d) q = 0.01, (e) q = 0.025, and (f) q = 0.05.



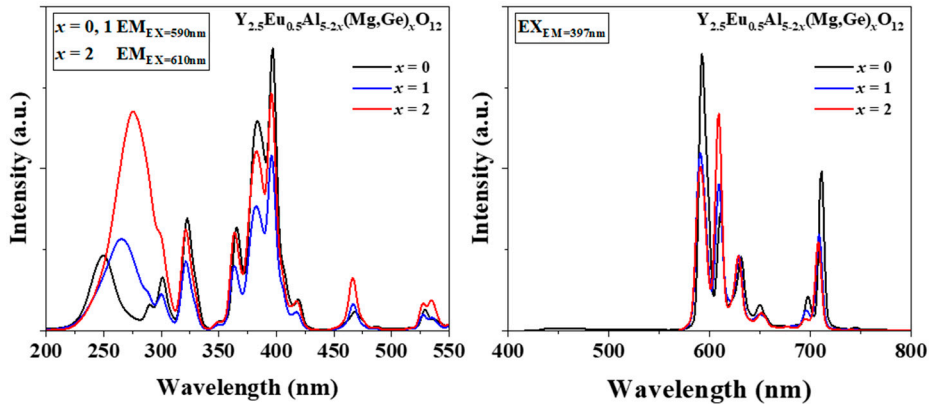
The excitation and emission spectra of $Y_{3-p}Eu_pMg_2AlGe_2O_{12}$ (p = 0.01-0.8).



The excitation and emission spectra of $Y_{3-q}Ce_qMg_2AlGe_2O_{12}$ (q = 0.001-0.05).

Figure S2. The excitation and emission spectra of (A) $Y_{2.5}Eu_{0.5}Mg_xAl_{5-2x}Ge_xO_{12}$ and (B) $Y_{2.95}Ce_{0.05}Mg_xAl_{5-2x}Ge_xO_{12}$ (x = 0-2).

(A)



(B)