

Supporting data

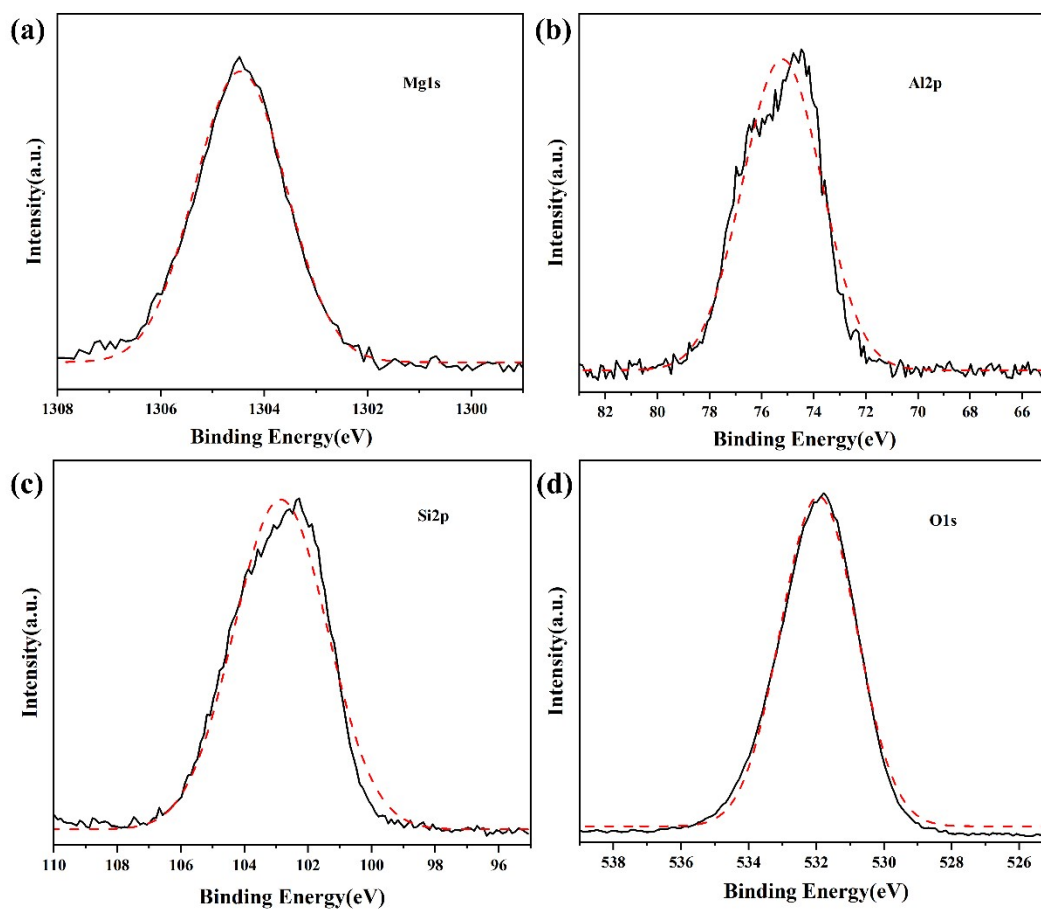


Fig. S1 The high resolution XPS spectra of Mg 1s(a), Al 2p(b), Si 2p(c) and O 1s(d).

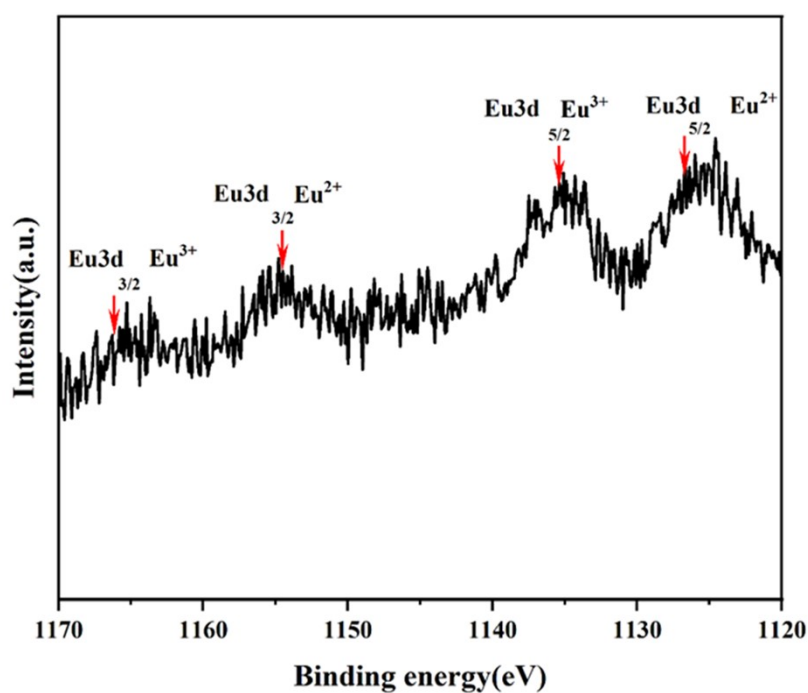


Fig. S2 The high-resolution XPS spectra of Eu 3d

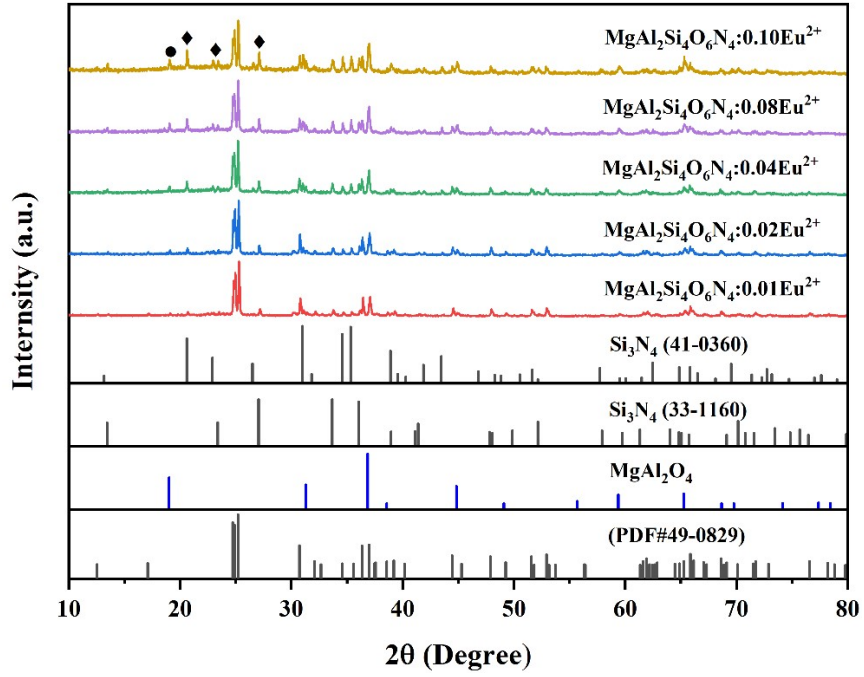


Fig. S3 The impurity phases of MASON:Eu²⁺

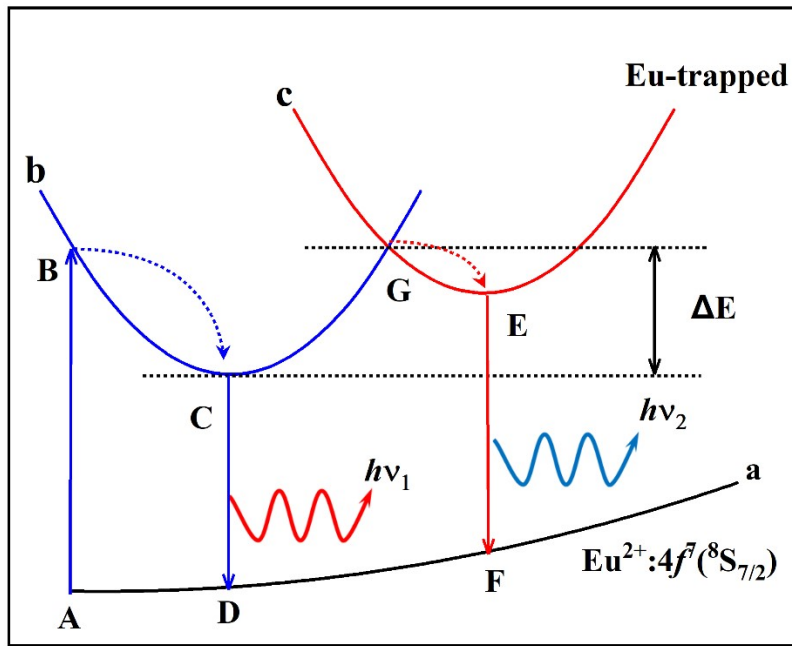


Fig. S4 The configuration coordinate diagram illustrating anomalous blue shift emitting

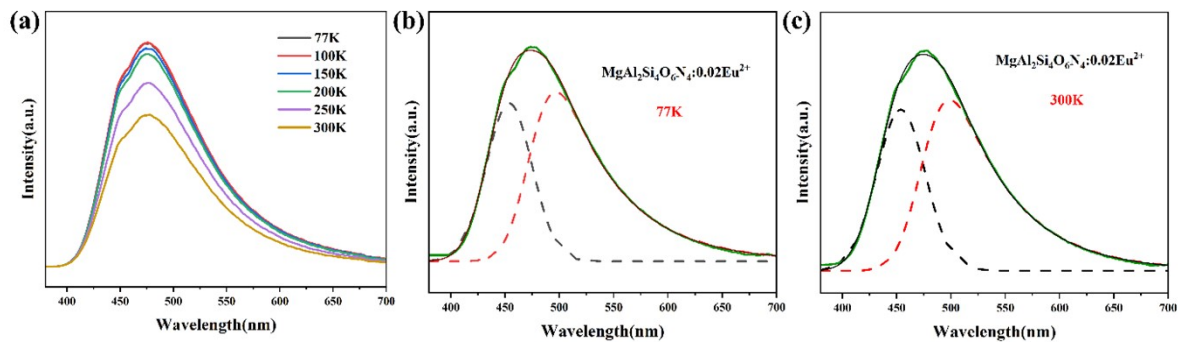


Fig. V4. (a) Temperature-dependent PL spectra of $\text{MgAl}_2\text{Si}_4\text{O}_6\text{N}_4:0.02\text{Eu}^{2+}$ phosphor, and Gaussian peak separation of PL spectra of $\text{MgAl}_2\text{Si}_4\text{O}_6\text{N}_4:0.02\text{Eu}^{2+}$ phosphor at 77k (b) and 300k (c)