Supporting Information

Efficient Narrow-band Green Phosphor for Mini-LED Displays Using Dual Strategies of High Concentration Quenching and Energy Transfer

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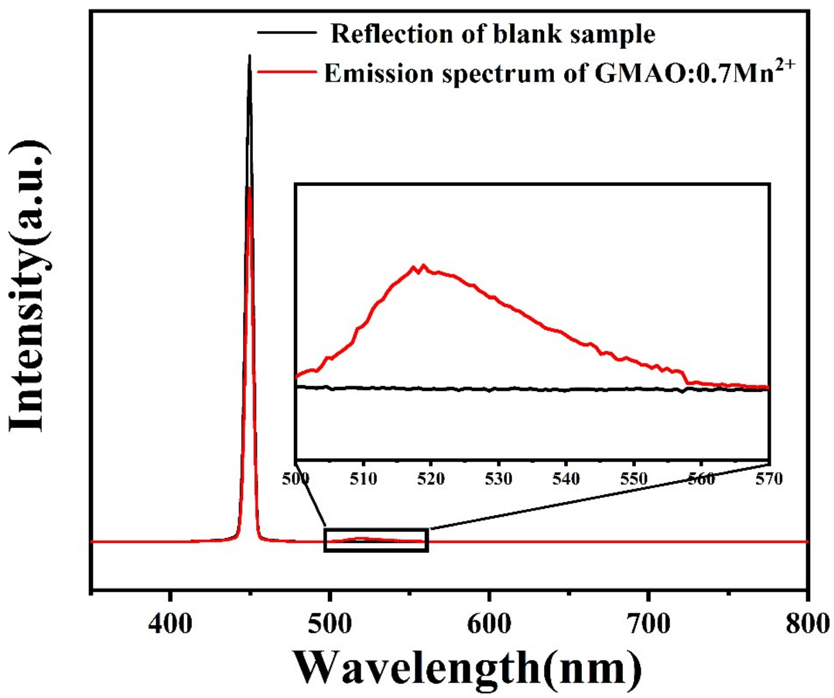

Figure S1. The quantum efficiency measurement spectrum of GMAO:0.7Mn^{2+}.

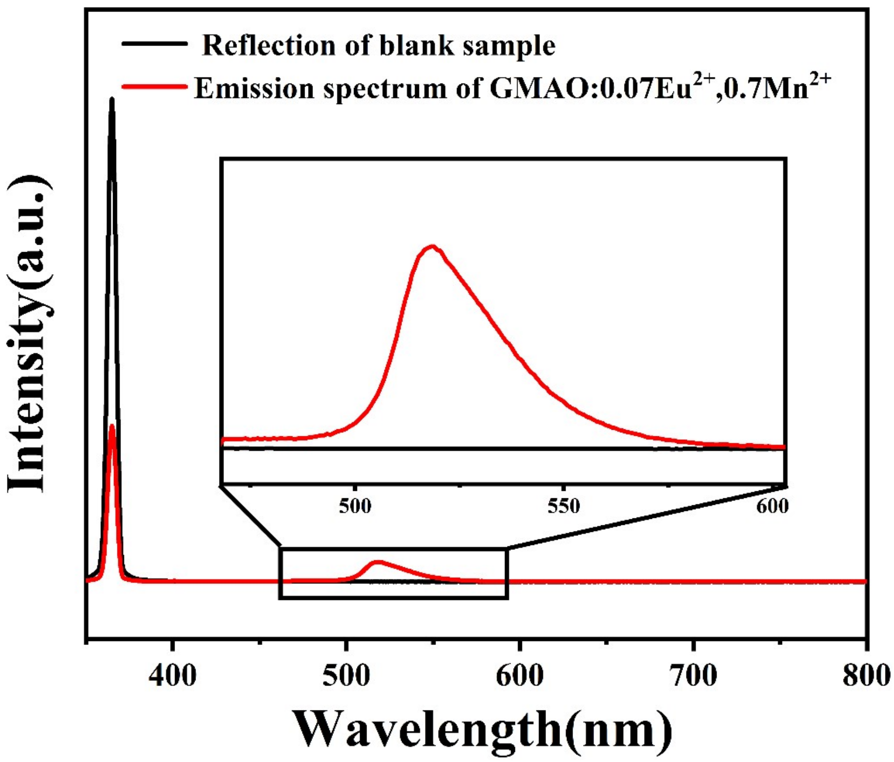

Figure S2. The quantum efficiency measurement spectrum of GMAO: $0.07Eu^{2+}$,$0.7Mn^{2+}$.

Calculation S1 Blasses equation

$$R_C = 2\left(\frac{2\ \ V}{4\ \ \pi N_Z C}\right)^{\frac{1}{3}} \#$$

Where C is the total concentration of Eu^{2+} and Mn^{2+}, V is the volume of the unit cell, and N_z is the number of available sites for the dopant in the unit cell. For GMAO: $0.07Eu^{2+}$, $0.7Mn^{2+}$, V = 583.83 Å^3, C = 0.77, N_z = 2.

Calculation S2 Average lifetime (τ)

$$\tau = \frac{\left(A_1{\tau_1}^2 + A_2{\tau_2}^2\right)}{\left(A_1\tau_1 + A_2\tau_2\right)}$$

Where t and I are time (ns) and luminous intensity respectively, and A_1, A_2, and

τ_1, τ_2 are exponential components of constant and lifetime.

Calculation S3 Energy transfer efficiency (η_T)

$$\eta_T = 1 - \frac{\tau_S}{\tau_{S\ O}}$$

Where τ_{so} is the lifetime of Eu^{2+} when undoped with Mn^{2+} and τ is the lifetime of Eu^{2+} when doped with Mn^{2+}.

Calculation S4 Activation energy (ΔE)

$$\ln\left(\frac{I_0}{I} - 1\right) = lnA - \frac{\Delta E}{KT} \#$$

In this equation, I0 and I are the initial emission intensity and the integral emission intensity with temperature change, respectively. ΔE is the activation energy, a is the constant, and K is the Boltzmann constant (8.62×10^{-5}eV/K).