

Enhanced NIR Emission and Thermal Stability of $\text{La}_2\text{MgSnO}_6$: Mn^{4+} , Ni^{2+} via Energy Transfer

Yuhao Liu,^a Cong Dou,^a Fan Dou,^b Zihan Zhang,^a Xuan Gao,^c Hongzhe Zhang,^a Sitong Wang,^a
Xiaoming Wang^{*a} and Huan Jiao^{*a}

Electronic Supplementary Information (ESI):

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Table S1 Data for the Rietveld refinement of LMS: 0.6%Mn⁴⁺, 2.5%Ni²⁺.

Chemical formula	LMS: 0.6%Mn ⁴⁺ , 2.5%Ni ²⁺
Crystal system	Monoclinic
Space group	<i>P2₁/n</i> (No. 14)
Cell Parameters /Å	<i>a</i> = 5.64362(6) <i>b</i> = 5.72584(5) <i>c</i> = 8.02780(8)
Cell volume/Å ³	259.414(4)
Formula units /cell	<i>Z</i> = 2
Structure refinement	Topas 5.0
Temperature (K)	293
Profile function	PV_TCHZ
Radiation	Cu Kα
2θ range (°)	10-120
Step size (°)	0.02
<i>R</i> _{wp} (%)	4.77
<i>R</i> _p (%)	3.57
GOF	1.42

Table S2 Main parameters of processing and refinement results of LMS:Ni²⁺ (x =

Compound	x = 0.005	z = 0.010	x = 0.015	x = 0.020	x = 0.025	x = 0.030
Space group	<i>P2₁/n</i>	<i>P2₁/n</i>	<i>P2₁/n</i>	<i>P2₁/n</i>	<i>P2₁/n</i>	<i>P2₁/n</i>
<i>a</i> , (Å)	5.6446	5.6445	5.6440	5.6436	5.6424	5.6414
<i>b</i> , (Å)	5.7250	5.7245	5.7243	5.7242	5.7238	5.7235
<i>c</i> , (Å)	8.0296	8.0294	8.0291	8.0287	8.0263	8.0256
<i>V</i> , (Å ³)	259.48	259.45	259.44	259.32	259.22	259.20
<i>Z</i>	2	2	2	2	2	2
2 θ (°)	10-120	10-120	10-120	10-120	10-120	10-120
<i>R</i> _{wp} (%)	9.58	10.13	10.02	9.36	9.75	9.92
<i>R</i> _p (%)	7.08	7.34	7.81	6.78	7.12	7.16
GOF	1.27	1.25	1.21	1.13	1.12	1.19

0.005-0.03) .

Table S3 Main parameters of processing and refinement results of LMS:Mn⁴⁺ (z = 0.002-0.012).

Compound	z = 0.002	z = 0.004	z = 0.006	z = 0.008	z = 0.01	z = 0.012
Space group	<i>P2₁/n</i>	<i>P2₁/n</i>	<i>P2₁/n</i>	<i>P2₁/n</i>	<i>P2₁/n</i>	<i>P2₁/n</i>
<i>a</i> , (Å)	5.6445	5.6442	5.6440	5.6436	5.6433	5.6424
<i>b</i> , (Å)	5.7250	5.7245	5.7241	5.7238	5.7235	5.7233
<i>c</i> , (Å)	8.0296	8.0294	8.0291	8.0287	8.0280	8.0265
<i>V</i> , (Å ³)	259.478	259.449	259.439	259.406	259.300	259.291
<i>Z</i>	2	2	2	2	2	2
2 θ (°)	10-120	10-120	10-120	10-120	10-120	10-120
<i>R</i> _w (%)	9.68	10.22	10.43	9.32	9.95	9.98
<i>R</i> _p (%)	7.18	7.24	7.91	6.82	7.22	7.36
GOF	1.17	1.23	1.23	1.13	1.24	1.28