

## Electronic Supplementary Information

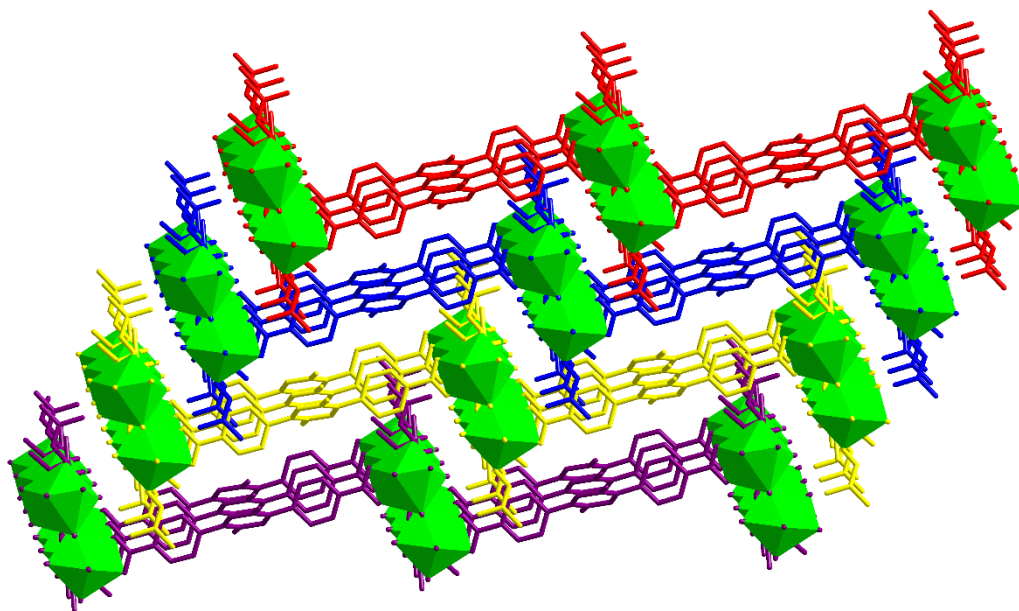
### **A Novel 2D Metal-Organic Framework Probe: Highly Sensitive and Visual Fluorescent Sensor for Al<sup>3+</sup>, Cr<sup>3+</sup>, Fe<sup>3+</sup> Ions**

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**Table S1.** X-ray crystallographic data for **Tb-DBA**

Formula	C <sub>33</sub> H <sub>21</sub> N <sub>2.5</sub> O <sub>8</sub> Tb
Fw	1507.11
Crystal system	Triclinic
Space group	<i>p</i> -1
<i>a</i> (Å)	8.3473 (3)
<i>b</i> (Å)	17.4598 (7)
<i>c</i> (Å)	18.3029 (7)
$\alpha$ (°)	76.871(2)
$\beta$ (°)	89.666 (2)
$\gamma$ (°)	81.002(2)
<i>V</i> (Å <sup>3</sup> )	2564.59(17)
<i>Z</i>	1
<i>D</i> <sub>c</sub> (g/cm <sup>3</sup> )	0.976
<i>F</i> (000)	731.0
Reflns collected	10503
Completeness(%)	99.5
GOF on <i>F</i> <sup>2</sup>	1.040
<i>R</i> <sub>1</sub> / <i>wR</i> <sub>2</sub> [ <i>I</i> >2σ( <i>I</i> )]	0.0405/0.1169

**Fig. S1** The stacking structure of Tb-DBA.

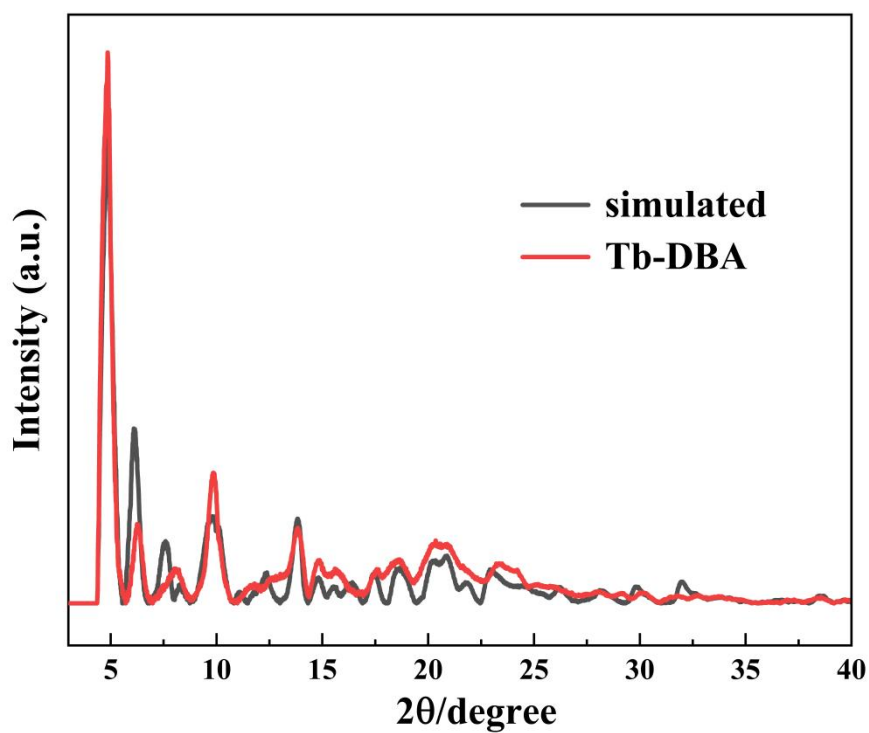


Fig. S2 As-synthesized and simulated PXRD patterns of Tb-DBA.

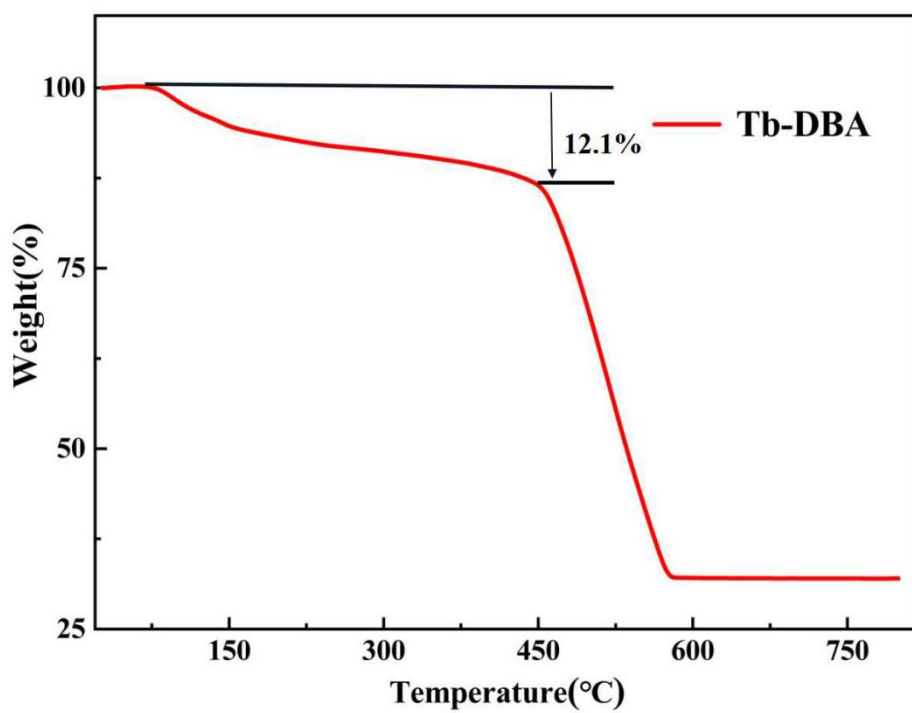


Fig. S3 TGA curves of Tb-DBA measured in  $N_2$  atmosphere at a temperature ramp of  $10^\circ C \text{ min}^{-1}$ .

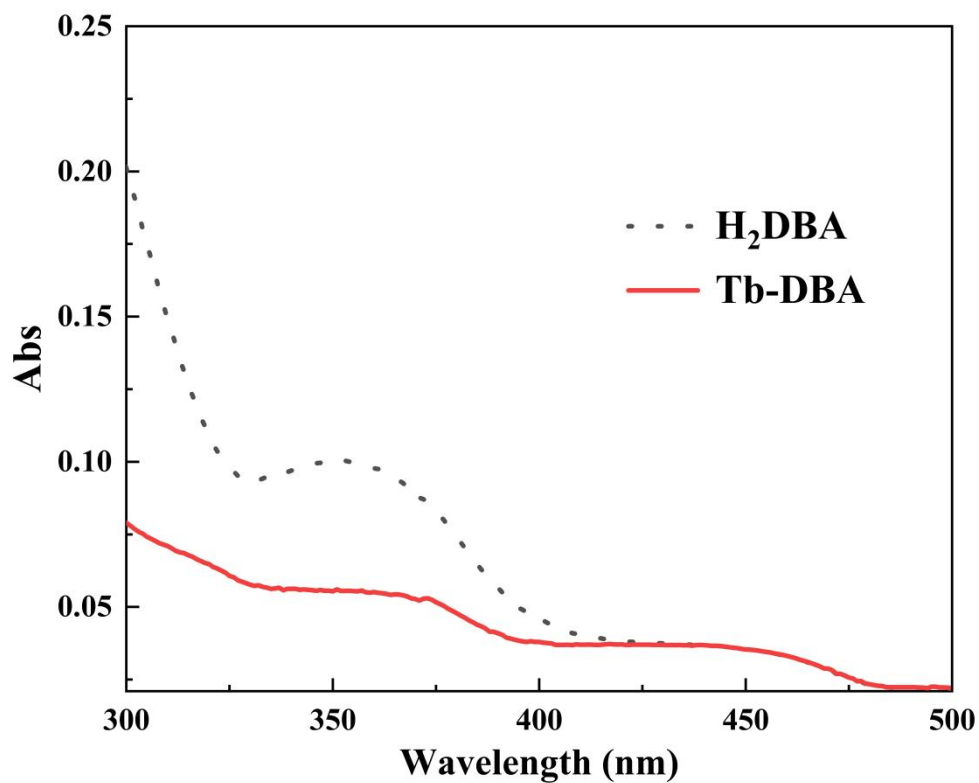


Fig. S4 UV-Vis spectra of H<sub>2</sub>DBA and Tb-DBA.

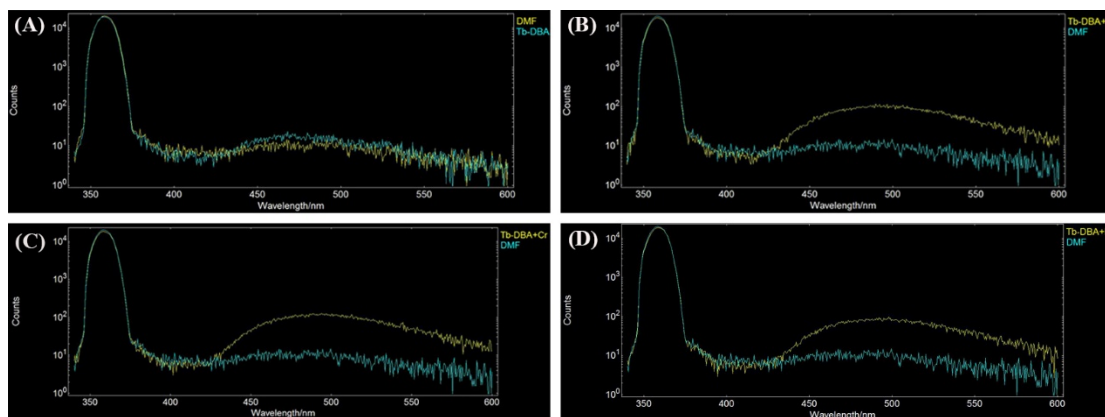


Figure S5. The quantum yields of Tb-DBA(A), Tb-DBA + Al<sup>3+</sup>(B), Tb-DBA + Cr<sup>3+</sup>(C) and Tb-DBA + Fe<sup>3+</sup>(D) .

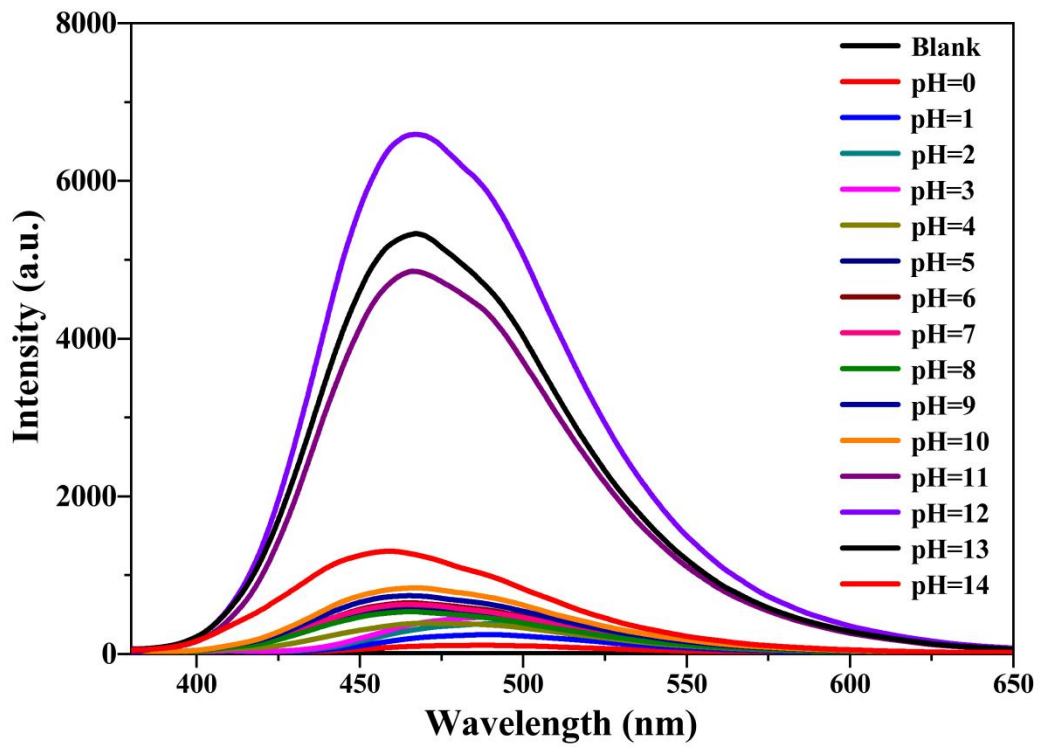


Fig. S6 Fluorescence of Tb-DBA in pH = 0-14 solutions.

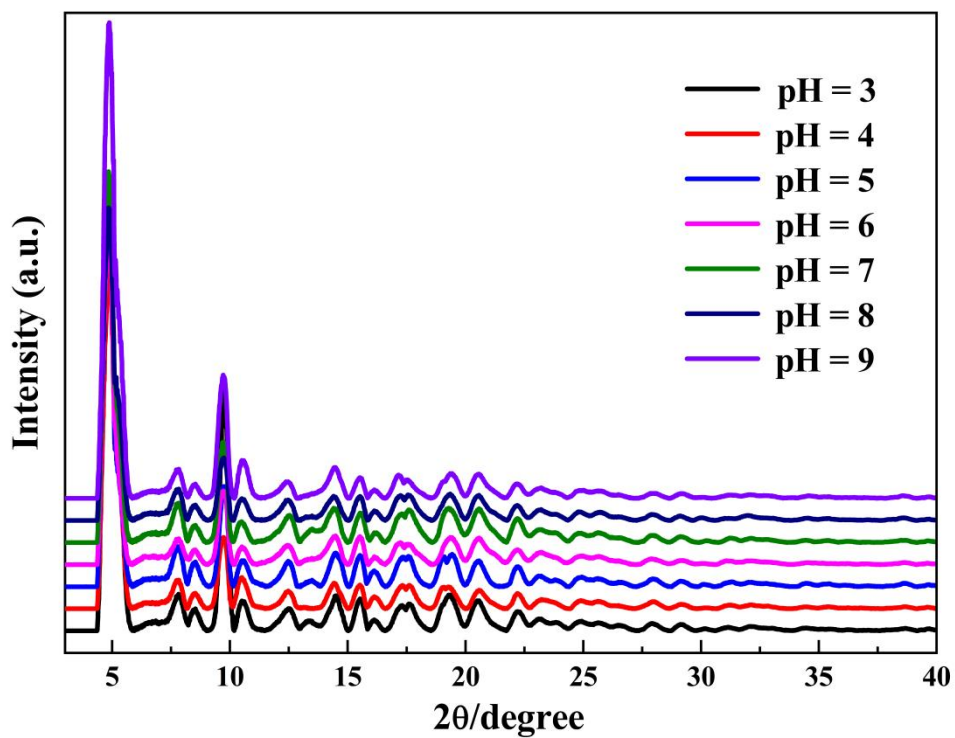
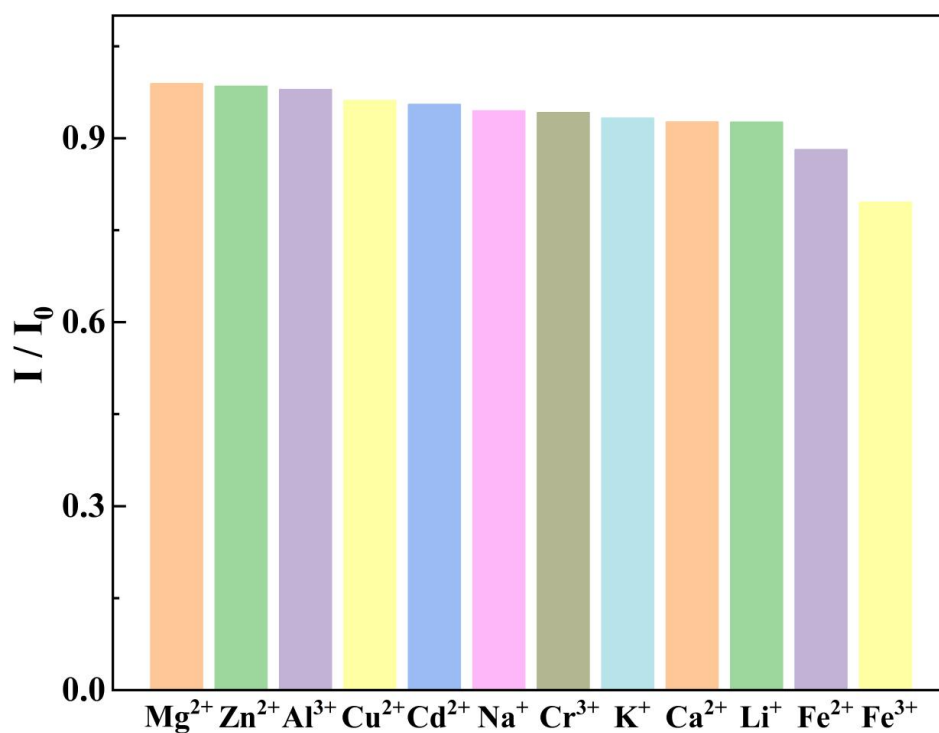
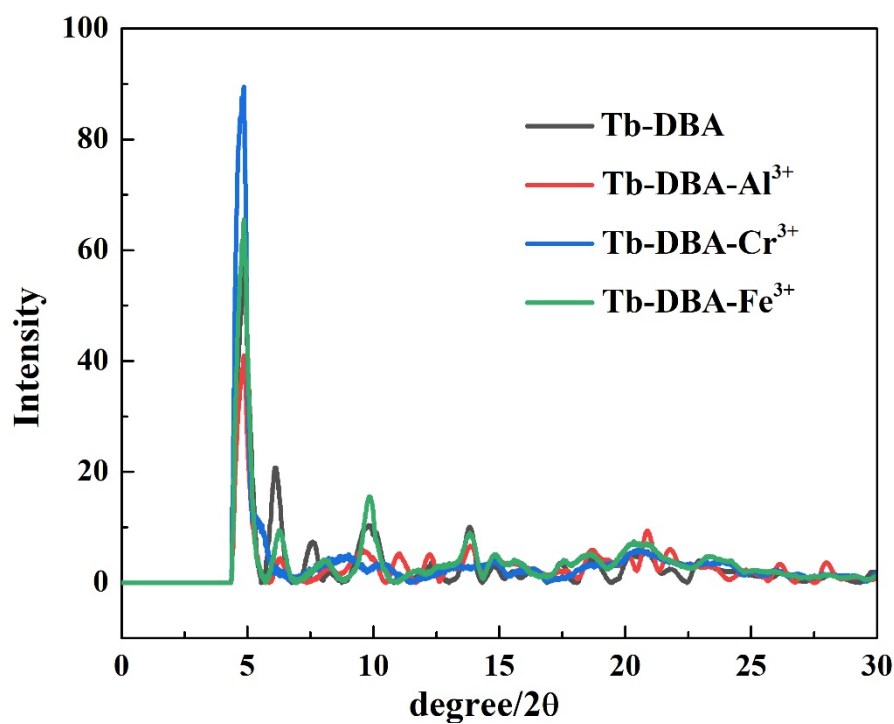


Fig. S7 PXRD patterns of Tb-DBA after soaked in different pH solutions.



**Fig. S8** Relative luminescent intensity of H<sub>2</sub>DBA introduced into different cations at 485 nm.



**Fig. S9** The PXRD patterns of Tb-DBA, Tb-DBA-Al<sup>3+</sup>, Tb-DBA-Cr<sup>3+</sup>, and Tb-DBA-Fe<sup>3+</sup>.

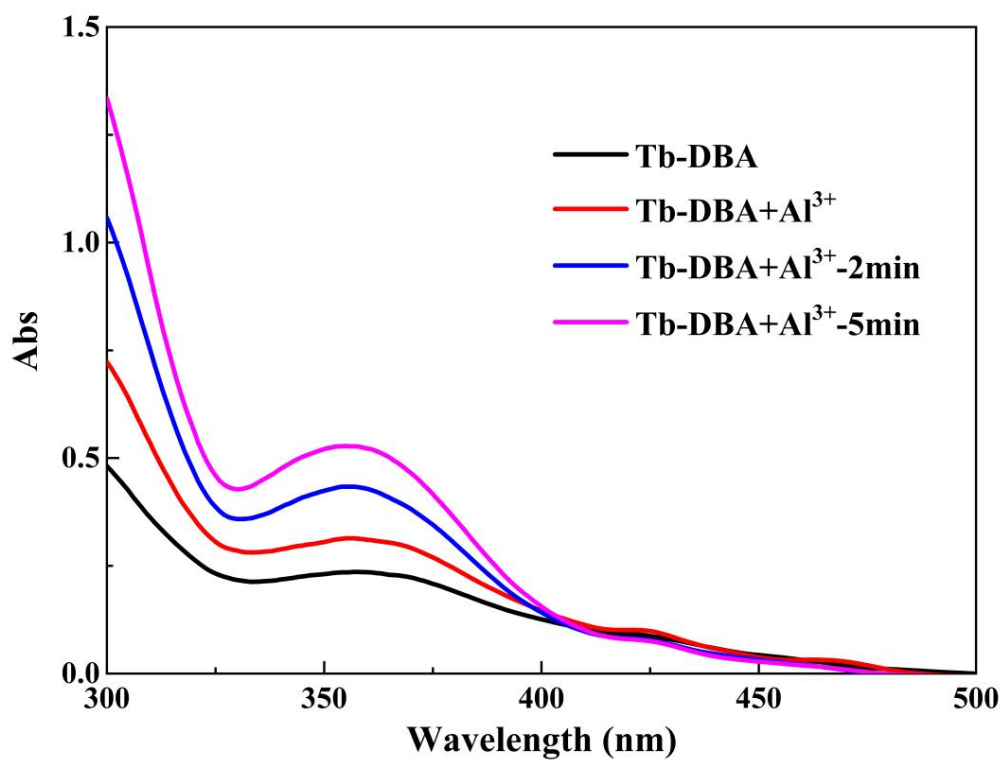


Fig. S10 UV-Vis spectra of Tb-DBA with Al<sup>3+</sup> ions.

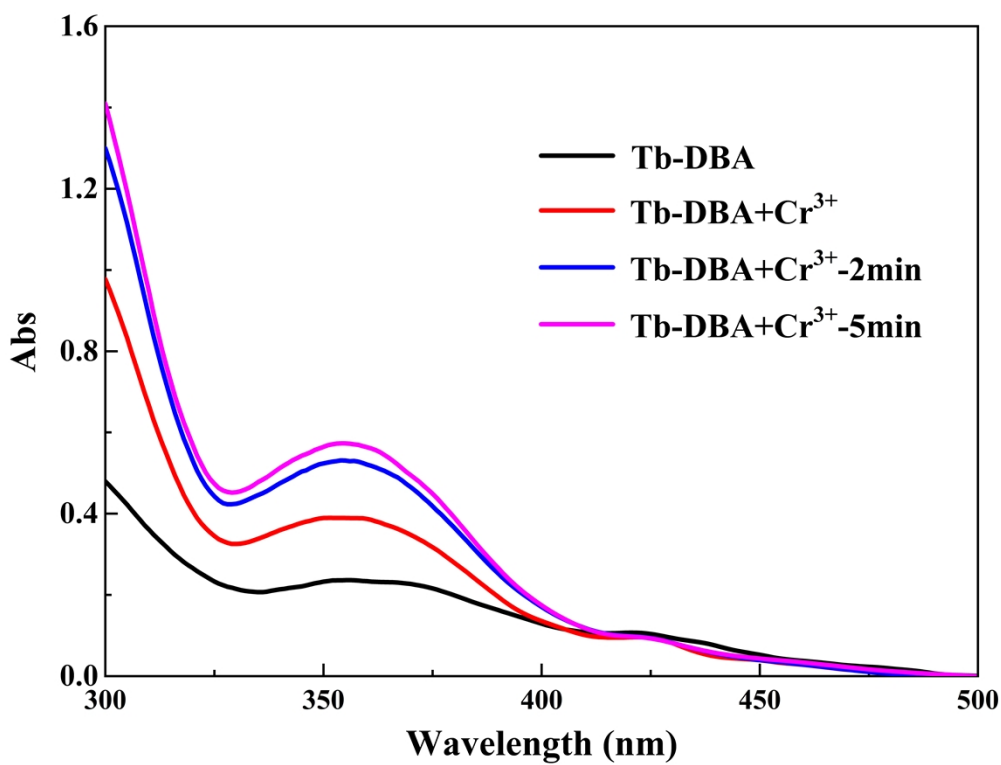
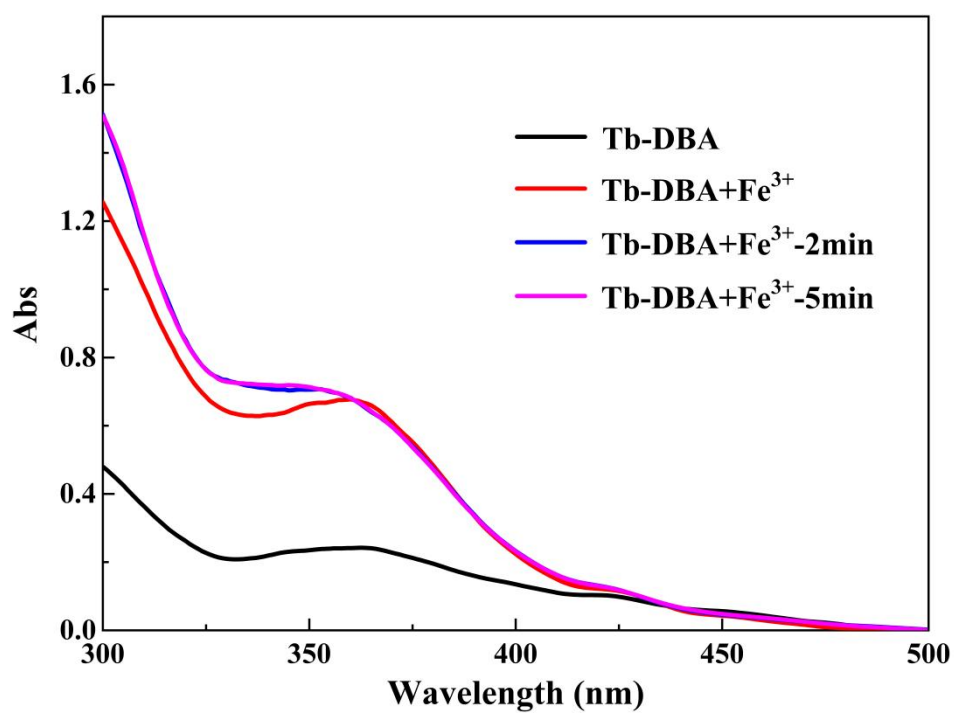


Fig. S11 UV-Vis spectra of Tb-DBA with Cr<sup>3+</sup> ions.

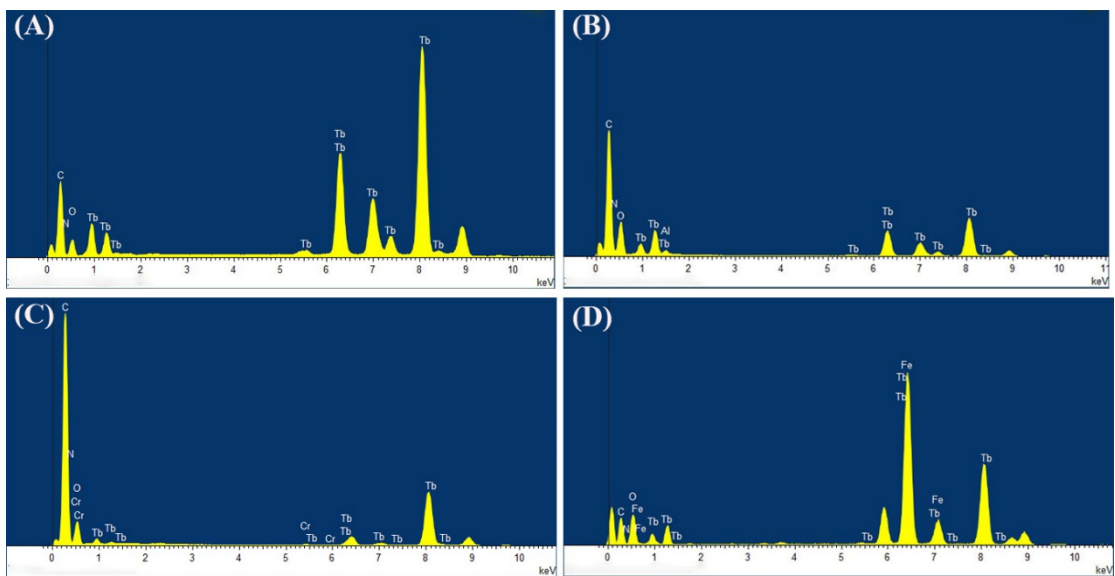


**Fig. S12** UV-Vis spectra of Tb-DBA with  $\text{Fe}^{3+}$  ions.

**Table S2.** ICP analysis for  $\text{Tb}^{3+}$  contents.

Samples	$\text{Tb}^{3+}$ (mmol/L)
Tb-DBA	0.00
Tb-DBA+ $\text{Al}^{3+}$	2.0
Tb-DBA+ $\text{Cr}^{3+}$	1.7
Tb-DBA+ $\text{Fe}^{3+}$	1.2





**Figure S13.** EDS measurement of Tb-DBA(A), Tb-DBA + Al<sup>3+</sup>(B), Tb-DBA + Cr<sup>3+</sup>(C) and Tb-DBA+Fe<sup>3+</sup>(D).