Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting Information

Enhanced narrow green emission by constructing efficient energy transfer from Eu^{2+} to Mn^{2+} in $KAl_4Ga_7O_{17}$ for backlit LCD displays

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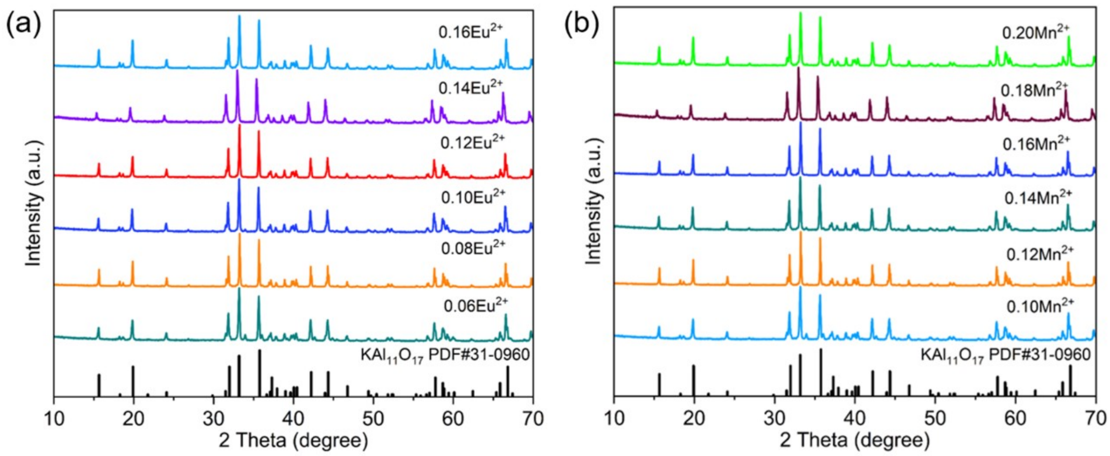

Fig. S1. (a) XRD patterns of KAGO:xEu^{2+} phosphors; (b) XRD patterns of KAGO:xMn^{2+} phosphors.

Table S1. Rietveld refinement parameters of KAGO:0.1Eu^{2+},0.12Mn^{2+} phosphor

Compound	KAGO:0.1Eu^{2+},0.12Mn^{2+}
Space Group	$P6_3/mmc$
a (Å)	5.6136
b (Å)	5.6136
c (Å)	22.6663
V (Å^3)	618.574
α (°)	90
β (°)	90
γ (°)	120
Z	1
2θ-interval (°)	5-120
R_{wp} (%)	11.56
R_p (%)	8.27

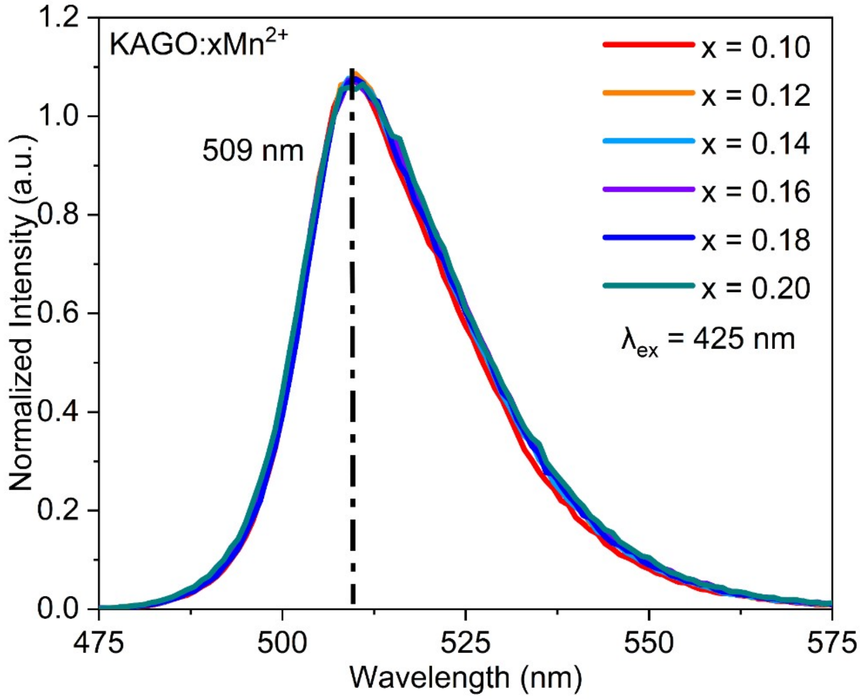

Fig. S2. Normalized PL spectra of KAGO:xMn^{2+} phosphors.

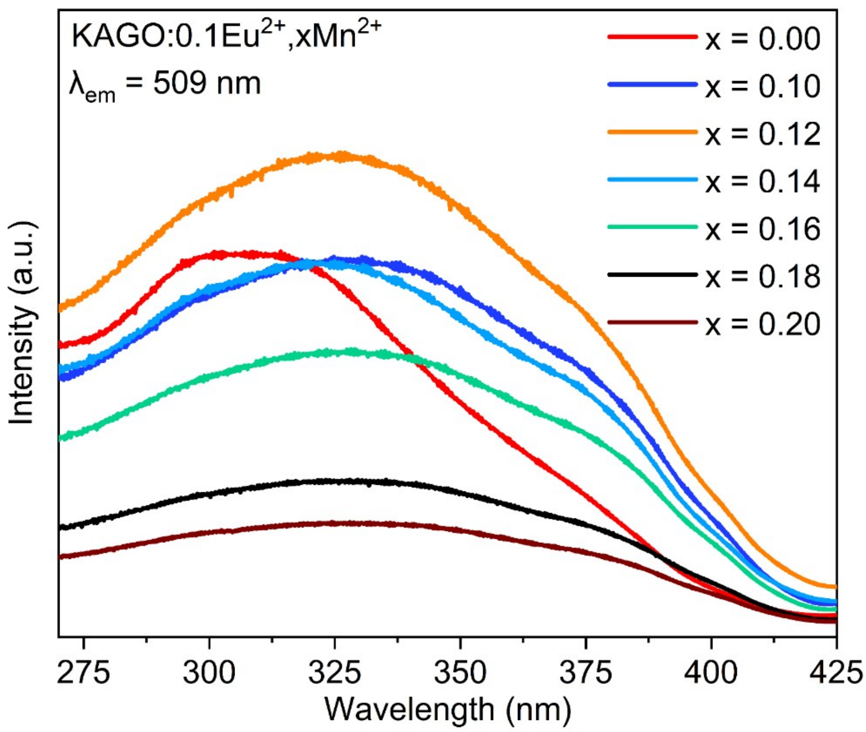

Fig. S3. PLE spectra of KAGO:0.1Eu^{2+},xMn^{2+} phosphors.

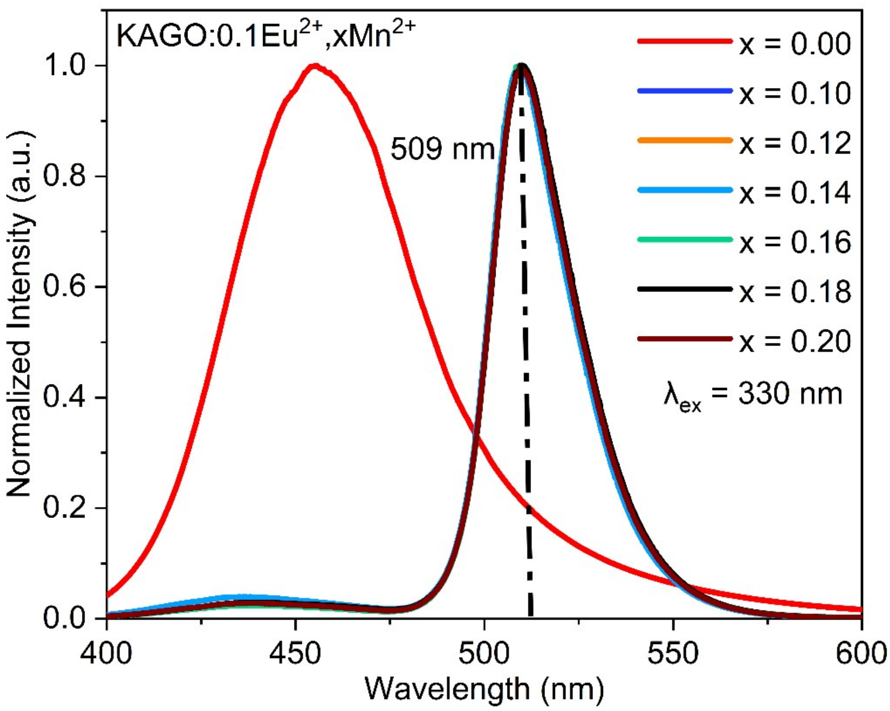

Fig. S4. Normalized PL spectra of KAGO:0.1Eu^{2+},xMn^{2+} phosphors.

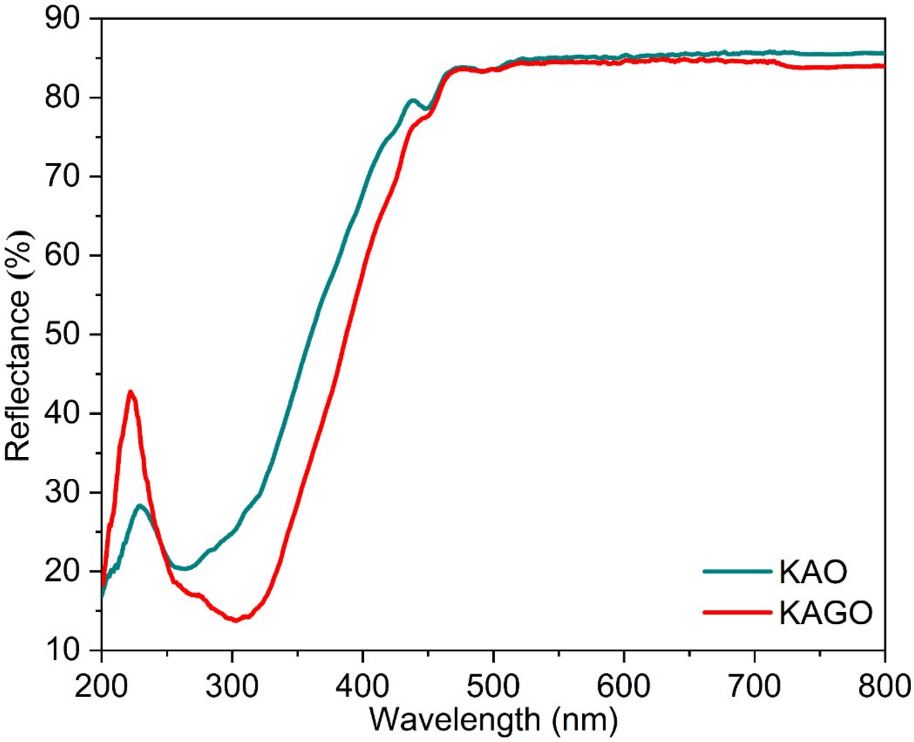

Fig. S5. Diffuse reflectance spectra (DRS) of KAO and KAGO matrix.

Table S2. The calculated energy transfer (ET) efficiencies of $Eu^{2+} \rightarrow Mn^{2+}$ in of KAGO

Sample	ET effciency (%)
KAGO:0.1Eu^{2+}	0
KAGO:0.1Eu^{2+},0.10Mn^{2+}	95.0
KAGO:0.1Eu^{2+},0.12Mn^{2+}	95.6
KAGO:0.1Eu^{2+},0.14Mn^{2+}	95.9
KAGO:0.1Eu^{2+},0.16Mn^{2+}	96.4
KAGO:0.1Eu^{2+},0.18Mn^{2+}	96.5

The calculation method of coverage area:

Firstly, the EL spectrum was collected by using an integrating sphere spectroradiometer system (ATA-1000, Ever fine). Then, the obtained spectra were input into CIE1931 chromaticity coordinate calculation software to obtain the corresponding color coordinates, and the coverage area of color coordinates was calculated by using the following equation:

$$A\ or\ A_{standard} = \frac{1}{2}\begin{vmatrix} x_R & y_R & 1 \\ x_G & y_G & 1 \\ x_B & y_B & 1 \end{vmatrix}$$

A and $A_{standard}$ are the color gamut of the white LED and the standards, respectively. By comparing the coverage area of the white LED with the coverage area of NTSC standard and Rec.2020 standard color coordinates, the calculated color gamut of white LED can cover 122% of the NTSC standard and 91% of the Rec.2020 standard.

Table S3. CIE color coordinates of white LED, NTSC standard, and Rec.2020 standard

	white LED	NTSC standard	Rec.2020 standard
Red	(0.69, 0.30)	(0.62, 0.33)	(0.62, 0.34)
Green	(0.07, 0.69)	(0.21, 0.71)	(0.17, 0.80)
Blue	(0.15, 0.02)	(0.14, 0.08)	(0.13, 0.05)