

## Supporting Information

### **Excellent luminescent thermal stability of Dy<sup>3+</sup>/Sm<sup>3+</sup> co-activated multifunctional titanate single-phase phosphors**

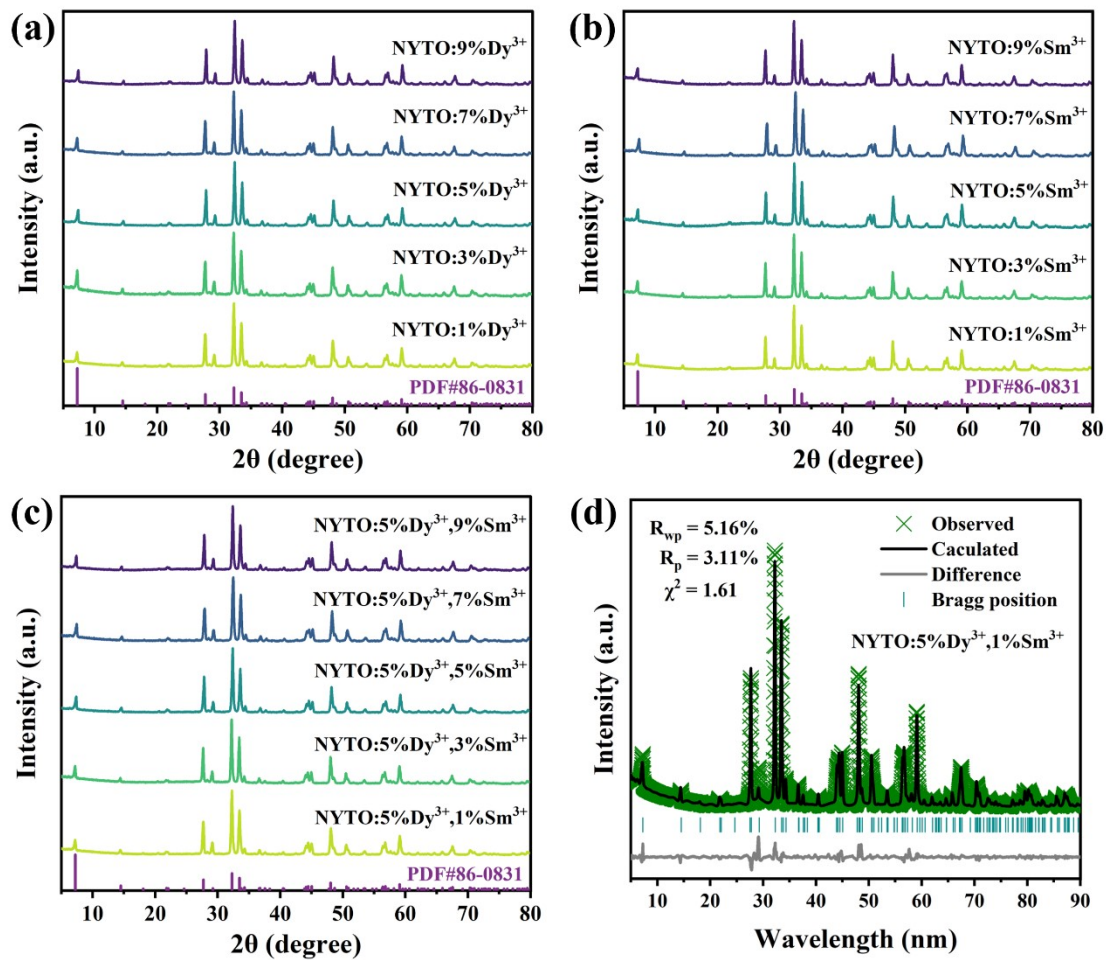
Feiyan Xie,<sup>a\*</sup> Junqiang Gu,<sup>b</sup> Jiao Zou,<sup>a</sup> Zhu Liu,<sup>a</sup> Baojun Chen,<sup>a</sup> and Juling Xu<sup>a</sup>

<sup>a</sup>School of Chemistry and Materials Engineering, Huizhou University, Huizhou 516007, China

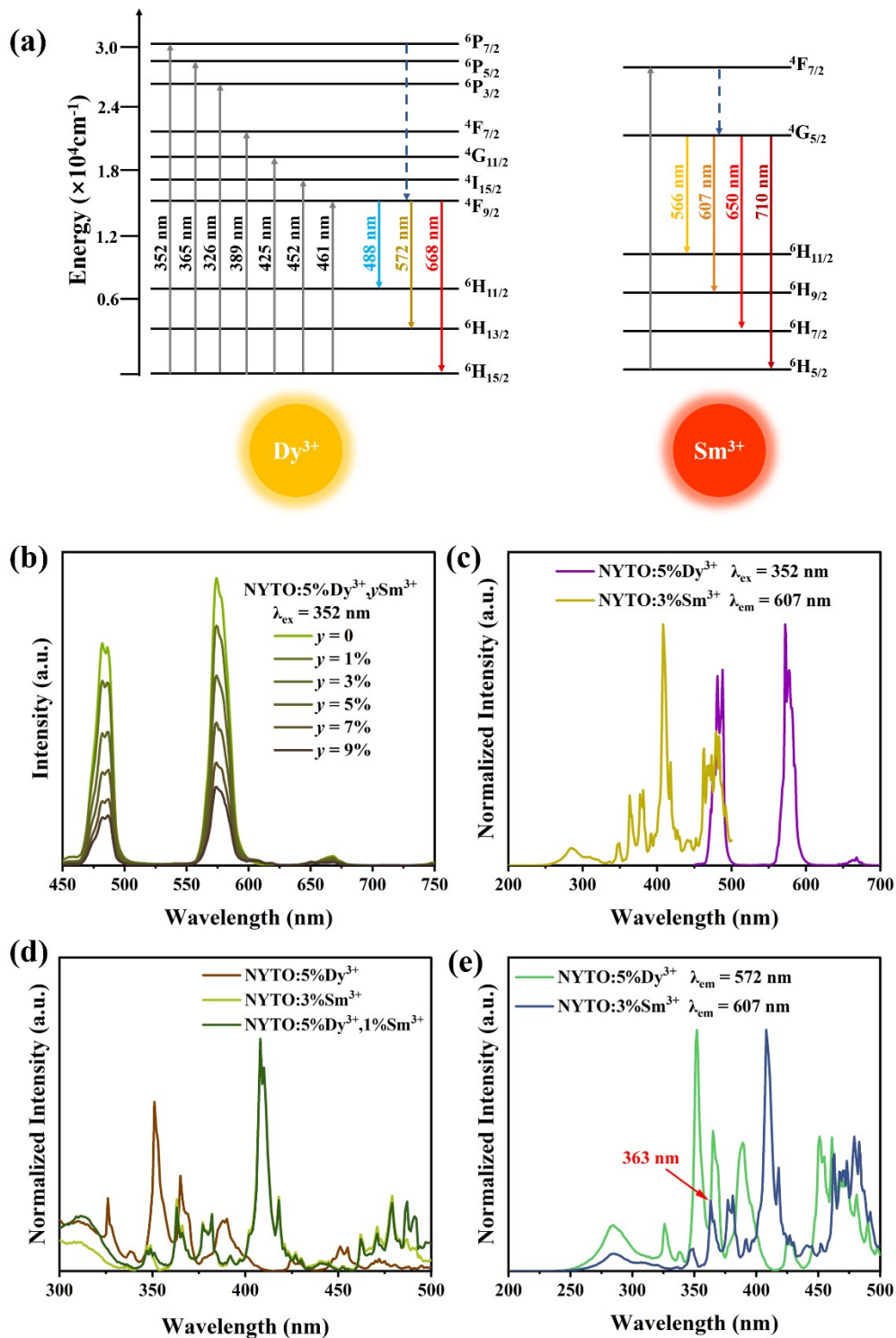
<sup>b</sup>College of Chemistry and Chemical Engineering, Jiangxi Normal University, Nanchang 330022, China

\* Corresponding author.

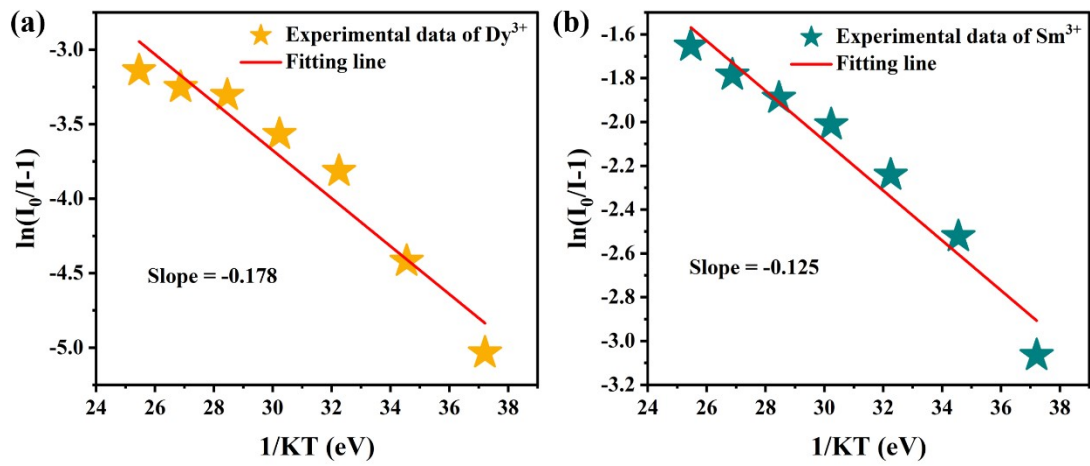
Email: xfy@hzu.edu.cn



**Figure S1.** XRD pattern of samples compared to the standard pattern (a) NYTO: $x\text{Dy}^{3+}$ ; (b) NYTO: $y\text{Sm}^{3+}$  and (c) NYTO: $5\%\text{Dy}^{3+},y\text{Sm}^{3+}$ . (d) Rietveld refinement of XRD data for the as-synthesized NYTO: $5\%\text{Dy}^{3+},1\%\text{Sm}^{3+}$  phosphor.



**Figure S2.** (a) Schematic energy-level diagram of Dy<sup>3+</sup> and Sm<sup>3+</sup>. (b) The PL spectra of NYTO:5%Dy<sup>3+</sup>,<sub>y</sub>Sm<sup>3+</sup> phosphors ( $\lambda_{\text{ex}} = 352 \text{ nm}$ ). (c) PLE spectrum of NYTO:3%Sm<sup>3+</sup> phosphor and PL spectrum of NYTO:5%Dy<sup>3+</sup> phosphor. (d) PLE spectra of NYTO:5%Dy<sup>3+</sup>, NYTO:3%Sm<sup>3+</sup> and NYTO:5%Dy<sup>3+</sup>,1%Sm<sup>3+</sup> phosphors ( $\lambda_{\text{em}} = 607 \text{ nm}$ ). (e) PLE spectra of NYTO:5%Dy<sup>3+</sup> ( $\lambda_{\text{em}} = 572 \text{ nm}$ ) and NYTO:3%Sm<sup>3+</sup> ( $\lambda_{\text{em}} = 607 \text{ nm}$ ) phosphors.



**Figure S3.** Arrhenius fitting of the integral intensity of the temperature-dependent PL spectra of (a)  $Dy^{3+}$  and (b)  $Sm^{3+}$ .

**Table 1.** The refined crystallographic parameters of NYTO host and NYTO:5%Dy<sup>3+</sup>,1%Sm<sup>3+</sup> phosphor.

Compound	NYTO host	NYTO:5%Dy <sup>3+</sup> ,1%Sm <sup>3+</sup>
Crystal structure	orthogonal	orthogonal
Space group	Pbcm (57)	Pbcm (57)
Lattice parameters	a = 12.212 Å	a = 12.232 Å
	b = 5.347 Å	b = 5.345 Å
	c = 5.345 Å	c = 5.344 Å
Unit cell volume	V = 349.09 Å <sup>3</sup>	V = 349.39 Å <sup>3</sup>
R <sub>p</sub>	7.98%	5.16%
R <sub>wp</sub>	4.85%	3.11%
χ <sup>2</sup>	1.98	1.61

**Table 2.** Element composition of NYTO:5%Dy<sup>3+</sup>,1%Sm<sup>3+</sup> phosphor.

Element	Theoretical ratio (%)	Atomic ratio (%)
Na	14.29	13.26
Y	13.43	13.31
Ti	14.29	13.62
O	57.14	58.72
Dy	0.71	0.88
Sm	0.14	0.21