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Supporting Information

**Colour evolution of dynamic persistent luminescence of $\text{Zn}_3\text{Ga}_2\text{Ge}_2\text{O}_{10}:\text{Cr}^{3+},\text{Mn}^{2+}$
phosphors for advanced anti-counterfeiting**

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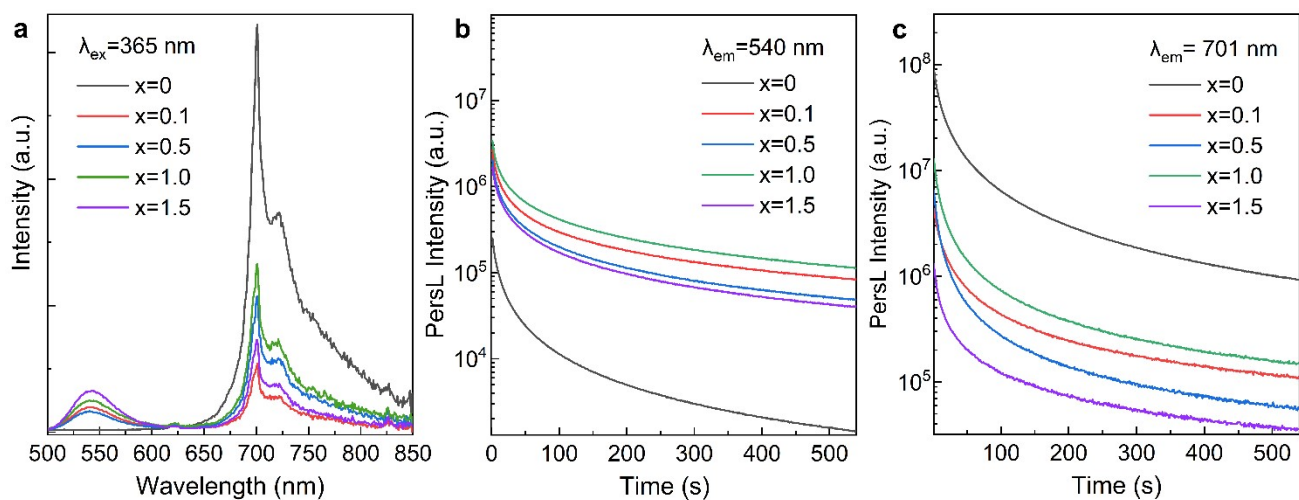


Fig. S1. Mn²⁺-content dependent luminescence of ZGGO:Cr,Mn phosphors. (a) PL spectra of the Zn₃Ga₂Ge₂O₁₀:0.5%Cr³⁺,x%Mn²⁺ ($x = 0, 0.1, 0.5, 1.0, 1.5$) phosphors annealed at 1100°C. (b,c) Afterglow decay curves at 540 nm and 701 nm, respectively, after irradiation by a 365 nm UV lamp for 5 min.

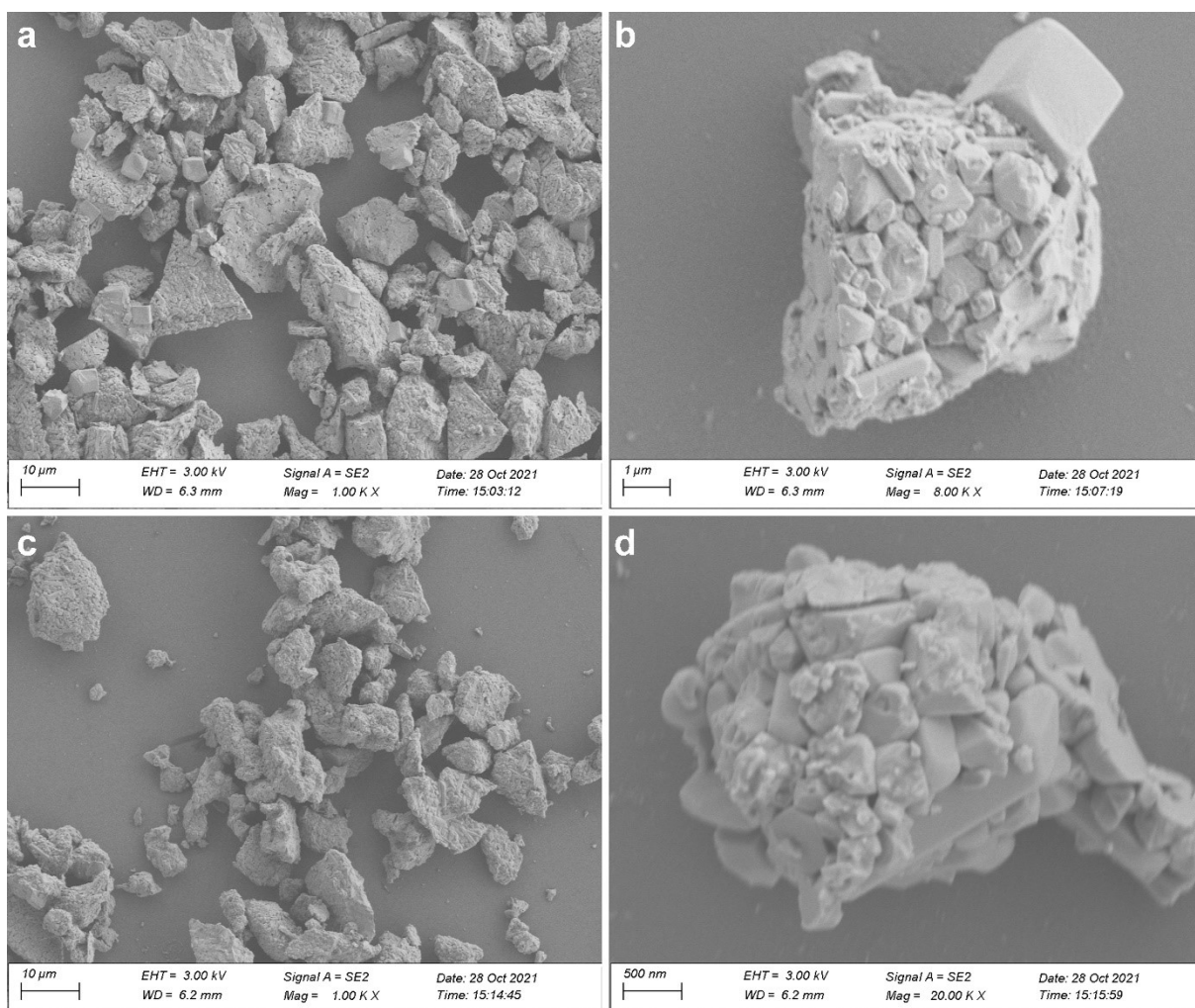


Fig. S2 Low-resolution and enlarged SEM images of ZGGO:0.5%Cr,1.0%Mn (a,b) and ZGGO:0.5%Cr,0.1%Mn (c, d) phosphors.

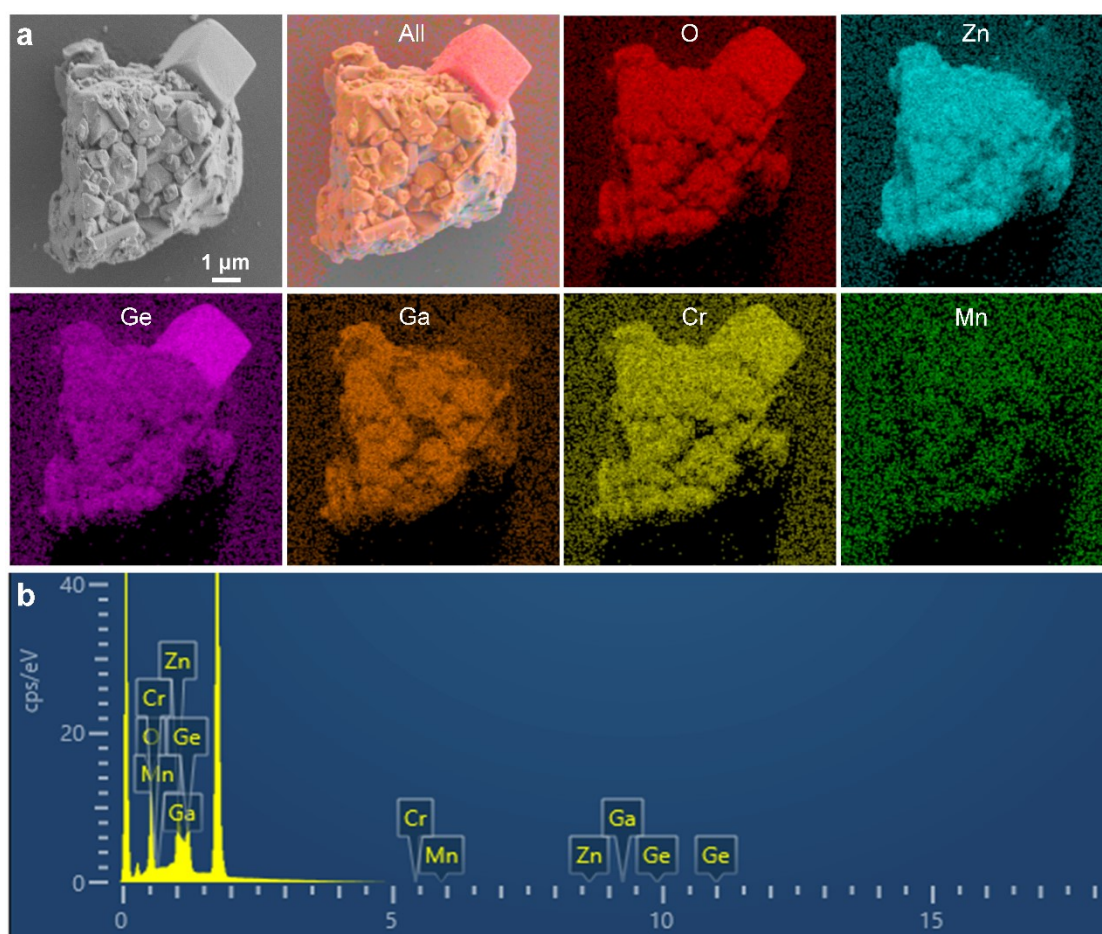


Fig. S3 (a) SEM image and EDX mappings of ZGGO:0.5%Cr,1.0%Mn phosphor. (b) EDX spectrum of ZGGO:0.5%Cr,1.0%Mn phosphor.