

Supporting Information

Eu²⁺ and Mn²⁺ Co-doping Lu₂Mg₂Al₂Si₂O₁₂ Phosphor for High Sensitivity and Multi-mode Optical Pressure Sensing

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Table S1. The specific parameters and reliability factors of single-doped sample and co-doped sample.

Samples	Crystallographic parameters			Reliability factors		
	a, b, c (Å)	V (Å ³)	α, β, γ (deg)	R_p	R_{wp}	χ^2
Single-doped	11.872(5)	1673.51(6)	90	2.58%	3.43%	1.866
Co-doped	11.875(4)	1674.74(2)	90	2.65%	3.57%	2.031

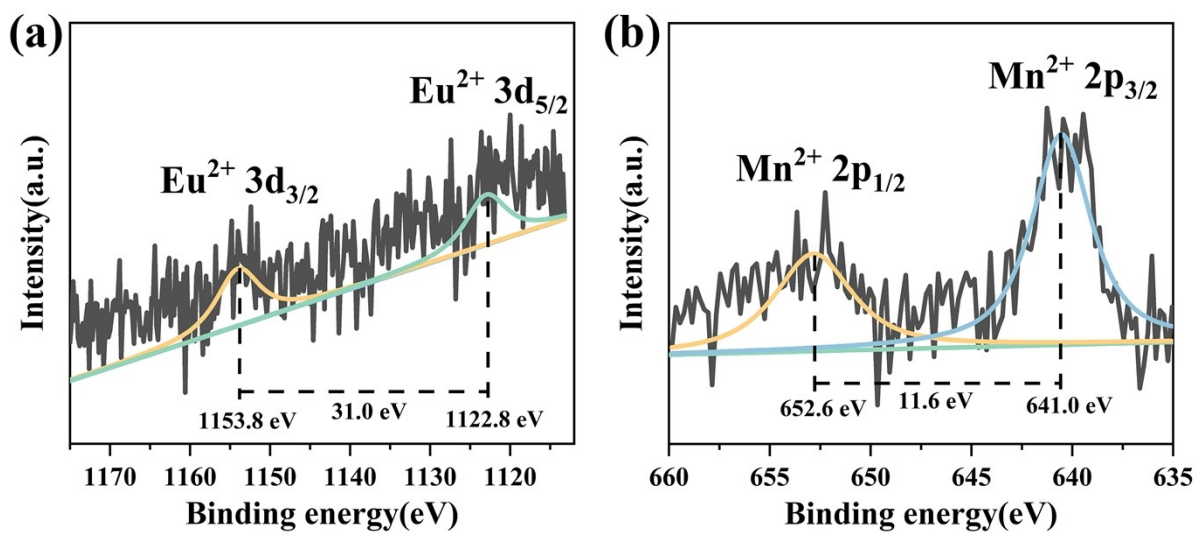


Figure S1. The high-resolution XPS spectra of (a) Eu²⁺ and (b) Mn²⁺.

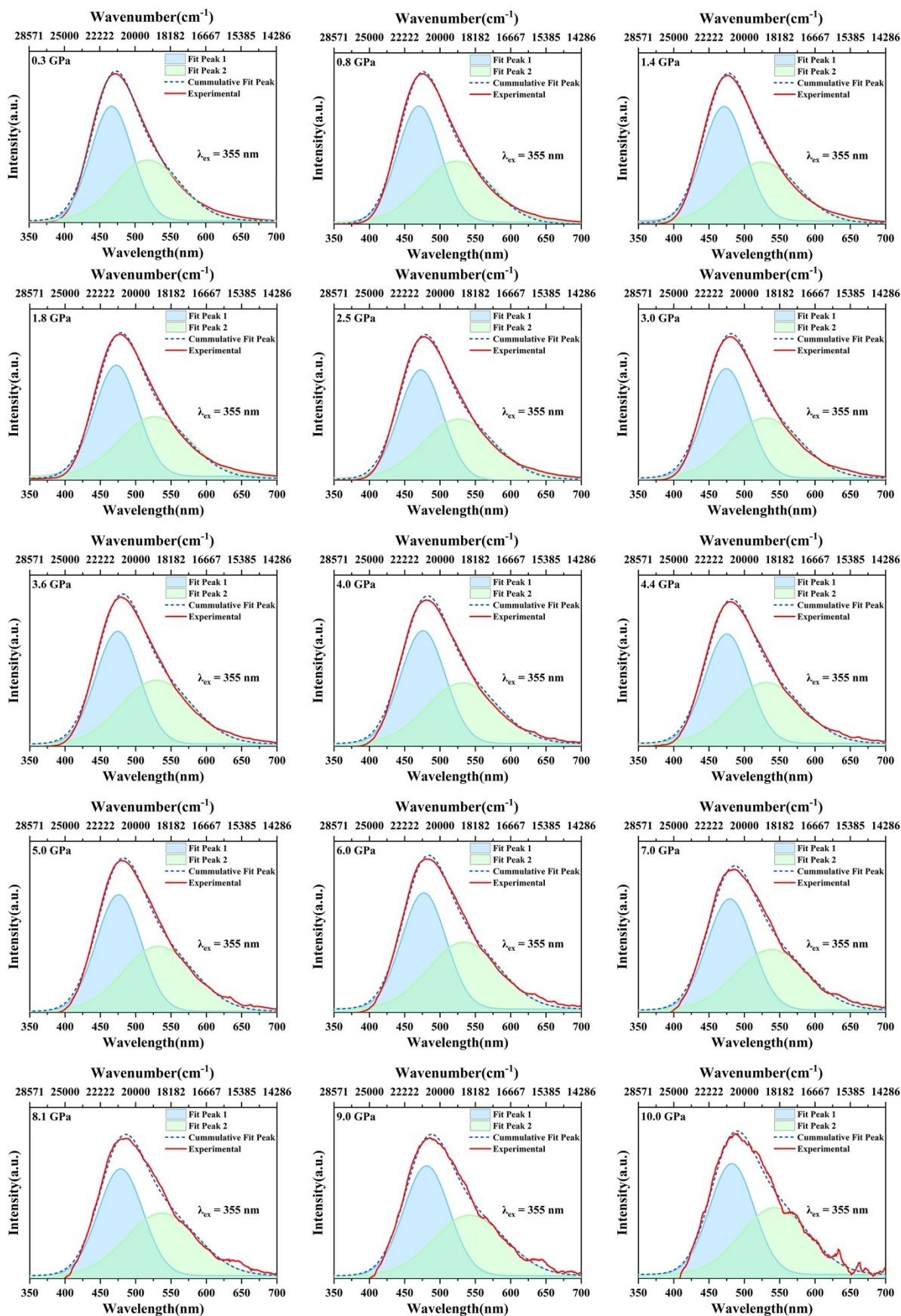


Figure S2. Gaussian fitting of the emission spectra of Eu^{2+} under different pressures.

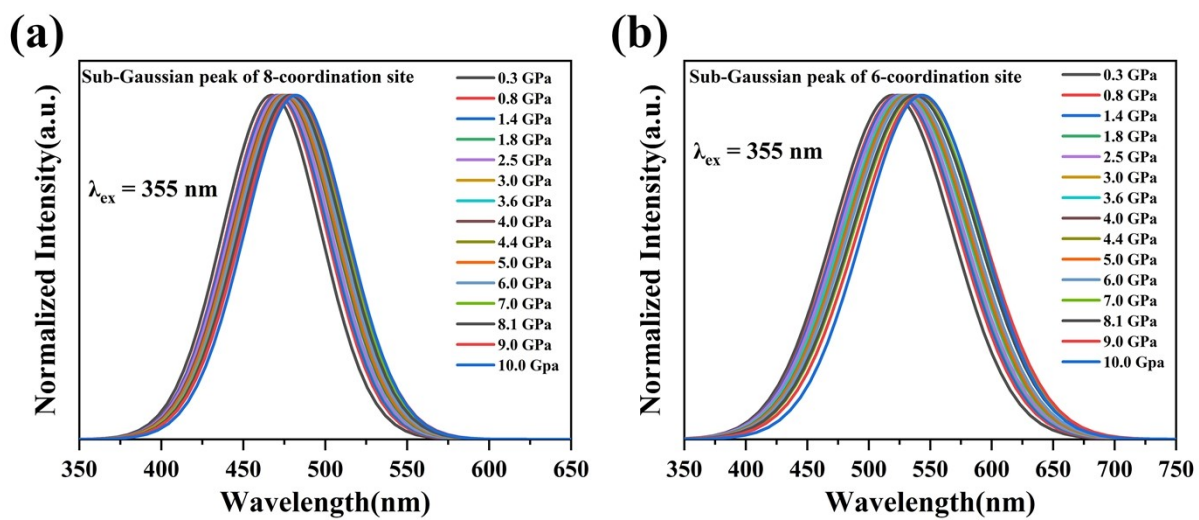


Figure S3. Normalized PL spectra of the (a) 8-coordination and (b) 6-coordination sites.

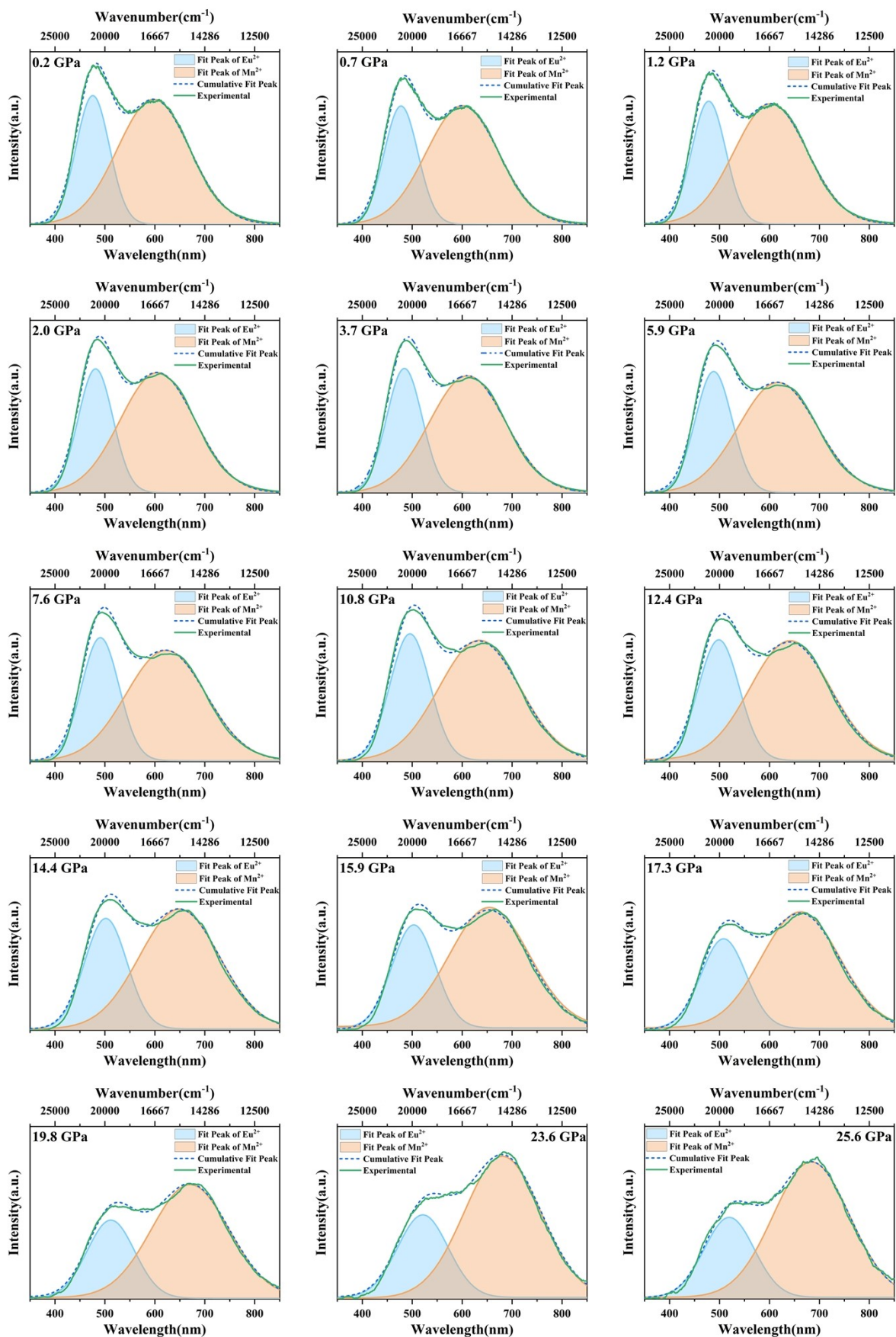


Figure S4. Gaussian fitting of the emission spectra of Eu^{2+} , Mn^{2+} under different pressures.

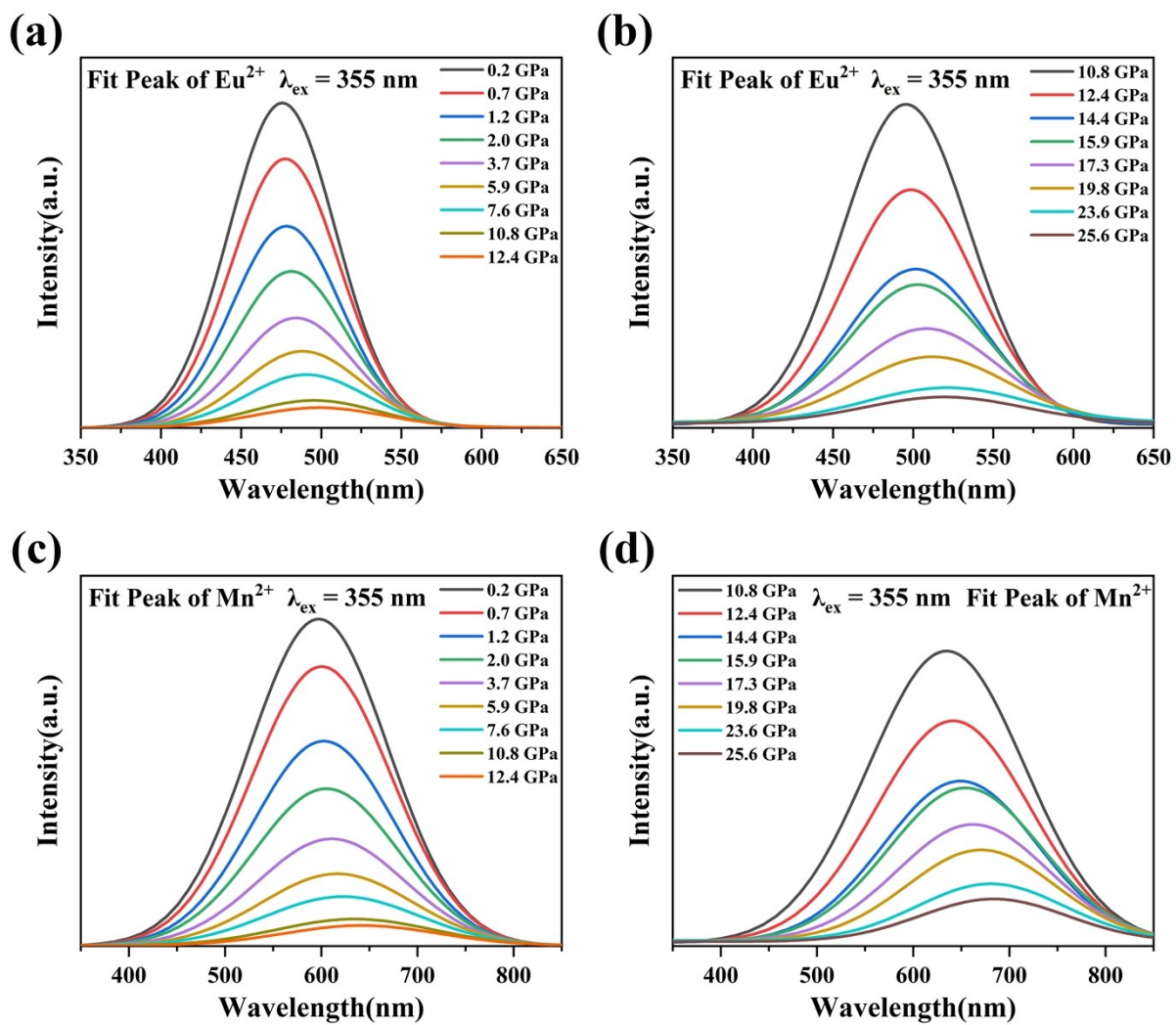


Figure S5. (a), (b) The fitting PL spectra of the Eu^{2+} and (c), (d) fitting PL spectra of the Mn^{2+} .

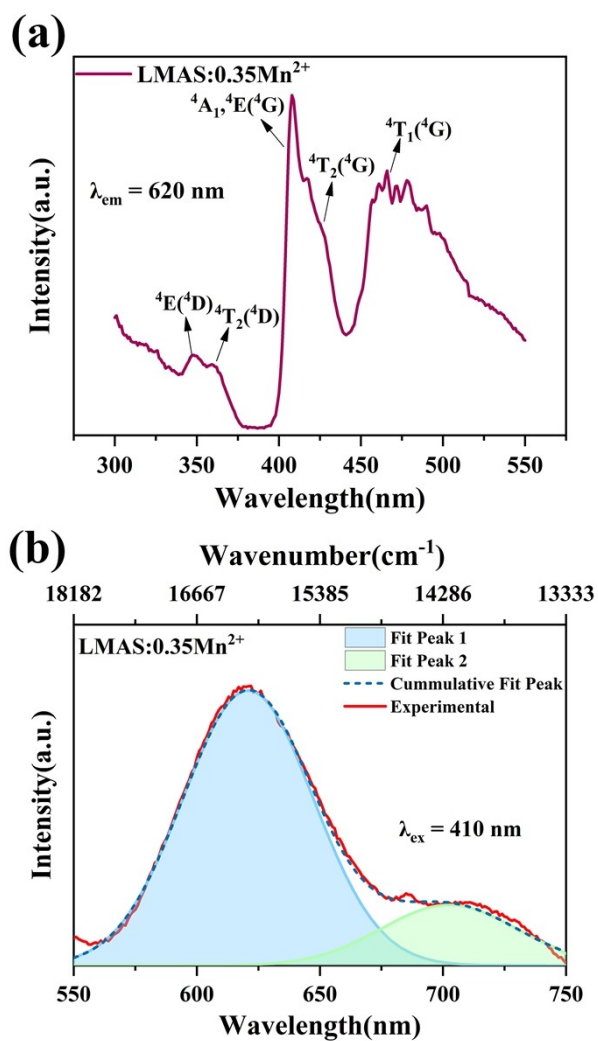


Figure S6. (a) PLE and (b) PL spectra of LMAS:0.35Mn²⁺.

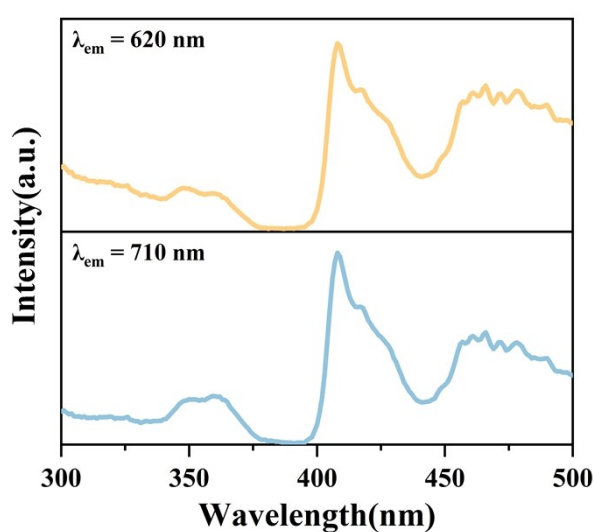


Figure S7. The PLE spectra of LMAS:0.35Mn²⁺ under 710 nm and 620 nm.

Table S2. Excitation spectrum data of LMAS:0.35Mn²⁺.

Energy level (⁶ A ₁ (⁶ S) →)	Wavelength (nm)	Energy (cm ⁻¹)
⁴ E(⁴ D)	348	28736
⁴ T ₂ (⁴ D)	360	27778
⁴ A ₁ , ⁴ E(⁴ G)	410	24390
⁴ T ₂ (⁴ G)	426	23474
⁴ T ₁ (⁴ G)	466	21459

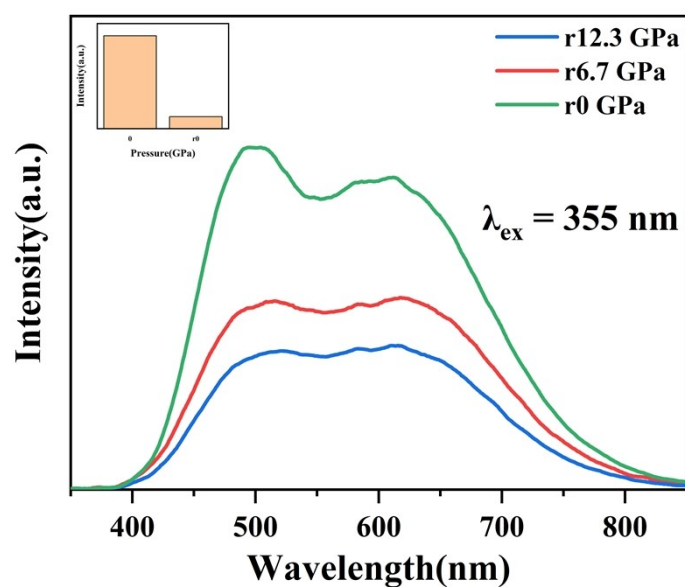


Figure S8. PL spectra of LMAS:0.01Eu²⁺,0.35Mn²⁺ during the decompression process. The inset is the integral intensity after the decompression process compared with the initial integral intensity.