

## Supporting Information

### Thermally Stable NIR Broad Emission of Cr<sup>3+</sup> Doping Phosphor With a High NIR Output Power

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Table S1 Main structural parameters of  $\text{YGa}_{1.5}\text{Al}_{1.5}(\text{BO}_3)_4:0.06\text{Cr}^{3+}$ .

	ISCD No. 91963	$\text{YGa}_{1.5}\text{Al}_{1.5}(\text{BO}_3)_4$	$\text{YGa}_{1.5}\text{Al}_{1.5}(\text{BO}_3)_4:0.06\text{Cr}^{3+}$
Space Group	R32H	R32H	R32H
a (Å)	9.342	3.961	9.360
b (Å)	9.342	3.961	9.360
c (Å)	7.325	7.338	7.339
Z	3	3	3
$R_{\text{wp}}$ (%)	--	7.68	7.65
$R_{\text{p}}$ (%)	--	10.9	10.2
$R_{\text{exp}}$ (%)	--	4.35	4.75

Table S2. Atomic coordinate parameters of  $\text{YGa}_{1.5}\text{Al}_{1.5}(\text{BO}_3)_4:0.06\text{Cr}^{3+}$ .

Atom	$\text{YGa}_{1.5}\text{Al}_{1.5}(\text{BO}_3)_4$				$\text{YGa}_{1.5}\text{Al}_{1.5}(\text{BO}_3)_4:0.06\text{Cr}^{3+}$			
	X	Y	Z	Occ	X	Y	Z	Occ
Y	0.00000	0.00000	0.00000	0.16819	0.00000	0.00000	0.00000	0.16796
Al	0.55309	0.00000	0.00000	0.31002	0.55367	0.00000	0.00000	0.29279
Ga	0.55309	0.00000	0.00000	0.25000	0.55367	0.00000	0.00000	0.25000
B1	0.00000	0.00000	0.50000	0.16667	0.00000	0.00000	0.00000	0.16667
B2	0.44411	0.00000	0.50000	0.50000	0.44725	0.00000	0.50000	0.50000
O1	0.85085	0.00000	0.50000	0.50000	0.85061	0.00000	0.50000	0.50000
O2	0.59015	0.00000	0.50000	0.50000	0.59070	0.00000	0.50000	0.50000
O3	0.45198	0.14709	0.51733	1.00000	0.45087	0.14576	0.51907	1.00000

Table S3. PL properties of some Cr<sup>3+</sup>-doped NIR-emitting phosphors.

Phosphors	PLQY	Relative PL intensity @temperature	Output power	photoelectric conversion efficiency	Ref
Ca <sub>2</sub> YAl <sub>3</sub> Ge <sub>2</sub> O <sub>12</sub> :Cr <sup>3+</sup>	78%	85%@373 K	33.3 mW @100 mA	11.5% @100 mA	S1
Ca <sub>3</sub> Sc <sub>2</sub> Ge <sub>3</sub> O <sub>12</sub> :0.06Cr <sup>3+</sup>	81%	95%@423 K	109.3 mW @300 mA	11.9%@300 mA	S2
LuCa <sub>2</sub> ScZrGa <sub>2</sub> GeO <sub>12</sub> :Cr <sup>3+</sup>	69%	64%@423 K	37.88 mW @100 mA	12.44% @100 mA	S3
Mg <sub>3</sub> Gd <sub>2</sub> Ge <sub>3</sub> O <sub>12</sub> :Cr <sup>3+</sup>	61%	45%@423 K	23.2 mW @100 mA	8.45% @100 mA	S4
KAIP <sub>2</sub> O <sub>7</sub> :Cr <sup>3+</sup>	79%	77%@423 K	32.1 mW @100 mA	11.4% @100 mA	S5
Mg <sub>2</sub> SnO <sub>4</sub> :Cr <sup>3+</sup>	77%	67%@423 K	187.19 mW @100 mA	13.67% @100 mA	S6
KA <sub>0.4</sub> G <sub>0.6</sub> O:Cr	89%	77%@423 K	39.3 mW @100 mA	16.3% @100 mA	S7
Sr <sub>3</sub> Al <sub>9.8</sub> SiO <sub>20</sub> :0.2Cr	68%	77%@380 K	46.63 mW @100 mA	16.9% @100 mA	S8
GdGa <sub>3</sub> (BO <sub>3</sub> ) <sub>4</sub> :15%Cr <sup>3+</sup>	11%	94%@423 K	6.45mW @120 mA	1.57% @120 mA	S9
Mg <sub>3</sub> Lu <sub>2</sub> Ge <sub>3</sub> O <sub>12</sub> :Cr <sup>3+</sup>	49%	50%@398 K	5.3 mW @20 mA	13.1% @20 mA	S10
YGa <sub>1.5</sub> Al <sub>1.5</sub> (BO <sub>3</sub> ) <sub>4</sub> :0.06Cr <sup>3+</sup>	86%	104%@423 K	40.8 mW @100 mA	10.9% @100 mA	TW

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