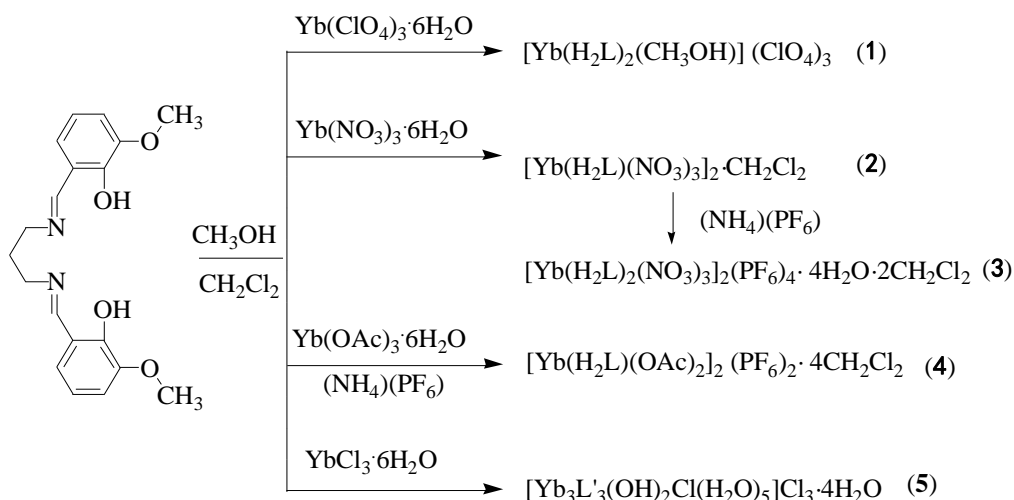
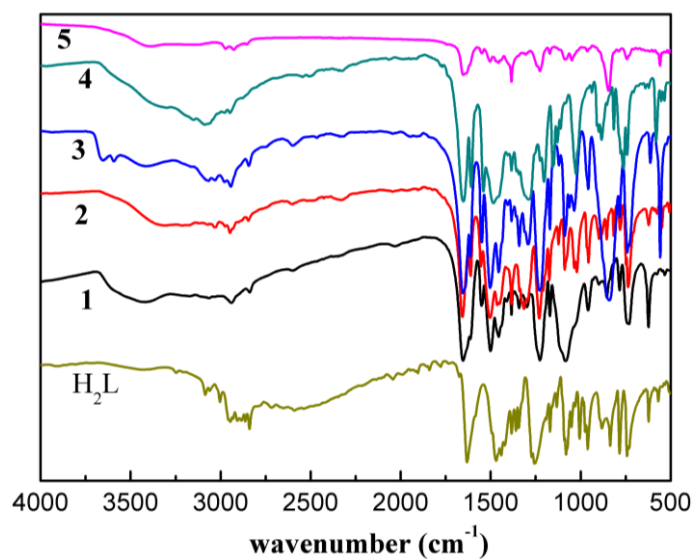


## Supplementary Information

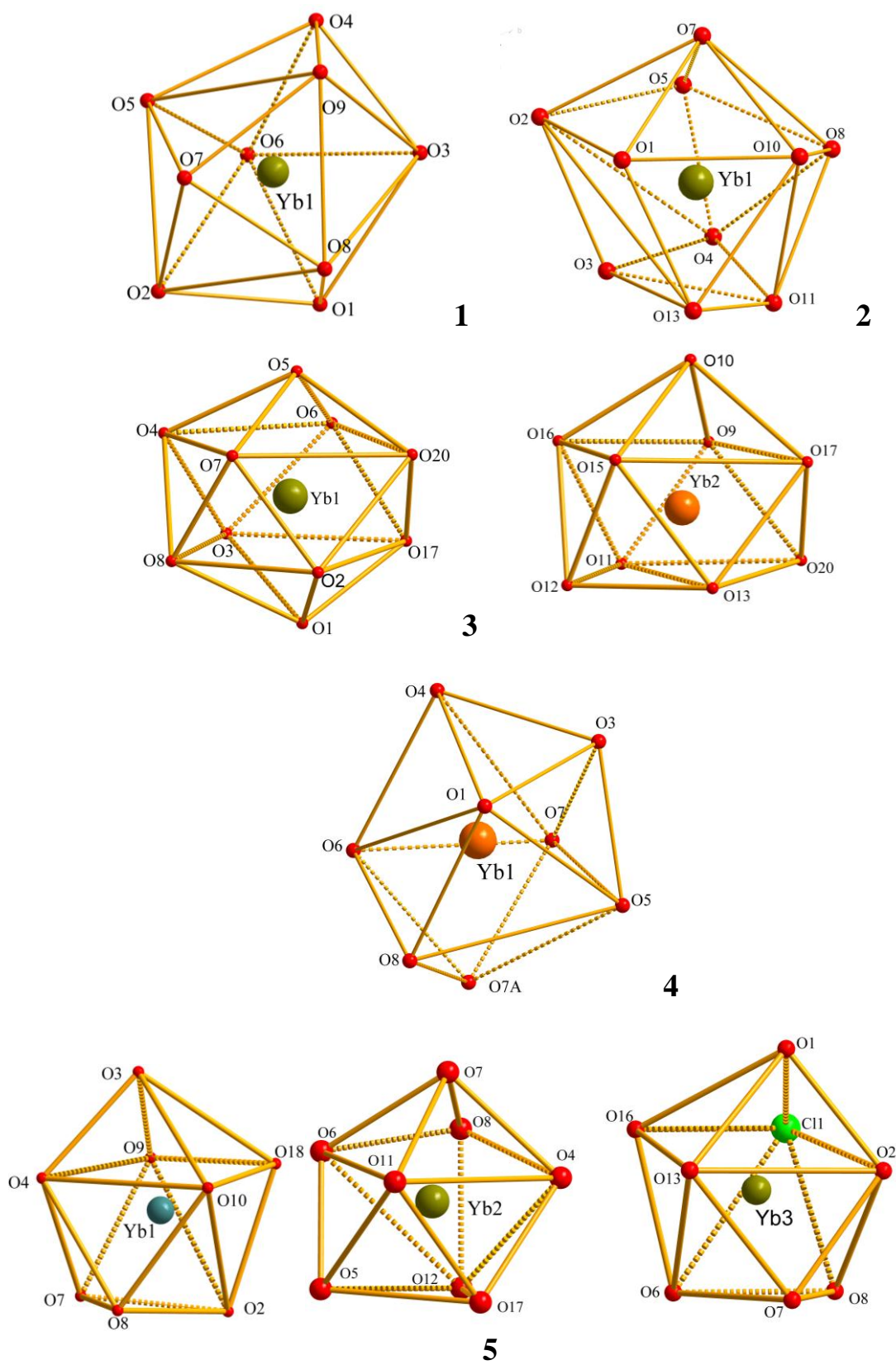
### NIR luminescence and catalysis of multifarious salen type ytterbium complexes modulated by anions



**Scheme 1** Synthesis of complexes 1–5.



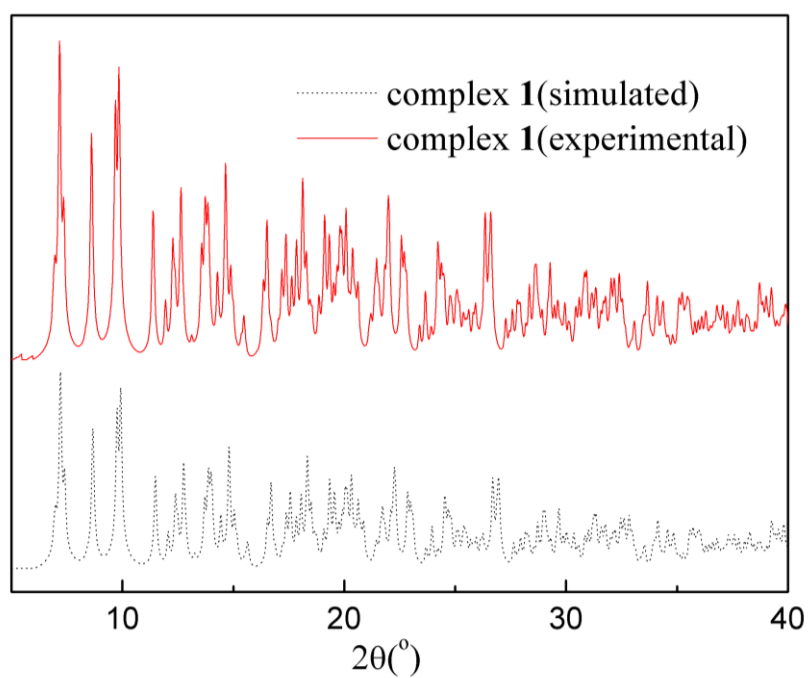
**Fig. S1** Infrared spectra of complexes 1–5.



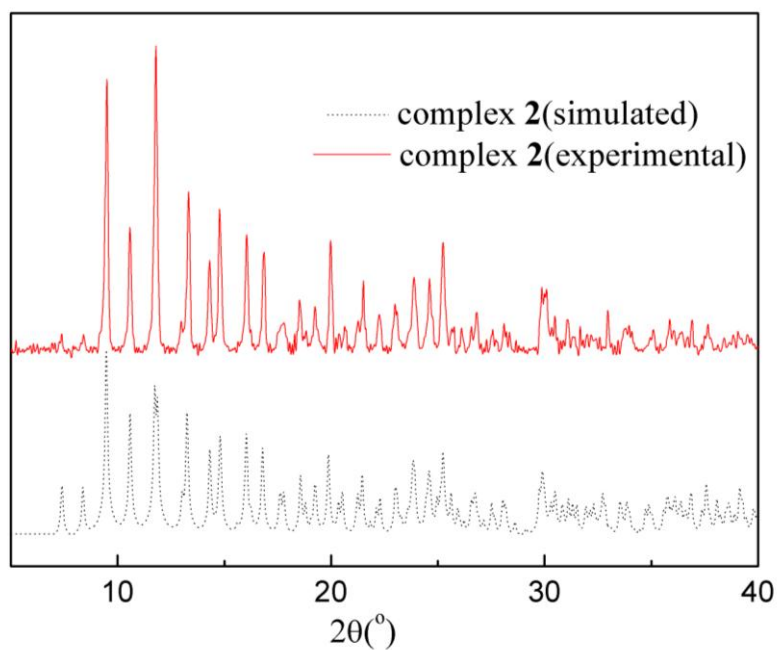
**Fig. S2** The coordination geometry of the Yb(III) ion in complexes 1–5.

**Table S1.** Hydrogen bonds parameters for complex **5** [Å and °]

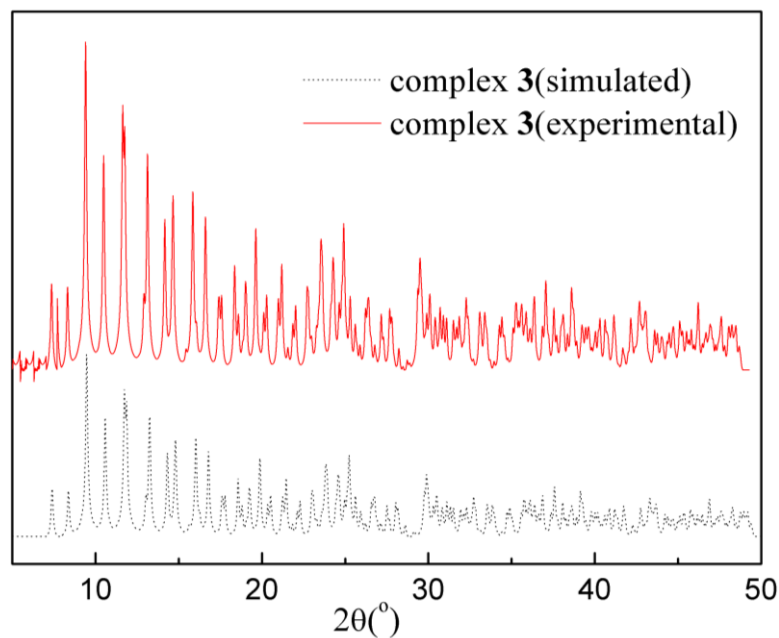
D–H···A	d(D–H)	d(H···A)	D(D···A)	<(DHA)
O(9)–H(9)···Cl(1)	0.8475	2.3942	3.1290	140.0
O(8)–H(8)···Cl (2)	0.8512	2.4942	3.2489	148.2
O(10)–H(10)···Cl (2)	0.8528	2.2949	3.0815	153.5
O(12)–H(12)···Cl (2)	0.8472	2.3206	3.1395	162.7
O(7)–H(7)···Cl (3)	0.8530	2.4469	3.2284	152.6
O(11)–H(11)···Cl (3)	0.8415	2.4458	3.1463	151.9
O(13)–H(13)···Cl (3)	0.8414	2.4325	3.1100	153.2



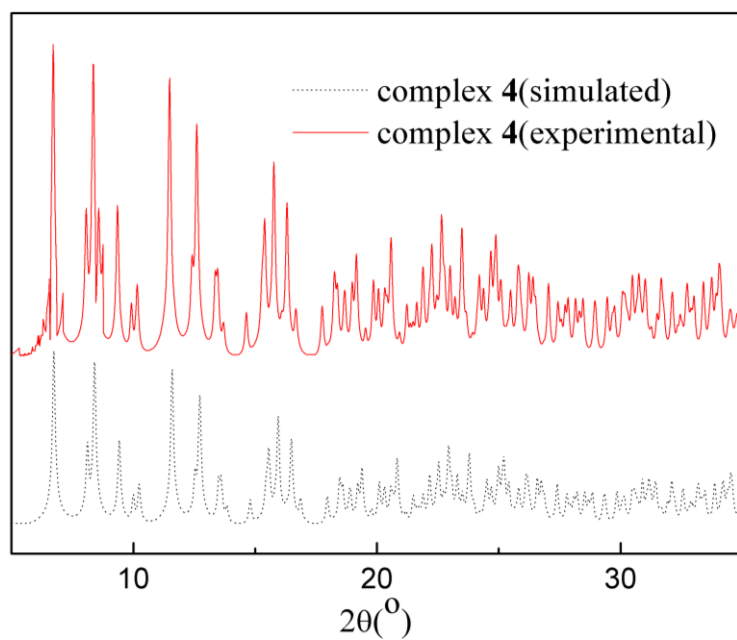
**Fig. S3** X-ray powder diffraction patterns of simulated and experimental for **1**



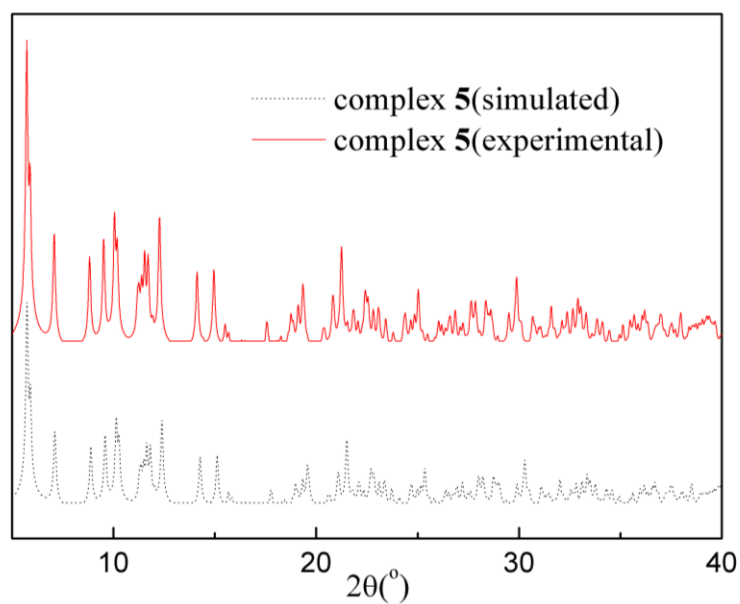
**Fig. S4** X-ray powder diffraction patterns of simulated and experimental for **2**



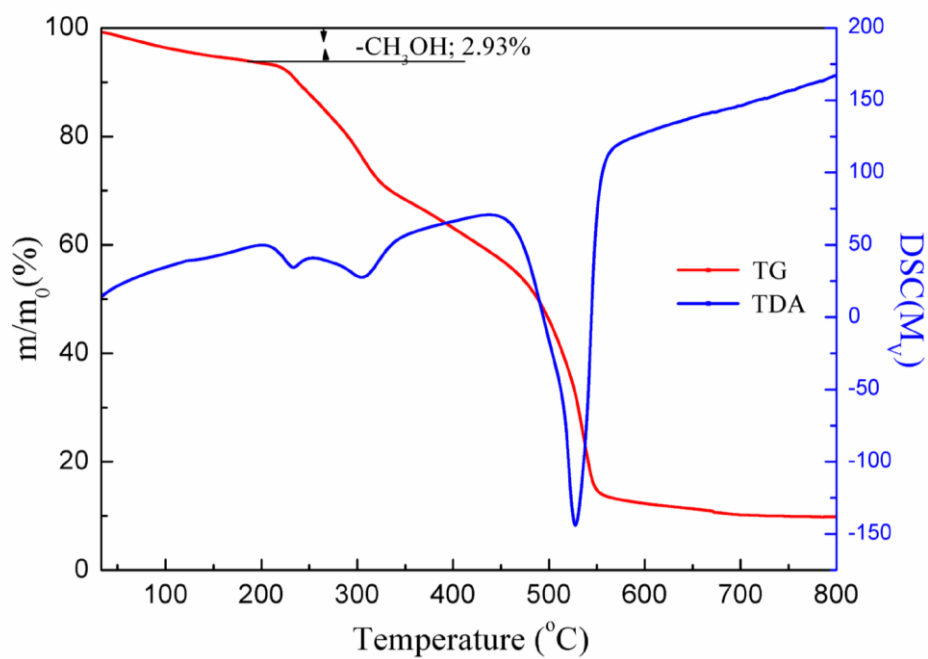
**Fig. S5** X-ray powder diffraction patterns of simulated and experimental for **3**



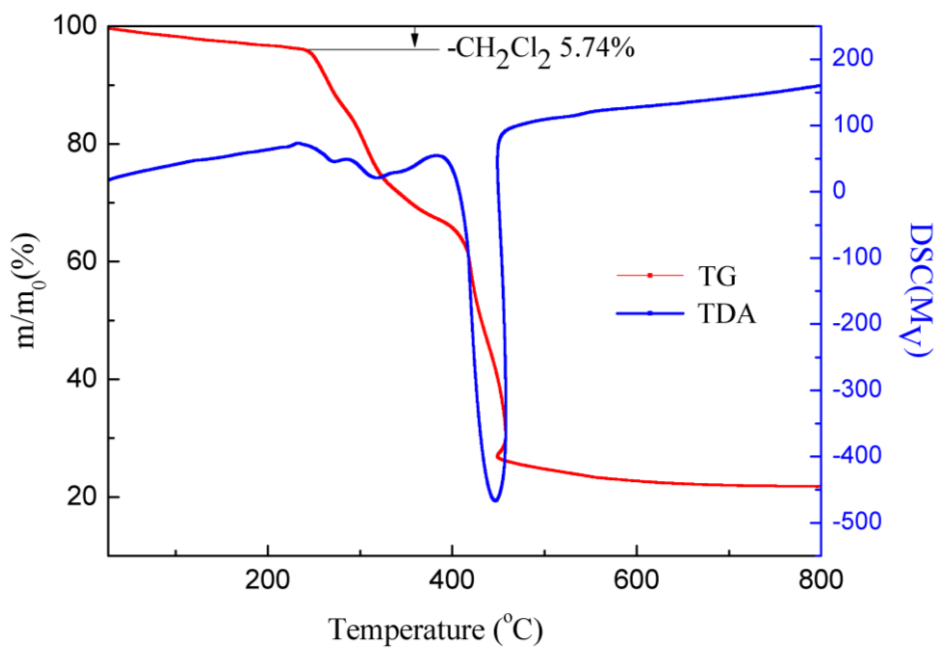
**Fig. S6** X-ray powder diffraction patterns of simulated and experimental for **4**



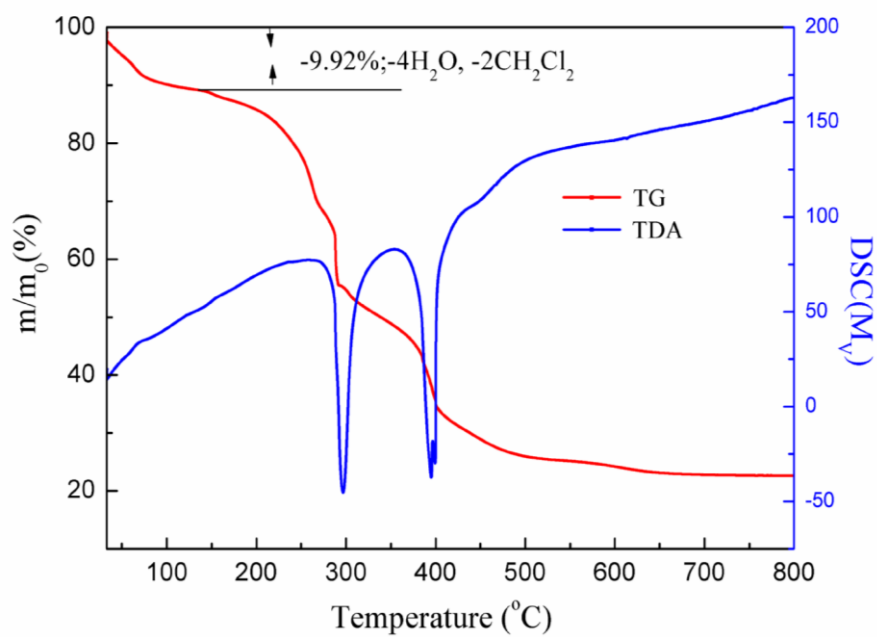
**Fig. S7** X-ray powder diffraction patterns of simulated and experimental for **5**



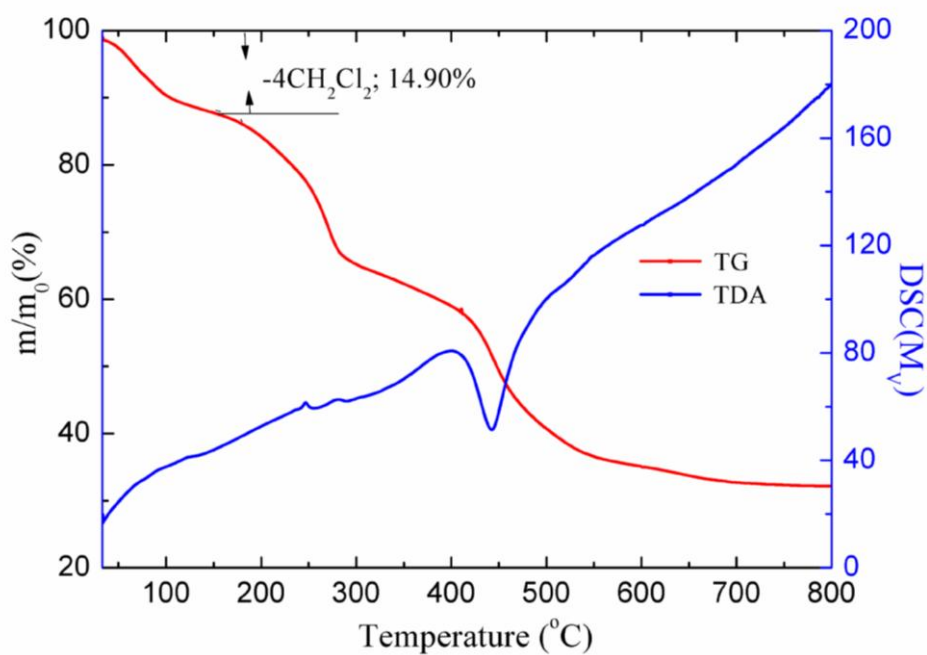
**Fig. S8** Thermogravimetric curve for the complex 1.



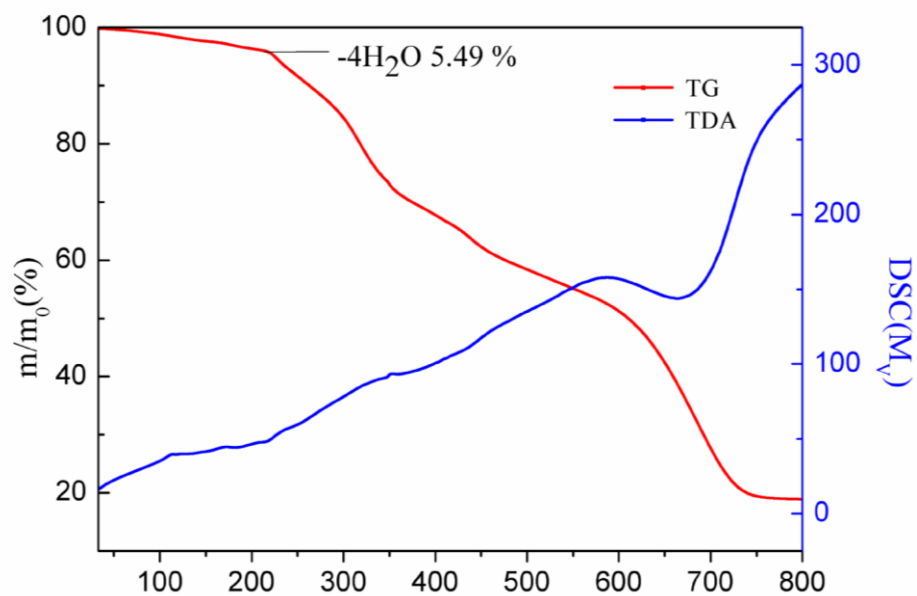
**Fig. S9** Thermogravimetric curve for the complex 2.



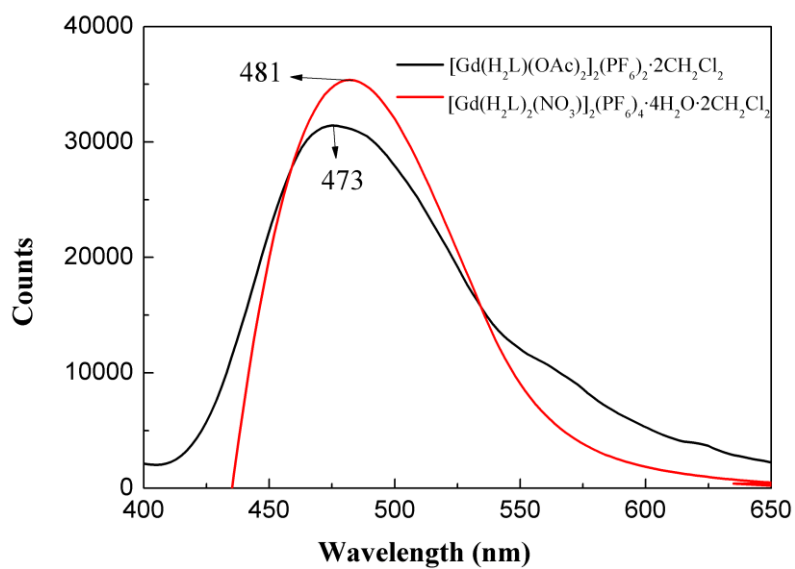
**Fig. S10** Thermogravimetric curve for the complex 3.



**Fig. S11** TG-DSC curve for the complex 4.



**Fig. S12** Thermogravimetric curve for the complex **5**.



**Fig. S13** Phosphorescence spectrum of complexes  $[\text{Gd}(\text{H}_2\text{L})(\text{OAc})_2]_2(\text{PF}_6)_2 \cdot 6\text{H}_2\text{O}$  and  $\text{Gd}(\text{H}_2\text{L})_2(\text{NO}_3)_2(\text{PF}_6)_4 \cdot 4\text{H}_2\text{O} \cdot 2\text{CH}_2\text{Cl}_2$  at 77K.