

## Electronic Supplementary Information

### Thermal stability and self-reduction of a new red phosphor



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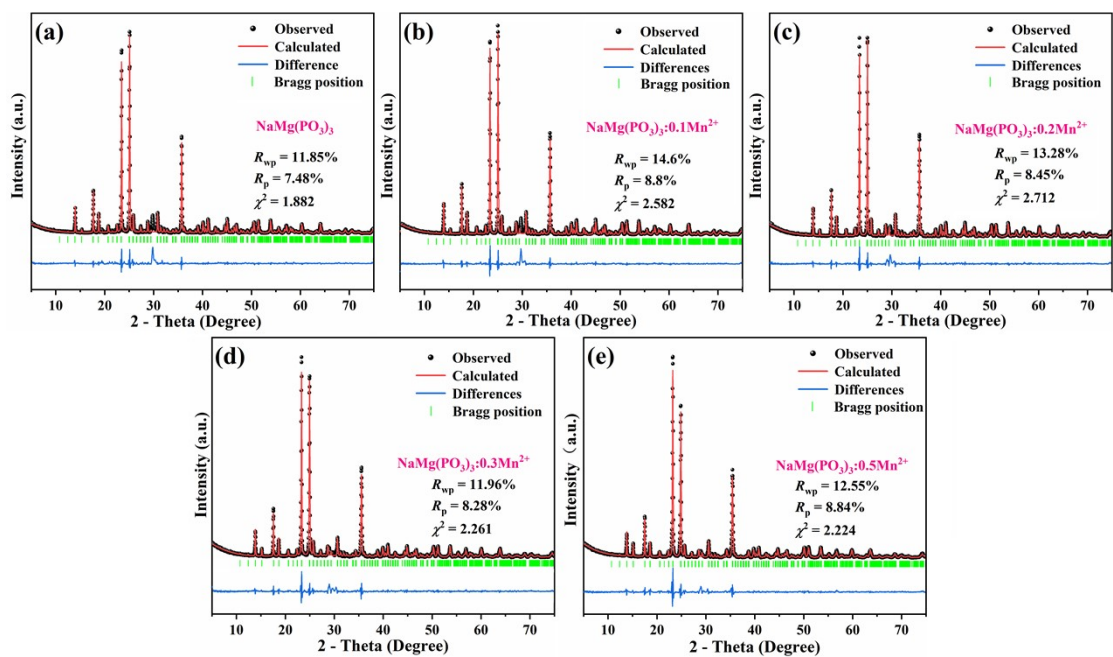
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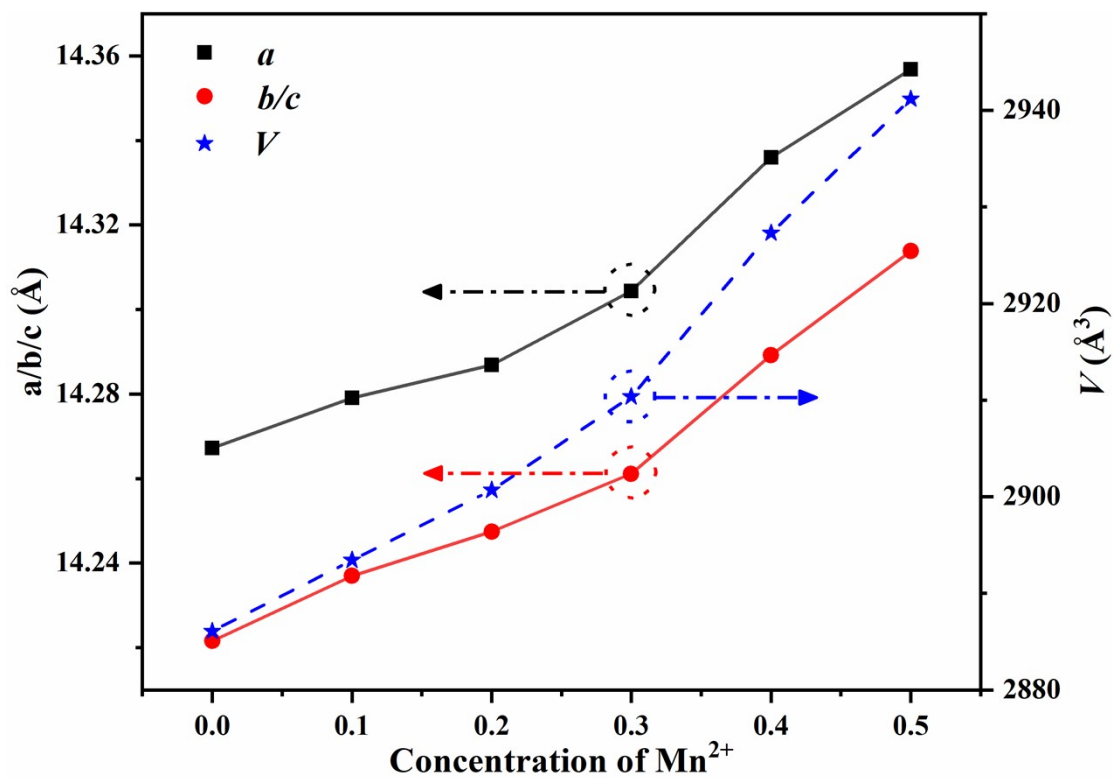
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**Table. S1** Rietveld refined crystallographic parameters of the  $\text{NaMg}_{1-x}(\text{PO}_3)_3:x\text{Mn}^{2+}$  samples.

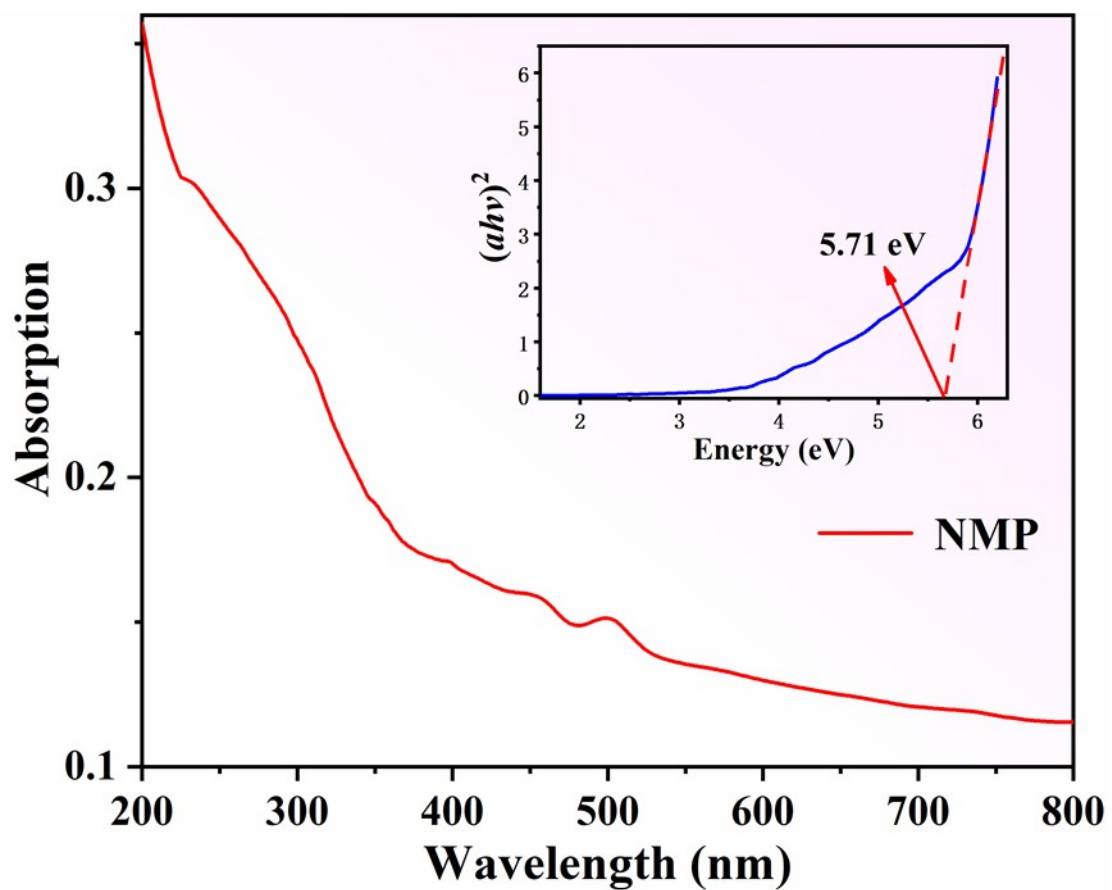
Formula	$x = 0.0$	$x = 0.1$	$x = 0.2$	$x = 0.3$	$x = 0.4$	$x = 0.5$
Crystal system	Orthorho	Orthorho	Orthorho	Orthorho	Orthorho	Orthorho
	mbic	mbic	mbic	mbic	mbic	mbic
Space group	<i>Pbca</i>	<i>Pbca</i>	<i>Pbca</i>	<i>Pbca</i>	<i>Pbca</i>	<i>Pbca</i>
$a$ (Å)	14.267171	14.279147	14.286875	14.304394	14.335966	14.356815
$b$ (Å)	14.221594	14.237005	14.247443	14.261115	14.289226	14.313797
$c$ (Å)	14.224002	14.232888	14.250390	14.266706	14.289963	14.312203
$V$ (Å <sup>3</sup> )	2886.077	2893.436	2900.687	2910.360	2927.297	2941.166
$2\theta$ (°)	5-75	5-75	5-75	5-75	5-75	5-75
$Z$	16	16	16	16	16	16
$R_p$ (%)	7.48	8.80	8.45	8.28	8.12	8.84
$R_{wp}$ (%)	11.85	14.60	13.28	11.96	11.61	12.55
$\chi^2$	1.882	3.582	2.712	2.261	1.823	2.224



**Figure S1.** Rietveld refinements of the XRD files of NaMg<sub>1-x</sub>(PO<sub>3</sub>)<sub>3</sub>:xMn<sup>2+</sup> ( $x = 0, 0.1, 0.2, 0.3$  and  $0.4$ ).



**Figure S2.** Evolution of lattice parameters and the unit cell volumes of NaMg<sub>1-x</sub>(PO<sub>3</sub>)<sub>3</sub>:xMn<sup>2+</sup> ( $x = 0, 0.1, 0.2, 0.3, 0.4$  and  $0.5$ ).



**Figure S3.** Experimental UV-Vis absorption spectrum of NMP ranging from 200 to 800 nm.

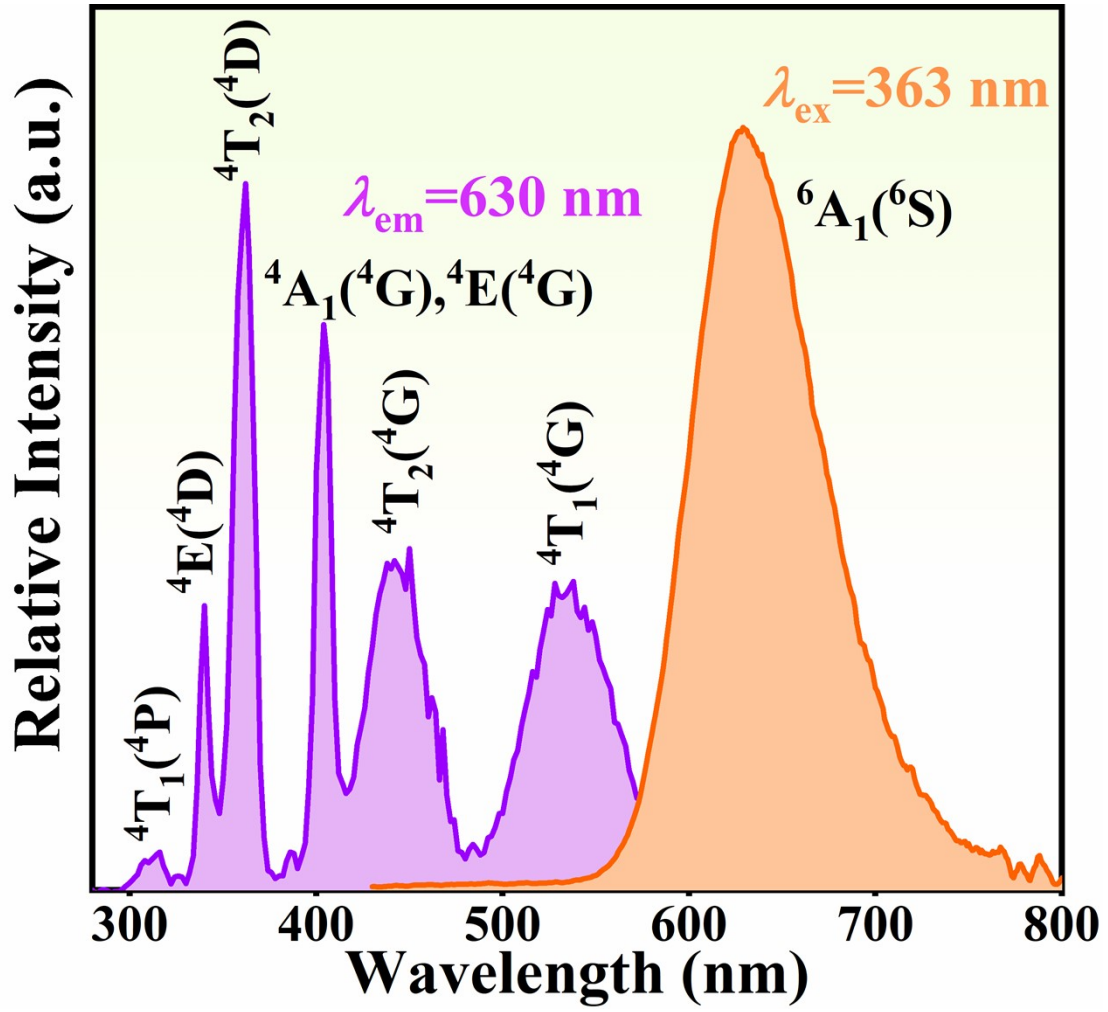
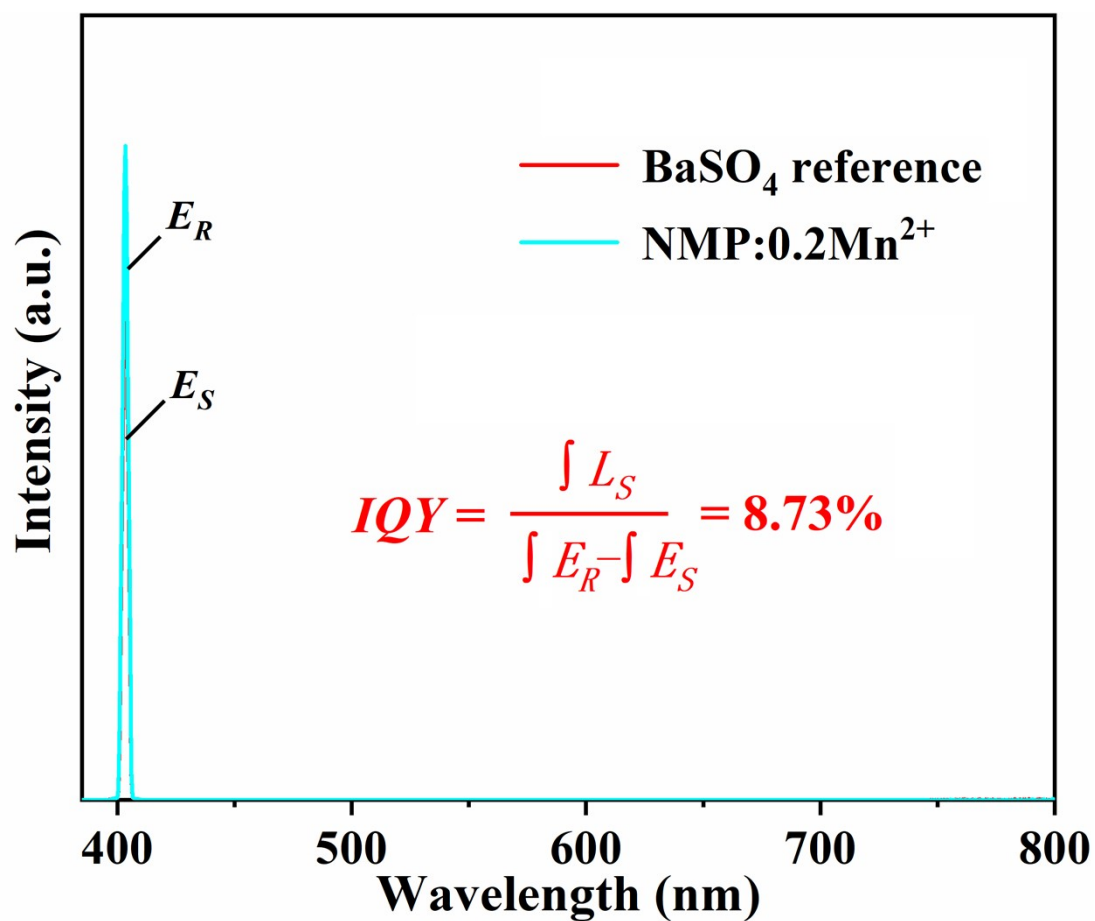


Figure S4. The PLE and PL spectra of NMP:0.2Mn<sup>2+</sup> phosphor.



**Figure S5.** Excitation line of BaSO<sub>4</sub> and emission spectrum of NMP:0.2Mn<sup>2+</sup> phosphor collected by using an integrating sphere.

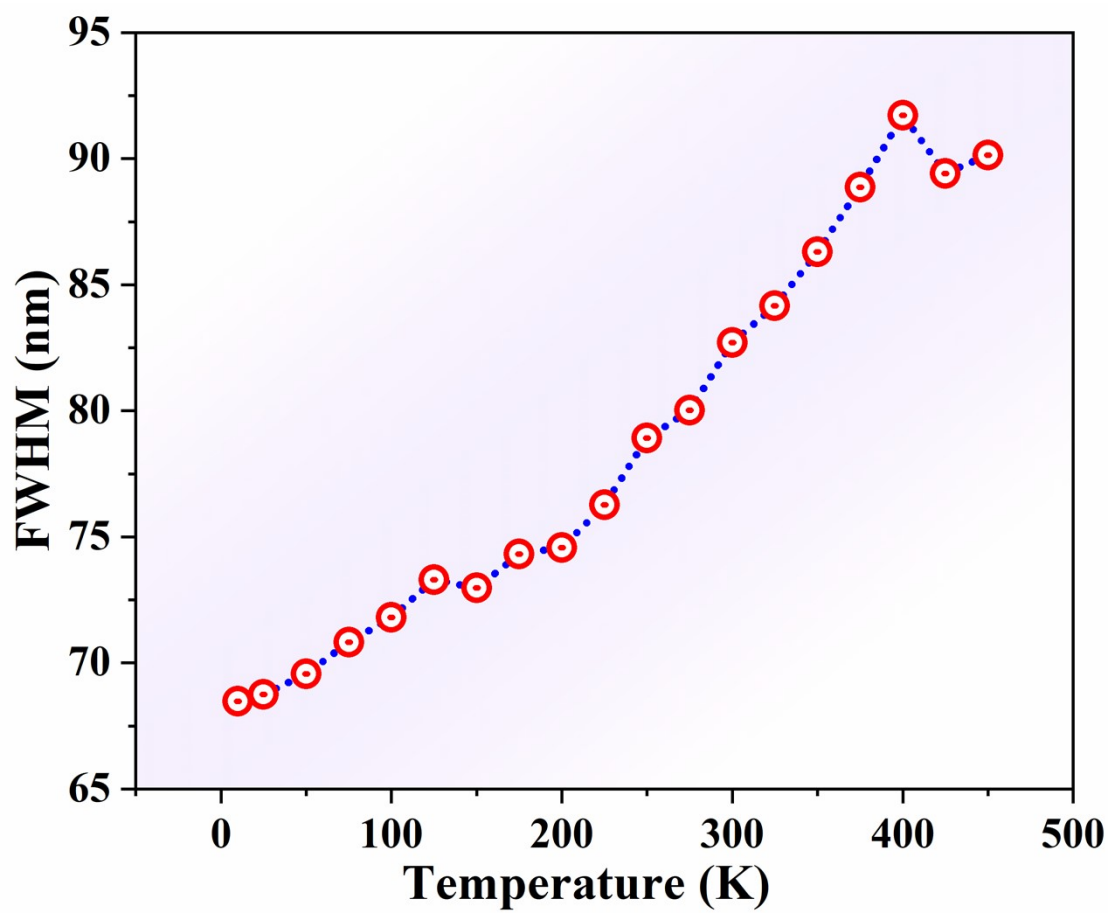


Figure S6. The temperature-dependent FWHM of NMP:0.2Mn<sup>2+</sup>.