Electronic Supplementary Material (ESI) for Inorganic Chemistry Frontiers.

Supporting Information

Compensation effect of electron traps for enhanced fluorescence intensity ratio thermometry performance

Zhi-Han Zuo, [a] *Song-Lin Jiang,* [a] *Zhi-Hao Zhang,* [a] *Jinhui Liang,* [a] *Junhao Li,* [b*] *Zhao-Qing Liu,* [a] *Yibo Chen* [a*]

[a] *School of Chemistry and Chemical Engineering/Guangzhou Key Laboratory for Clean Energy and Materials, Guangzhou University, Guangzhou 510006, China*

[b] *Guangdong Province Key Laboratory of Rare Earth Development and Application, Institute of Rare Metals, Guangdong Academy of Sciences, Guangzhou 510651, China*

***Corresponding Authors**

E-mail: lijunhao@irmgdas.gd.cn, chenyibo@gzhu.edu.cn

1. Supplementary Figures

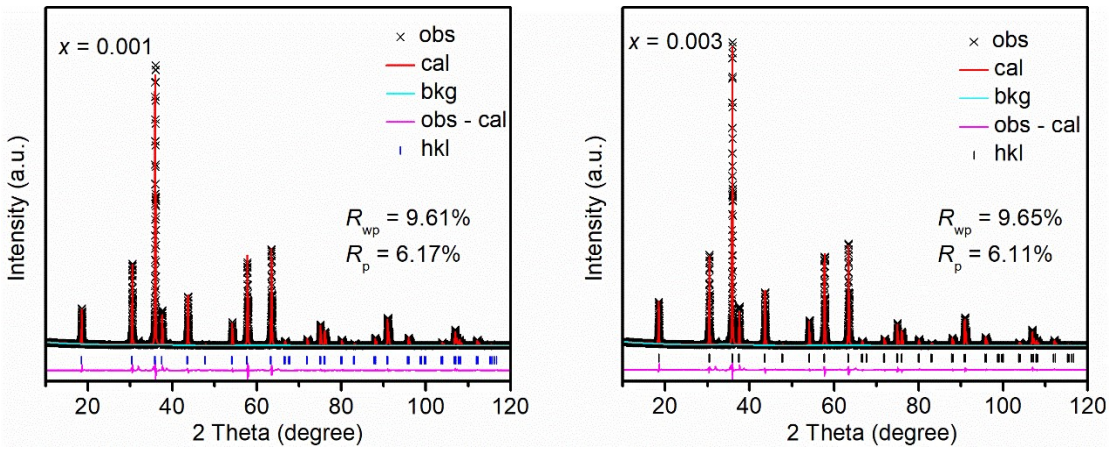

Fig. S1 Rietveld refinement XRD patterns of (a) ZGO:0.001Mn and (b) ZGO:0.003Mn.

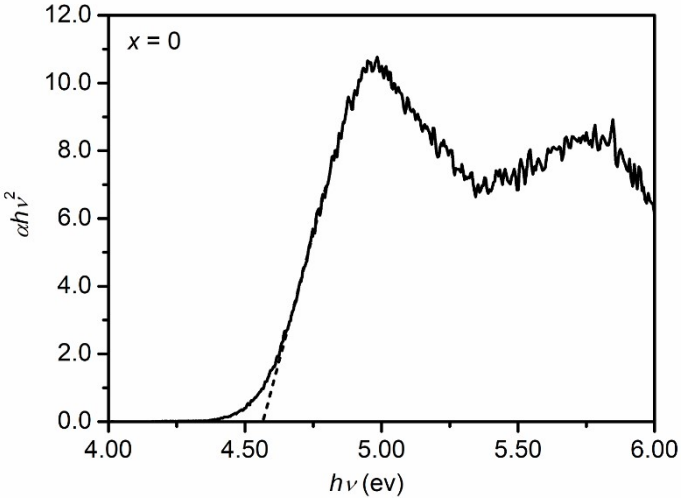

Fig. S2 Bandgap value of ZGO derived by Tauc's plot.

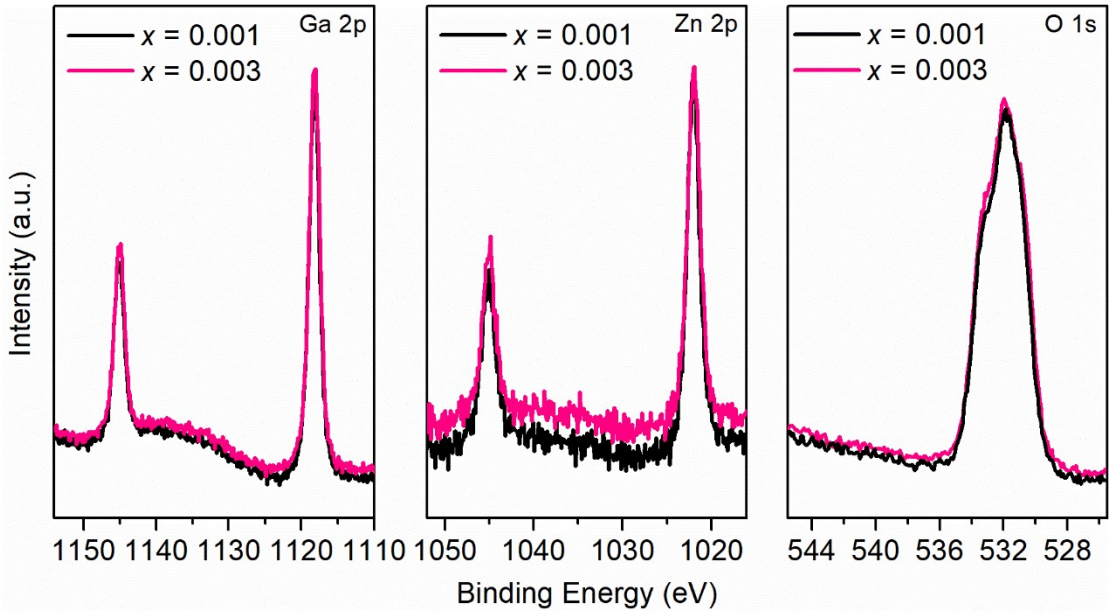

Fig. S3 XPS spectra of Zn 2p, Ga 2p, and O 1s in ZGO:*x*Mn (x = 0.001, 0.003).

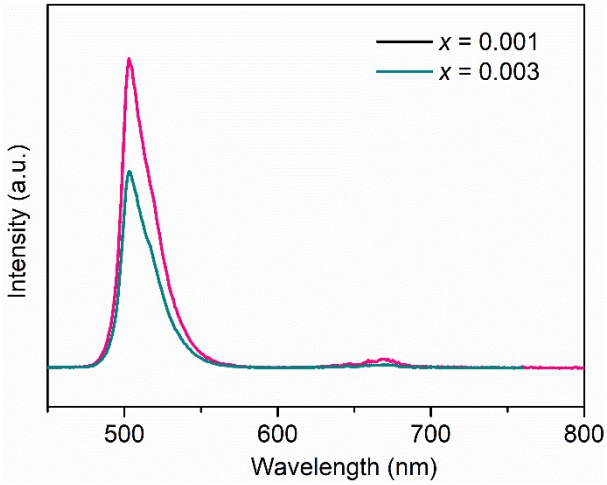

Fig. S4 PL spectra of ZGO:*x*Mn (x = 0.001, 0.003; λ_{ex} = 290 nm).

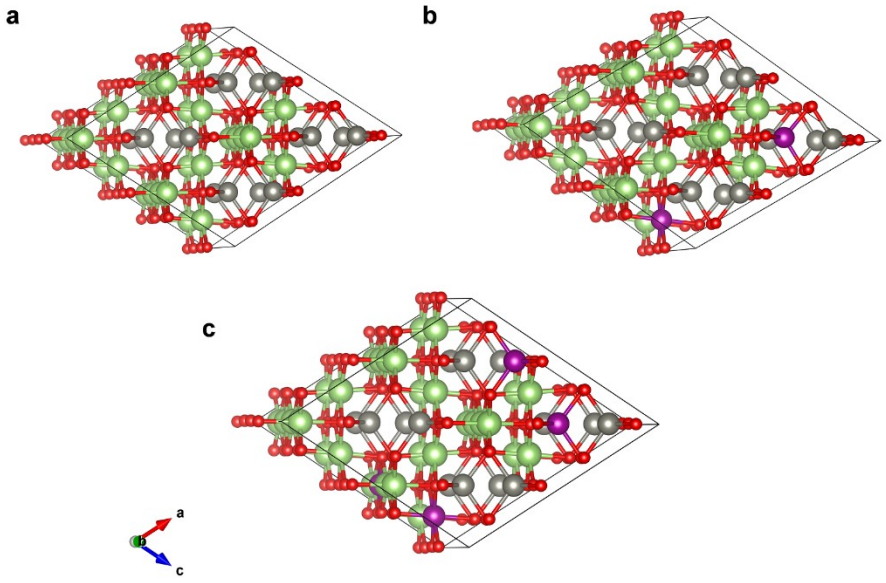

Fig. S5 Optimized crystal structures of $ZnGa_2O_4$ without an Zn-Ga antisite cluster at different Mn concentrations: (a) no Mn atoms, (b) 2 Mn atoms, and (c) 4 Mn atoms in a super cell. Green: Ga; grey: Zn; purple: Mn; red: O.

2. Supplementary Tables

Table S1 Lattice parameters of typical ZGO: xMn^{2+} samples.

x	Space-group	α (Å)	V (Å^3)
0.001	Fd-3m(227)-cubic	8.3154(0)	574.97(1)
0.003		8.3142(0)	574.72(0)

Table S2 Calculated formation energy of Zn-Ga antisite traps at different Mn concentrations.

Structure	E(antisite) (eV)	E(perfect) (eV)	ΔE_f (eV)
Mn_0	-631.658	-632.301	0.643
Mn_2	-642.173	-643.062	0.889
Mn_4	-650.167	-651.108	0.941