

**Up-conversion photoluminescence and temperature sensing properties of Er<sup>3+</sup>-doped  
Bi<sub>4</sub>Ti<sub>3</sub>O<sub>12</sub> nanoparticles with good water-resistance performance**

T. Wei<sup>&†</sup>, T. B. Zhang<sup>&</sup>, Y. J. Ma<sup>&</sup>, Y. F. Xie<sup>&</sup>, C. Z. Zhao<sup>§</sup>, F. M. Yang<sup>&</sup>, H. Y. Xiao<sup>&</sup>, Y.  
Zhao<sup>&</sup>, H. Y. Yan<sup>&</sup>

<sup>&</sup>*College of Science, Civil Aviation University of China, Tianjin 300300, China*

<sup>§</sup>*School of Electronics and Information Engineering, Tianjin Polytechnics University, Tianjin  
300160, China*

**Supporting Information:**

**Supplemental Tables**

**Table S1.** Atomic coordinates, atomic occupancies and isotropic thermal parameters of the BiT-0 at room temperature

Atom	Site	x	y	z	100U <sub>iso</sub> /Å <sup>2</sup>	Occupancy
Bi1	8 i	0(0)	0(0)	0.06747(8)	0.72(7)	1
Bi2	8 i	0(0)	0(0)	0.21059(7)	0.78(7)	1
Ti1	4 b	0(0)	0(0)	0.50(0)	1.25(52)	1
Ti2	8 i	0(0)	0(0)	0.36759(30)	1.49(32)	1
O1	8 e	0.25(0)	0.25(0)	0 (0)	4.66 (36)	1
O2	8 f	0.25(0)	0.25 (0)	0.25(0)	4.66 (36)	1
O3	8 i	0(0)	0(0)	0.4372(8)	4.66 (36)	1
O4	8 i	0(0)	0(0)	0.3270(8)	4.66 (36)	1
O5	16 j	0.25(0)	0.25(0)	0.1258(5)	4.66 (36)	1

<sup>†</sup> Corresponding Author, E-mail: [weitong.nju@gmail.com](mailto:weitong.nju@gmail.com) or [weitong\\_nju@163.com](mailto:weitong_nju@163.com)

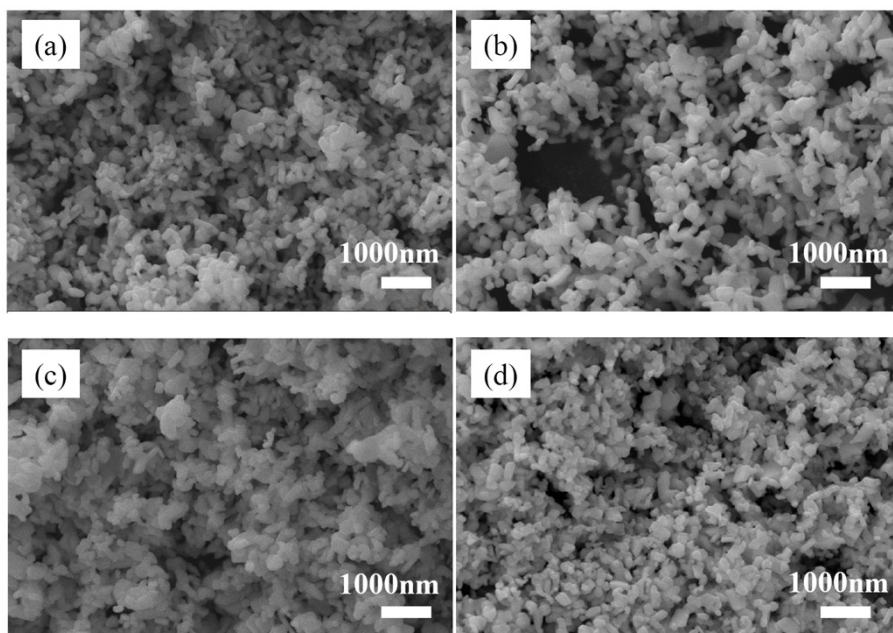
**Table S2.** Atomic coordinates, atomic occupancies and isotropic thermal parameters of the BiT-0.05 at room temperature

Atom	Site	x	y	z	$100U_{\text{iso}}/\text{\AA}^2$	Occupancy
Bi1	8 i	0(0)	0(0)	0.06755(8)	0.94(7)	0.975
Er1	8 i	0(0)	0(0)	0.06755(8)	0.94(7)	0.025
Bi2	8 i	0(0)	0(0)	0.21050(6)	1.18(7)	1
Ti1	4 b	0(0)	0(0)	0.50(0)	1.84 (55)	1
Ti2	8 i	0(0)	0(0)	0.36794(28)	0.95 (29)	1
O1	8 e	0.25(0)	0.25(0)	0 (0)	4.15 (35)	1
O2	8 f	0.25(0)	0.25 (0)	0.25(0)	4.15 (35)	1
O3	8 i	0(0)	0(0)	0.4400(7)	4.15 (35)	1
O4	8 i	0(0)	0(0)	0.3294(8)	4.15 (35)	1
O5	16 j	0.25(0)	0.25(0)	0.1269(5)	4.15 (35)	1

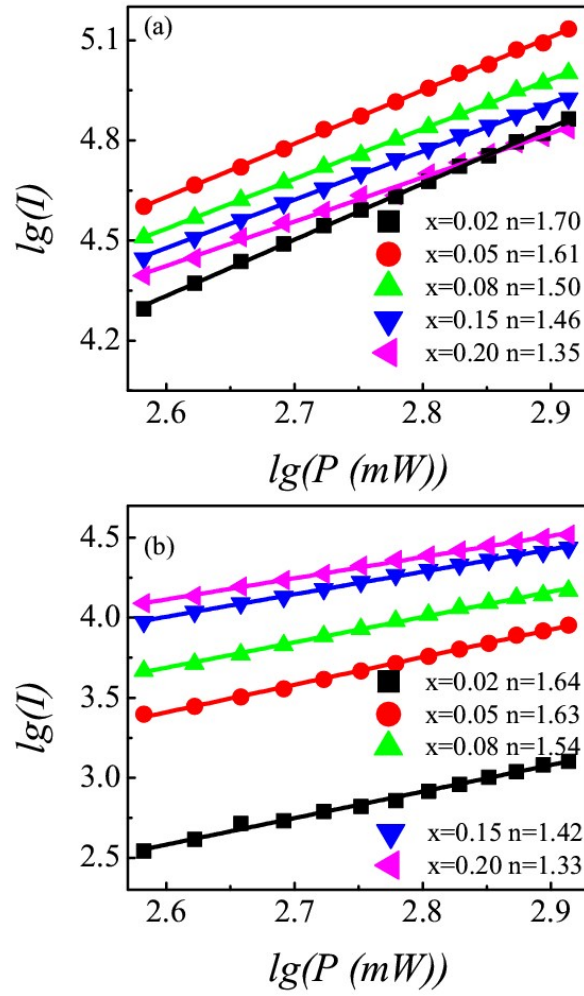
**Table S3.** Atomic coordinates, atomic occupancies and isotropic thermal parameters of the BIT-0.2 at room temperature

Atom	Site	x	y	z	$100U_{\text{iso}}/\text{\AA}^2$	Occupancy
Bi1	8 i	0(0)	0(0)	0.06760(11)	1.08 (9)	0.90
Er1	8 i	0(0)	0(0)	0.06760(11)	1.08 (9)	0.10
Bi2	8 i	0(0)	0(0)	0.21032(8)	1.13 (9)	1
Ti1	4 b	0(0)	0(0)	0.50(0)	0.86 (64)	1
Ti2	8 i	0(0)	0(0)	0.36630(35)	0.72 (38)	1
O1	8 e	0.25(0)	0.25(0)	0 (0)	3.03 (38)	1
O2	8 f	0.25(0)	0.25 (0)	0.25(0)	3.03 (38)	1
O3	8 i	0(0)	0(0)	0.4390(8)	3.03 (38)	1
O4	8 i	0(0)	0(0)	0.3317(9)	3.03 (38)	1
O5	16 j	0.25(0)	0.25(0)	0.1244(6)	3.03 (38)	1

## Supplemental Figures



**Fig. S1.** (Color online) SEM micrographs of BiT-0.02 (a), BiT-0.05 (b), BiT-0.08 (c), BiT-0.15 (d).



**Fig. S2.** (Color online) Dependence of UC green (a) and red (b) emission intensities on pumping power for BiT-x. The solid lines are the linear fitting results.