

Supplementary materials

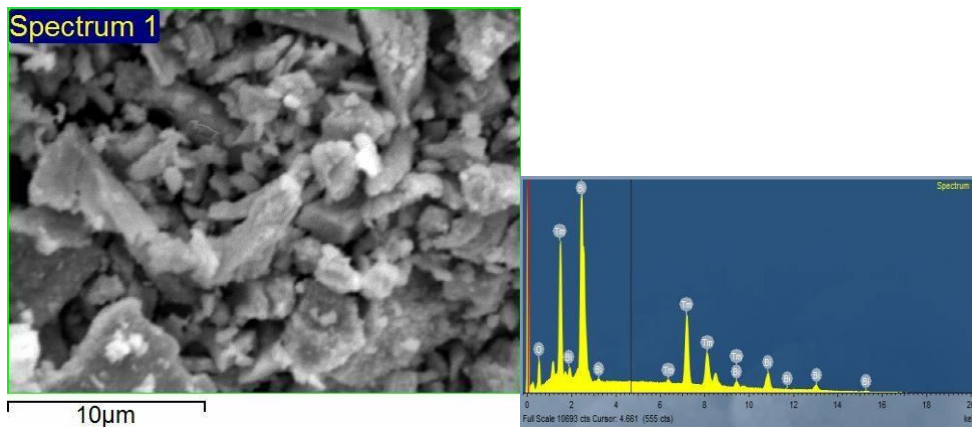
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1.EXD analysis of the samples:

Sample 2

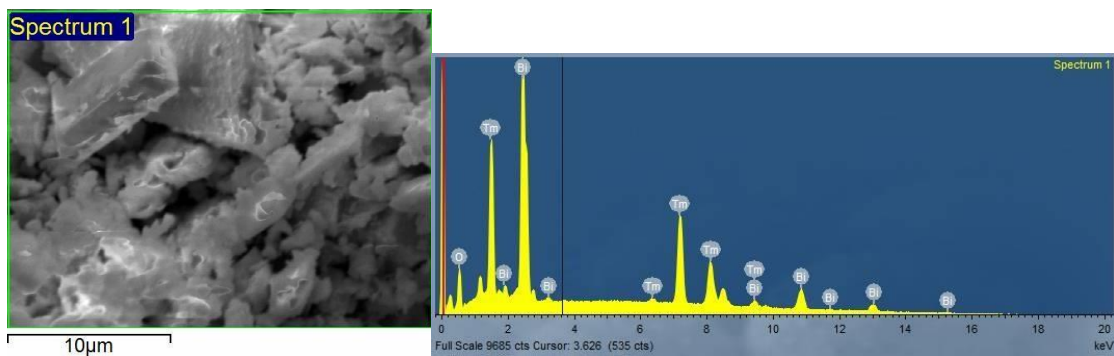
O (at.%)	Tm (at.%)	Bi (at.%)
66	22	12



(a)

Sample 3

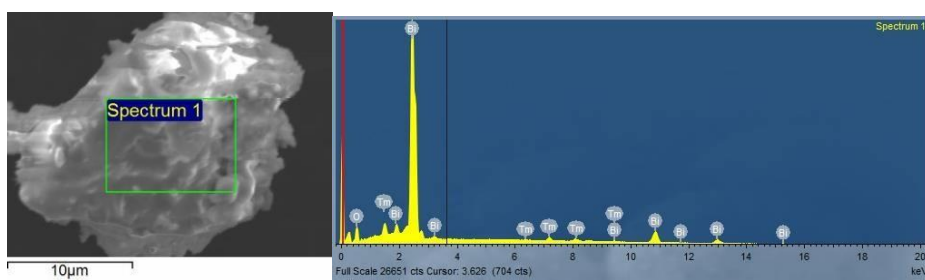
O (at.%)	Tm (at.%)	Bi (at.%)
53	15	30



(b)

Sample 4

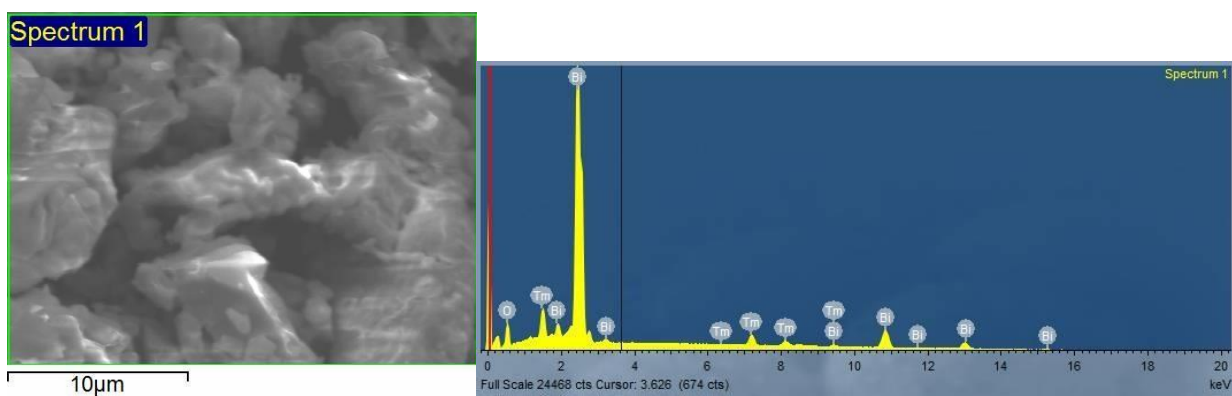
O (at.%)	Tm (at.%)	Bi (at.%)
66	9	26

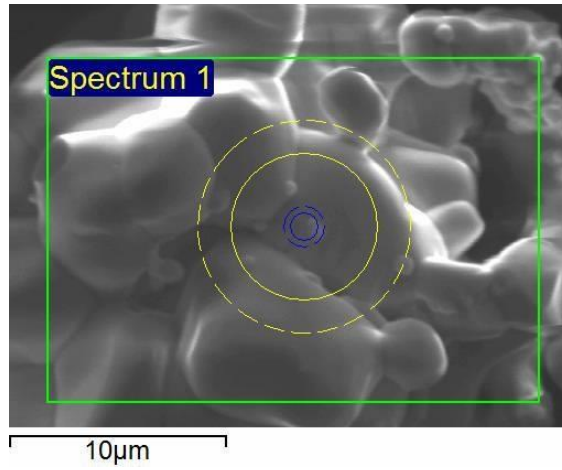


(c)

Sample 5

O (at.%)	Tm (at.%)	Bi (at.%)
60	2	36





(d)

Fig.S1. The EXD analysis of the samples with the different atomic concentrations of the thulium and bismuth ions.

2.Reflectance coefficient vs Tm^{3+} concentration at room temperature ($T=293\text{ K}$)

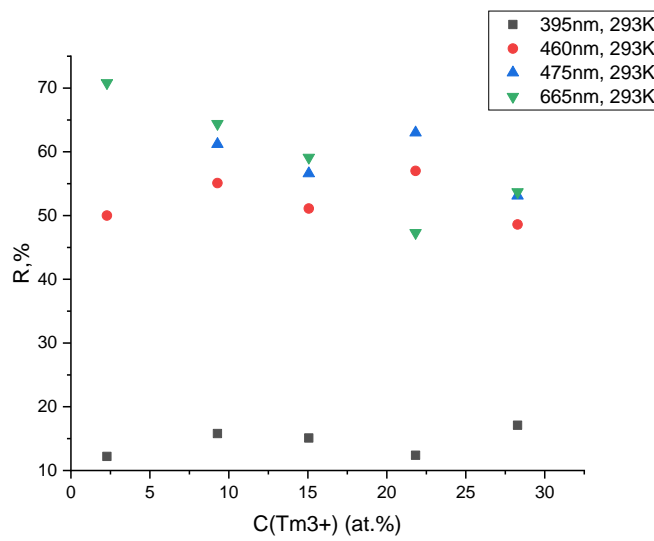


Fig.S2. The dynamic of $R(\%)$ depending on the Tm^{3+} concentration at $T=293\text{ K}$ at absorptionwavelength (395,460, 474, 665 nm).

3. Kinetic decay curves of UCL recorded at 665 nm

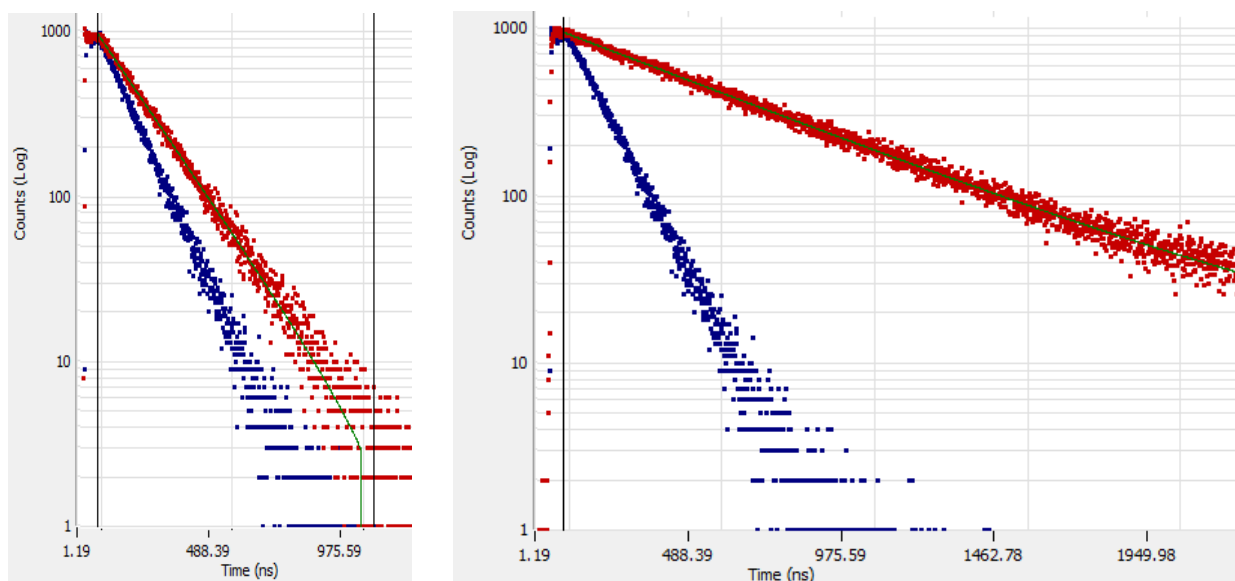


Fig.S3. Kinetic decay curves of UCL recorded at 665 nm under excitation with wavelengths of 980 nm (concentration of Tm^{3+} was of 15 at.% and 22 at.%) at $T=80$ K.

4. Refractive index spectrum in visible region for $\text{Bi}_2\text{O}_3/\text{Tm}_3\text{O}_3$ system

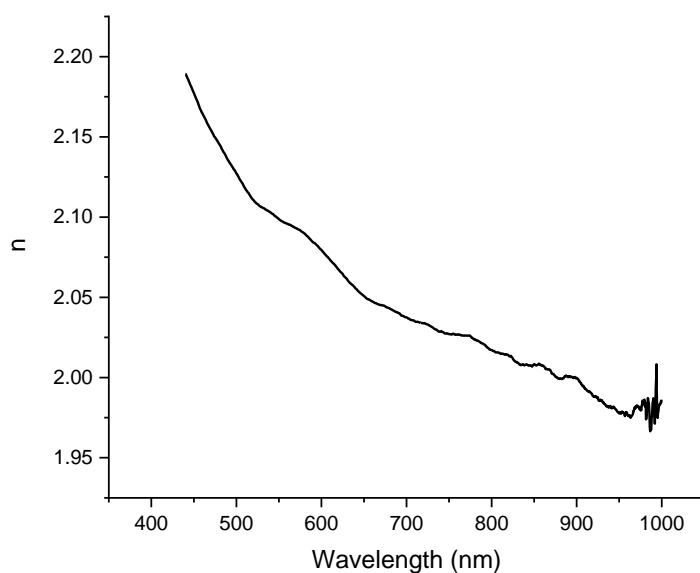


Fig.S4. Refractive index spectrum in visible region for $\text{Bi}_2\text{O}_3/\text{Tm}_3\text{O}_3$ system.

5. Complex dielectric functions in visible region for $\text{Bi}_2\text{O}_3/\text{Tm}_3\text{O}_3$ system

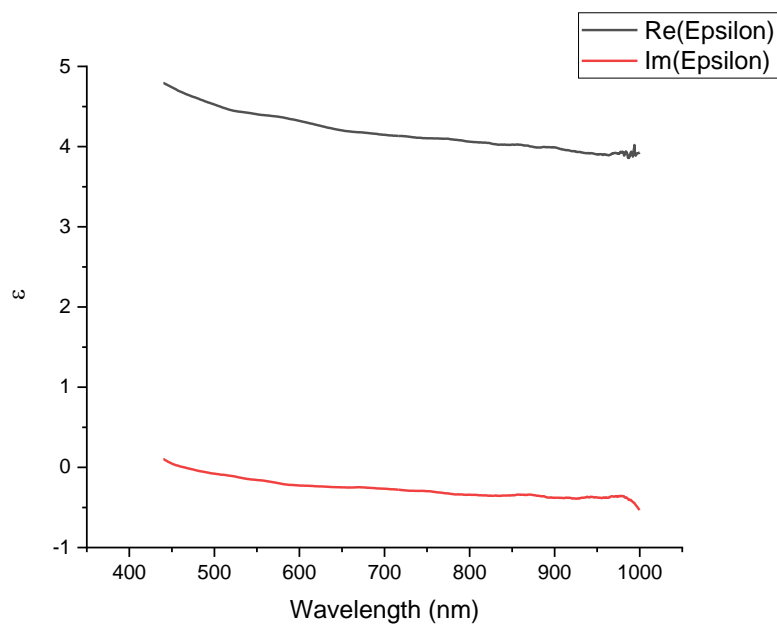


Fig.S5. Complex dielectric function in visible region for $\text{Bi}_2\text{O}_3/\text{Tm}_3\text{O}_3$ system.

6. Polarization in visible region for $\text{Bi}_2\text{O}_3/\text{Tm}_3\text{O}_3$ system

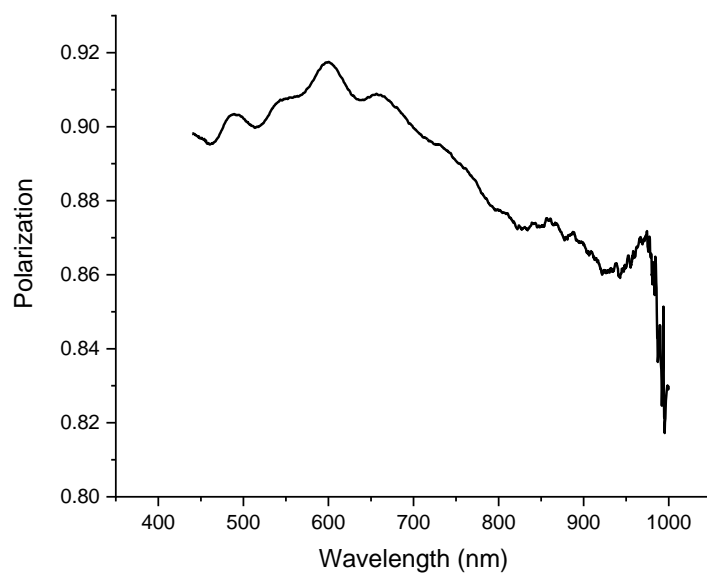


Fig.S6. Polarization in visible region for $\text{Bi}_2\text{O}_3/\text{Tm}_3\text{O}_3$ system.