

Supporting Information for

Facilitating Cryogenic Blue Persistent Luminescence in a Glassy Matrix

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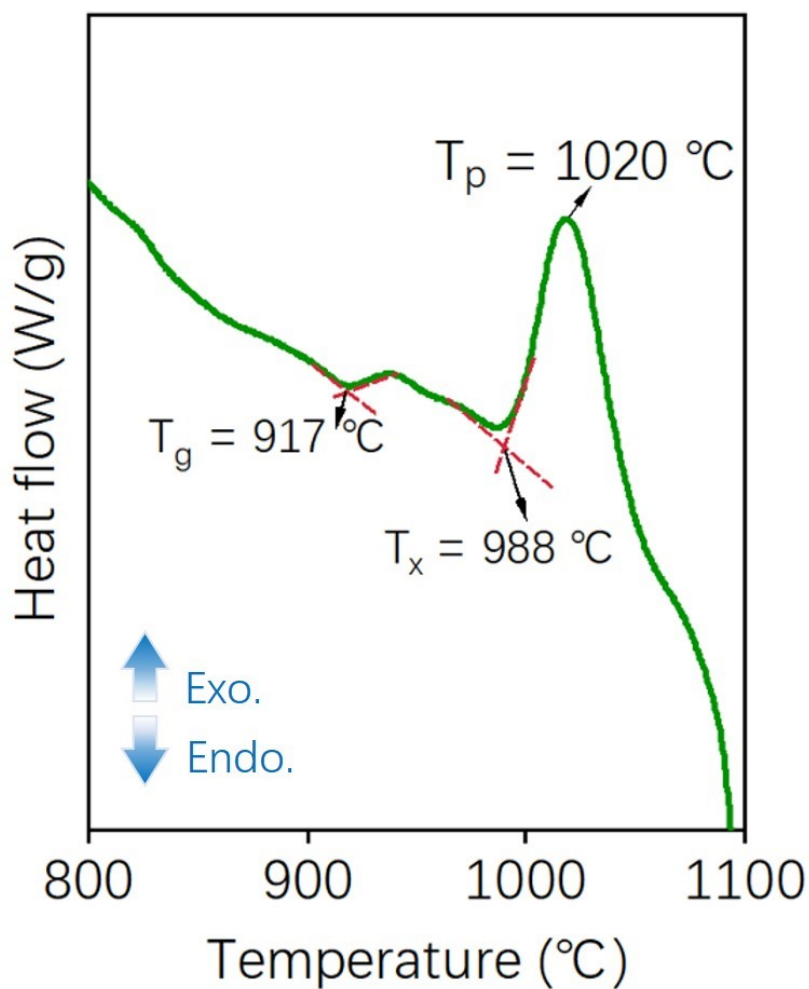


Figure S1. The differential scanning calorimetry (DSC) thermogram recorded the thermodynamic parameters of MAS-Eu glass. Exothermic (Exo.) and endothermic (Endo.) processes were indicated. The glass transition temperature (T_g), crystallization initiation temperature (T_x), and maximum crystallization temperature (T_p) were measured at 917 °C, 988 °C, and 1020 °C, respectively.

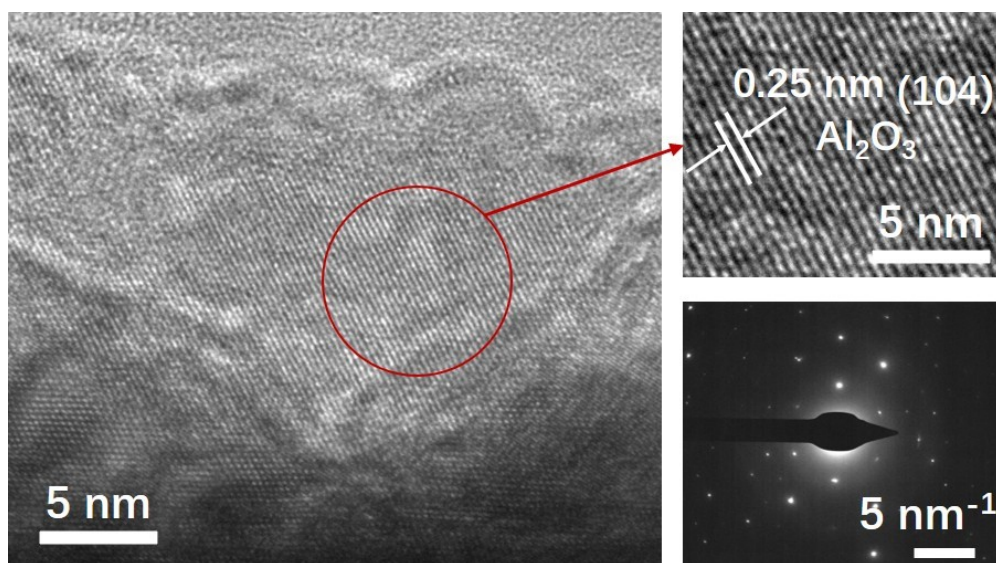


Figure S2. The detailed HRTEM image of MAS-Eu. The scale bar is 5 nm. The measured interplanar spacing is 0.25 nm, corresponding to the Al₂O₃ (104) plane.

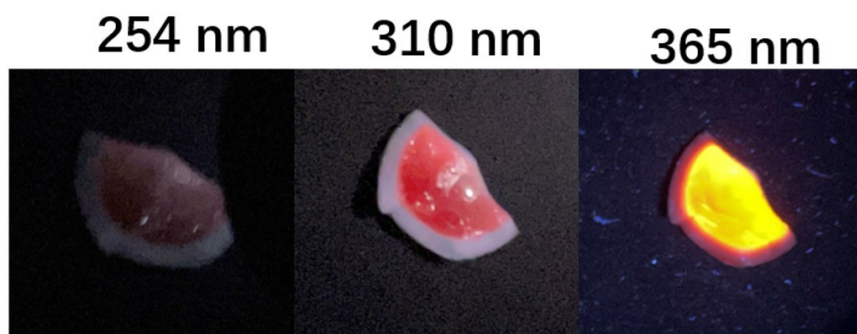


Figure S3. Photographs of the glassy specimen MAS-Sm illuminated by various wavelengths (254 nm, 310 nm, and 365 nm).

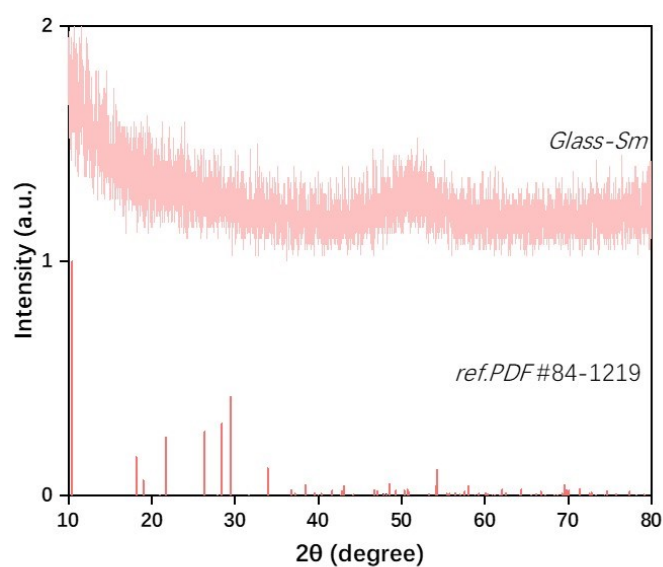


Figure S4. The XRD pattern of MAS-Sm synthesized at 1000 W for a duration of 30 minutes. The corresponding standard PDF card data of $\text{Mg}_2\text{Al}_4\text{Si}_5\text{O}_{18}$ (PDF# 084-1219) is included for reference.

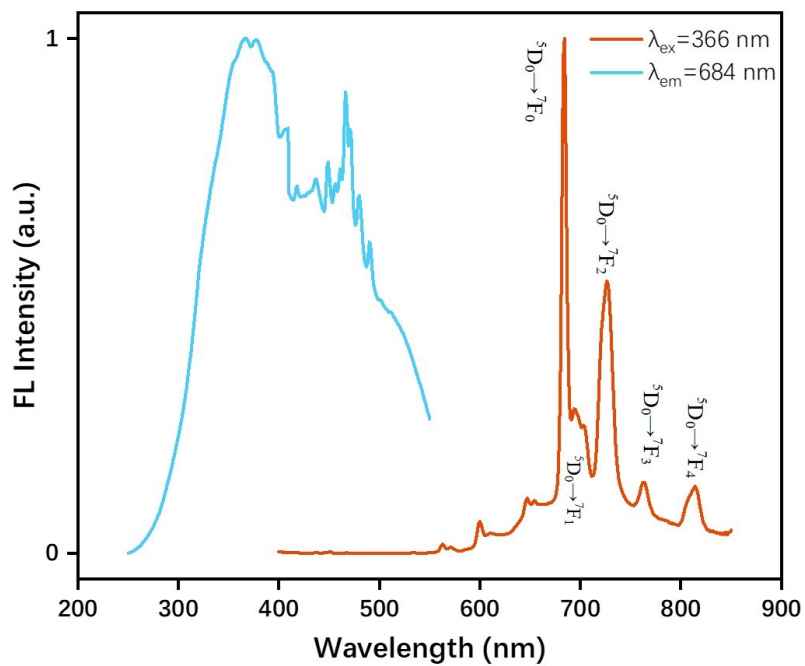


Figure S5. The PLE and PL spectra of the MAS-Sm glass.

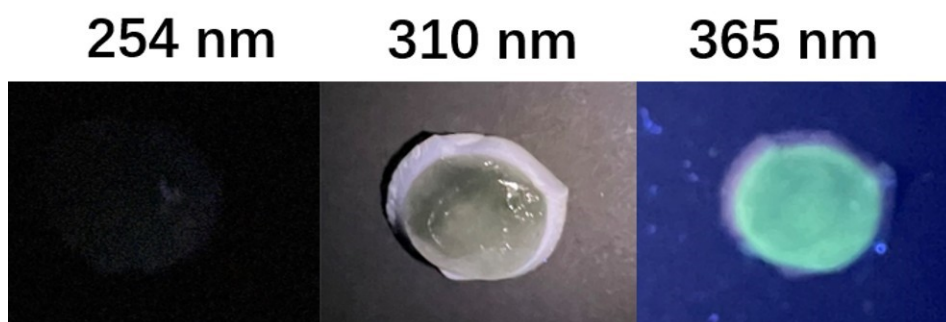


Figure S6. Photographs of the glassy specimen MAS-Tb illuminated by various wavelengths (254 nm, 310 nm, and 365 nm).

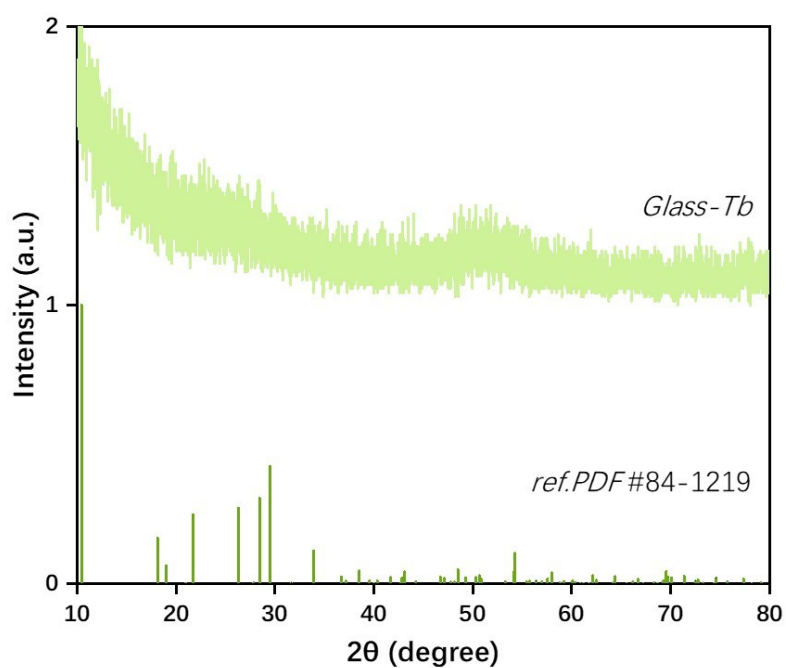


Figure S7. The XRD pattern of MAS-Tb synthesized at 1000 W for a duration of 30 minutes. The corresponding standard PDF card data of $\text{Mg}_2\text{Al}_4\text{Si}_5\text{O}_{18}$ (PDF# 084-1219) is included for reference.

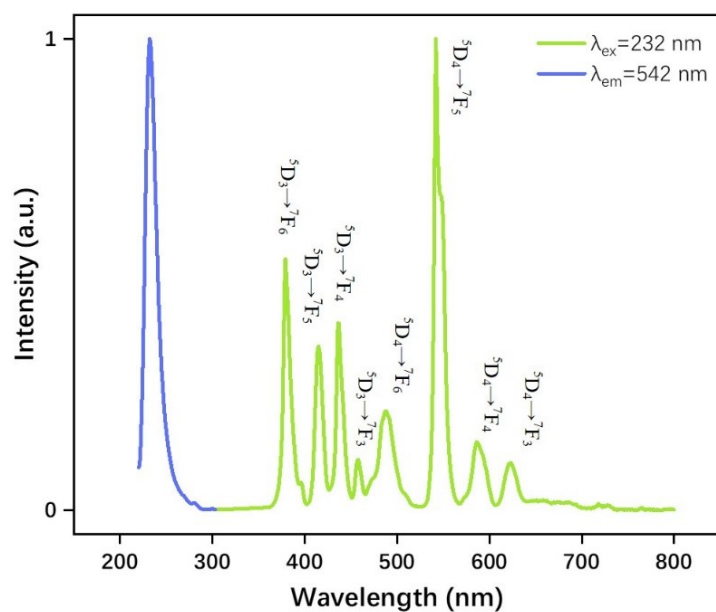


Figure S8. The PLE and PL spectra of the MAS-Tb glass.

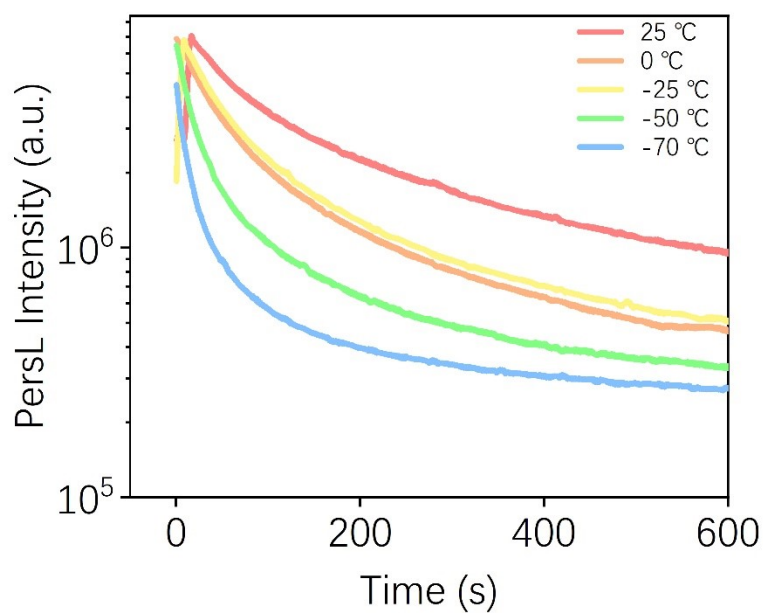


Figure S9. The PersL decay curves of the MAS-Eu glass at different ambient temperatures (25, 0, -25, -50 and -70 °C). A 5-min 365 nm charging was conducted at corresponding temperatures.

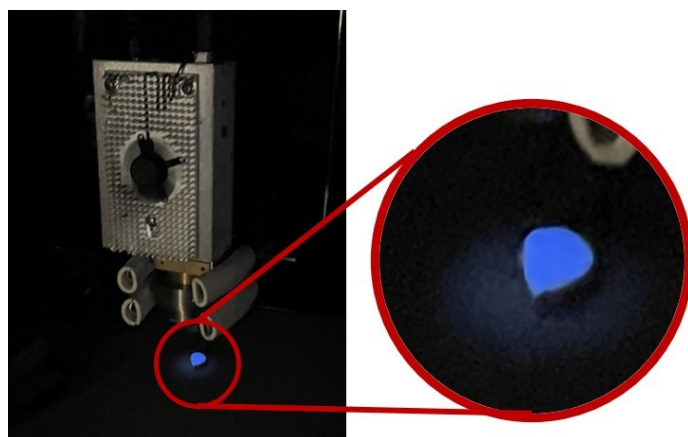


Figure S10. X-ray irradiation images of the MAS-Eu glass. The magnified view reveals the blue radioluminescence emitted by the glass.

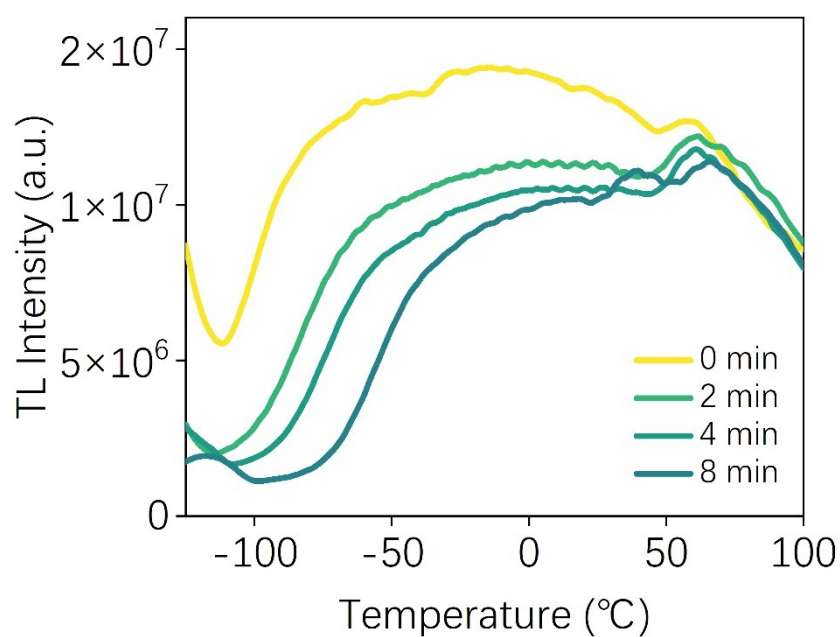


Figure S11. TL fading investigations at cryogenic temperatures were performed following a 30-second X-ray irradiation at -125 °C. The fading was assessed over various fading durations (0, 2, 4, and 6 minutes) at -125 °C prior to the acquisition of the TL profiles.

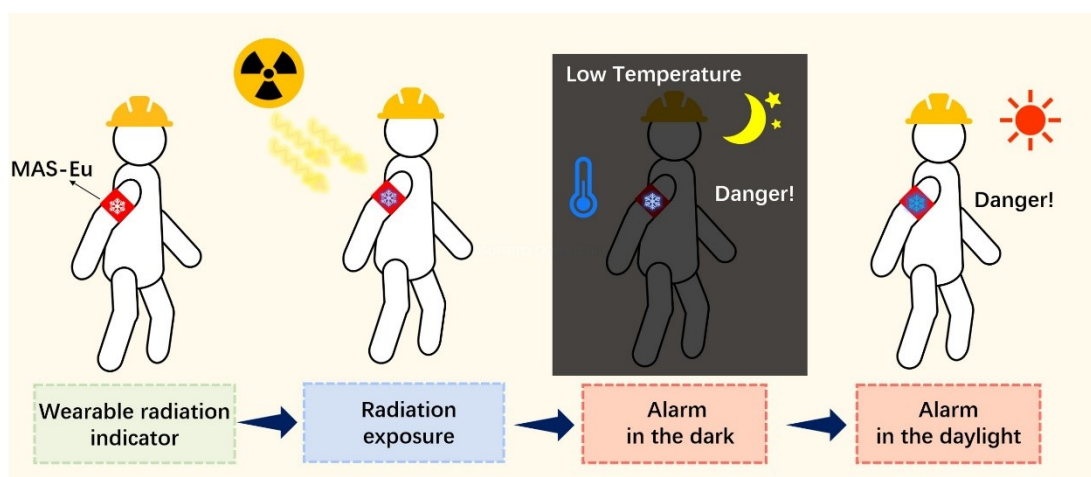


Figure S12. Schematic representation of MAS-Eu glass for prospective utilization in low-temperature X-ray leakage detection frameworks.



Figure S13. A schematic representation of the microwave reactor and its synthesis protocol.