Supporting Information

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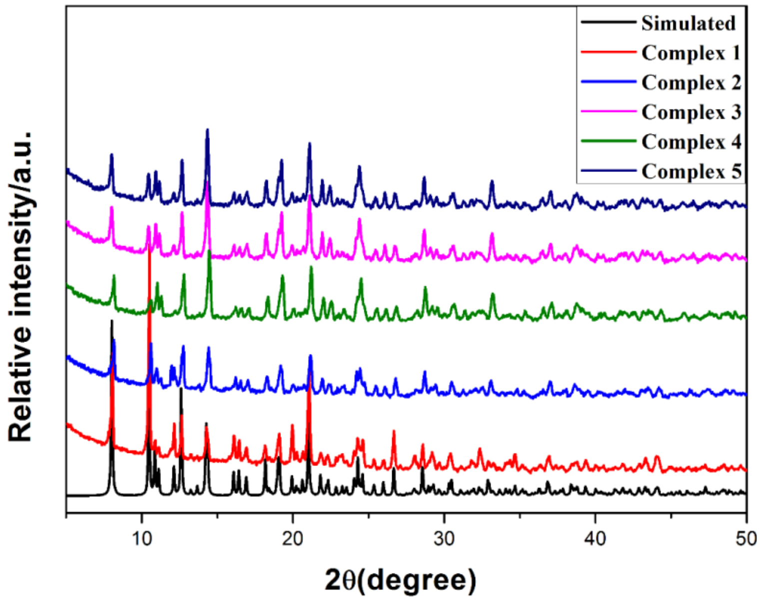


Fig. S1 The PXRD patterns for **1-5**.

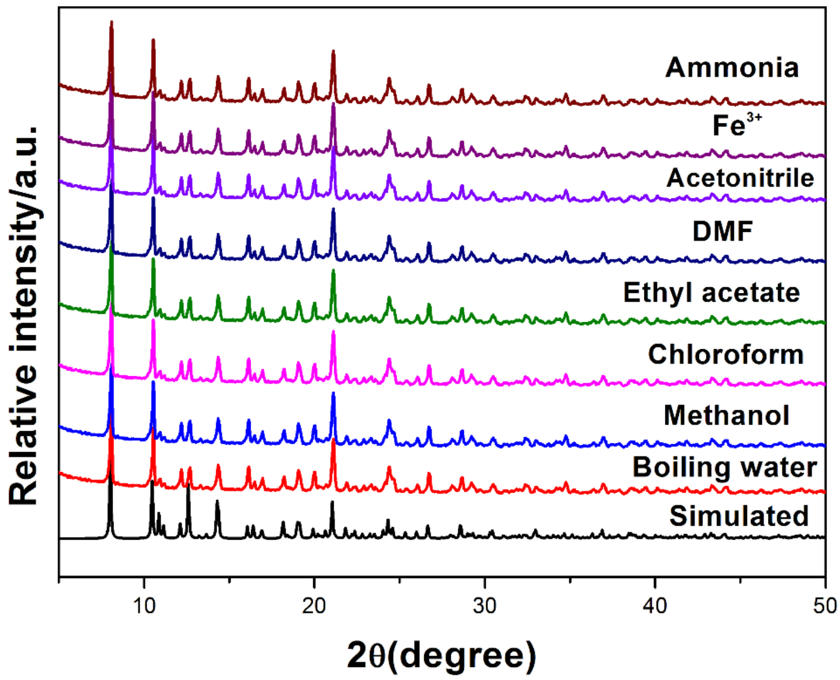


Fig. S2 PXRD patterns of **2** immersing in different solvents.

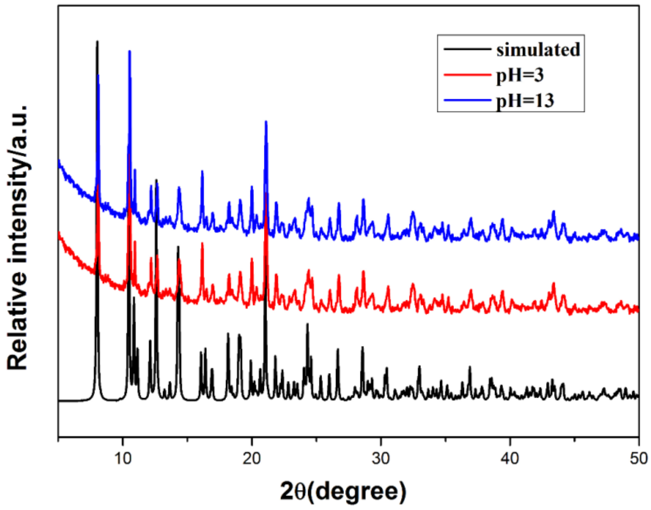


Fig. S3 PXRD patterns of **2** immersing in the acidic solution (pH=3) and basic solution (pH= 13).

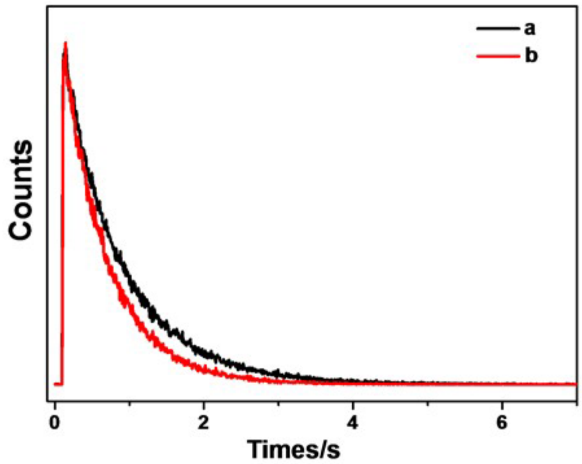


Fig.S4 Fluorescence lifetime decay curve of **2** for Eu(III) ion (a) and **4** for Tb(III) ion (b).

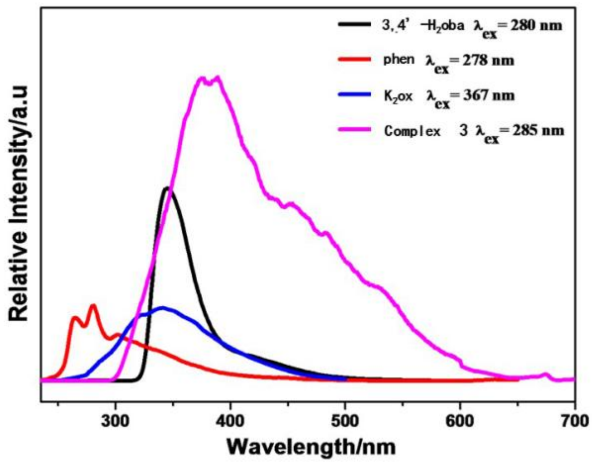
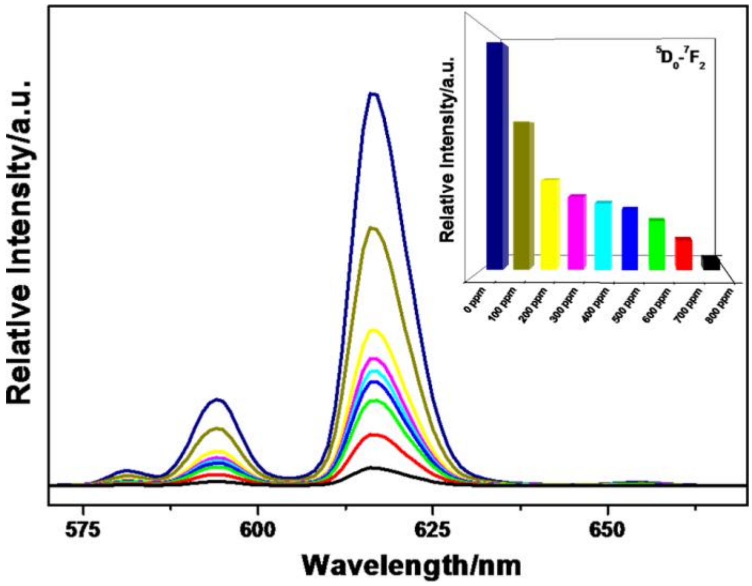
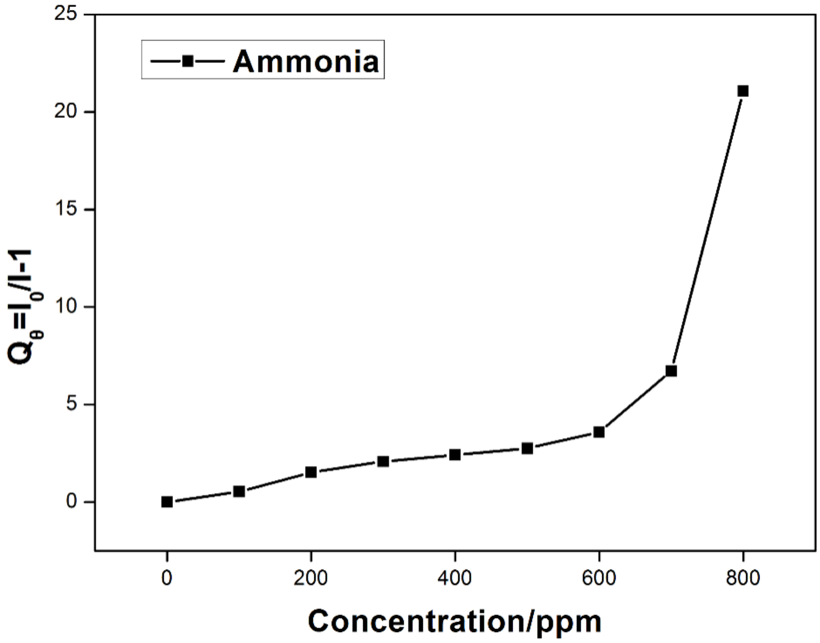


Fig. S5 The solid state emission spectra of **3** and the free ligands.



(a)



(b)

Fig.S6 Emission spectra of **2** dispersed in water with different concentrations of ammonia (λ_{ex}=350 nm) (a) and The relationship between the quenching effect and ammonia concentrations (b).

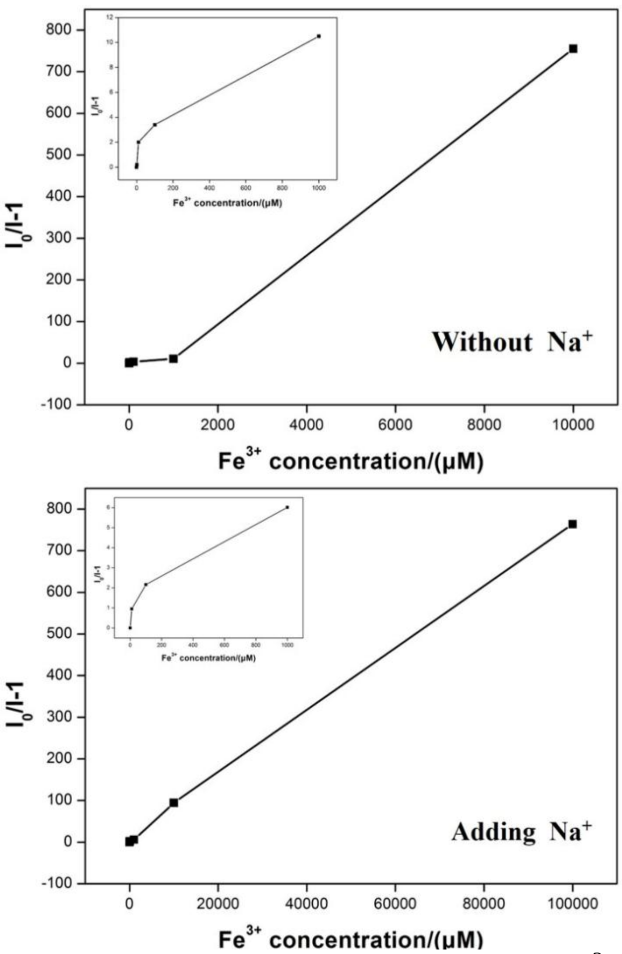


Fig. S7 The relationship between the quenching effect and Fe^{3+} concentrations.

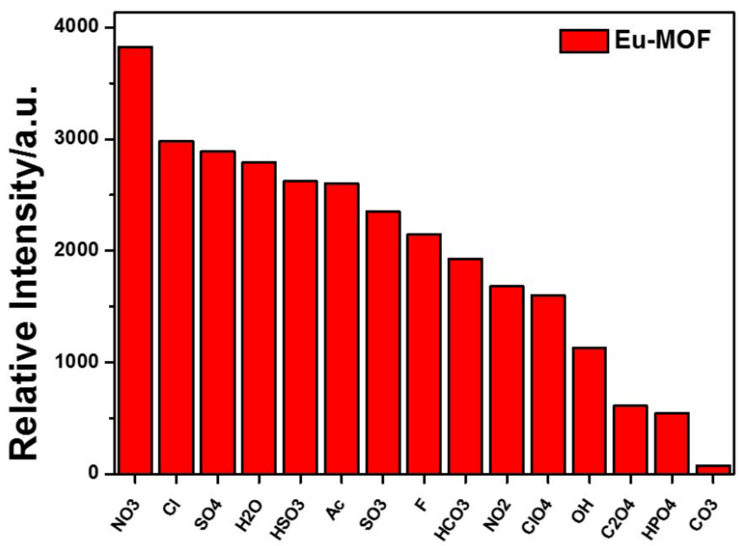


Fig. S8 The fluorescence intensity of complex **2** in Na_nX (X = anion) solvents.

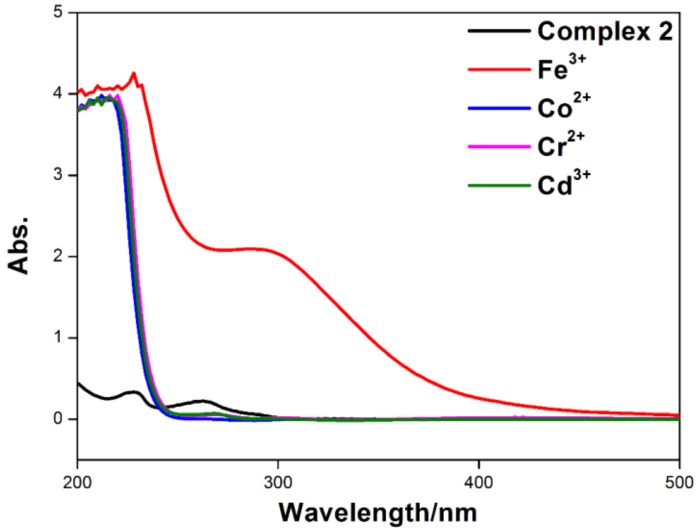


Fig. S9 Liquid UV-vis spectra of metal ions and **2** in the aqueous solution.

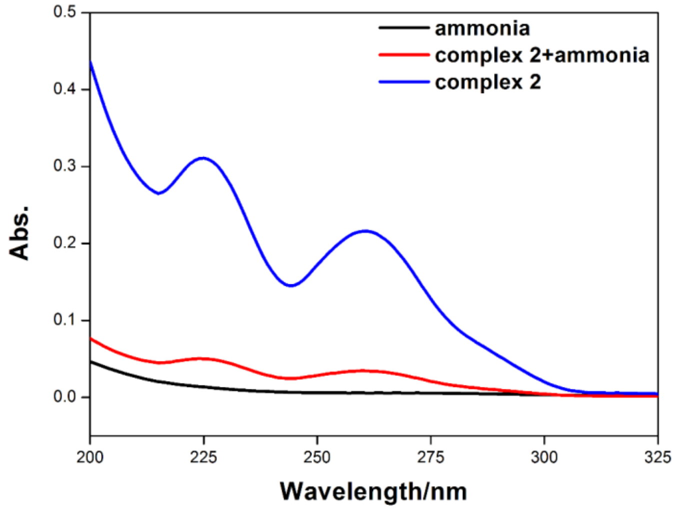


Fig. S10 Liquid UV-vis spectra of ammonia and **2** in the aqueous solution.

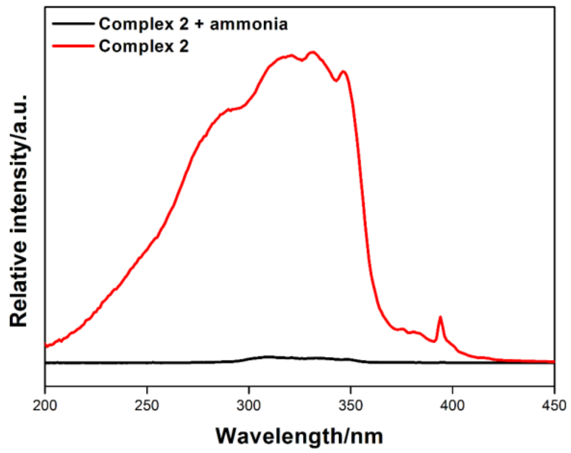


Fig. S11The excitation spectra of complex 2 before and after adding ammonia.

Table S1 Selected bond lengths [Å] and angles [°] for **1-5**

	1		
Sm(1)-O(12)	2.311(2)	Sm(1)-O(6)	2.329(2)
Sm(1)-O(5)	2.407(2)	Sm(1)-O(1)	2.508(3)
Sm(1)-O(16)	2.410(3)	Sm(1)-O(3)	2.416(2)
Sm(1)-N(7)	2.584(3)	Sm(1)-N(2)	2.637(3)
O(12)-Sm(1)-O(6)	86.31(9)	O(12)-Sm(1)-O(5)	75.97(9)
O(6)-Sm(1)-O(5)	106.08(9)	O(12)-Sm(1)-O(16)	80.51(9)
O(6)-Sm(1)-O(16)	150.88(9)	O(5)-Sm(1)-O(16)	95.78(10)
O(12)-Sm(1)-O(3)	132.84(9)	O(6)-Sm(1)-O(3)	77.01(9)
O(5)-Sm(1)-O(3)	67.24(8)	O(16)-Sm(1)-O(3)	130.24(9)
O(12)-Sm(1)-O(1)	124.06(9)	O(6)-Sm(1)-O(1)	149.23(9)
O(5)-Sm(1)-O(1)	79.82(9)	O(16)-Sm(1)-O(1)	52.73(9)
O(3)-Sm(1)-O(1)	77.82(9)	O(12)-Sm(1)-N(7)	144.65(10)
O(6)-Sm(1)-N(7)	86.05(9)	O(5)-Sm(1)-N(7)	139.16(9)
O(16)-Sm(1)-N(7)	89.84(10)	O(3)-Sm(1)-N(7)	78.37(10)
O(1)-Sm(1)-N(7)	71.74(9)	O(12)-Sm(1)-N(2)	81.80(9)
O(6)-Sm(1)-N(2)	74.06(9)	O(5)-Sm(1)-N(2)	157.68(9)
O(16)-Sm(1)-N(2)	78.42(10)	O(3)-Sm(1)-N(2)	132.50(9)
O(1)-Sm(1)-N(2)	111.84(9)	N(7)-Sm(1)-N(2)	62.91(10)
	2		
Eu(1)-O(6)	2.305(3)	Eu(1)-O(3)	2.313(3)
Eu(1)-O(1)	2.397(3)	Eu(1)-O(2)	2.405(3)
Eu(1)-O(4)	2.405(3)	Eu(1)-O(5)	2.503(3)
Eu(1)-N(1)	2.572(4)	Eu(1)-N(2)	2.628(4)
O(6)-Eu(1)-O(3)	86.10(11)	O(6)-Eu(1)-O(1)	75.85(10)
O(3)-Eu(1)-O(1)	106.24(11)	O(6)-Eu(1)-O(2)	132.64(11)
O(3)-Eu(1)-O(2)	76.93(10)	O(1)-Eu(1)-O(2)	67.42(10)
O(6)-Eu(1)-O(4)	80.51(11)	O(3)-Eu(1)-O(4)	150.66(11)
O(1)-Eu(1)-O(4)	95.68(11)	O(2)-Eu(1)-O(4)	130.60(10)
O(6)-Eu(1)-O(5)	124.04(11)	O(3)-Eu(1)-O(5)	149.46(11)
O(1)-Eu(1)-O(5)	79.69(11)	O(2)-Eu(1)-O(5)	78.09(11)
O(4)-Eu(1)-O(5)	52.81(10)	O(6)-Eu(1)-N(1)	144.88(12)
O(3)-Eu(1)-N(1)	86.36(11)	O(1)-Eu(1)-N(1)	139.01(11)
O(2)-Eu(1)-N(1)	78.33(11)	O(4)-Eu(1)-N(1)	89.74(11)
O(5)-Eu(1)-N(1)	71.57(11)	O(6)-Eu(1)-N(2)	81.84(11)
O(3)-Eu(1)-N(2)	74.46(11)	O(1)-Eu(1)-N(2)	157.53(11)
O(2)-Eu(1)-N(2)	132.70(11)	O(4)-Eu(1)-N(2)	77.85(11)
O(5)-Eu(1)-N(2)	111.49(11)	N(1)-Eu(1)-N(2)	63.10(12)
	3		
Gd(1)-O(4)#1	2.287(3)	Gd(1)-O(5)#2	2.304(3)

Gd(1)-O(1)	2.388(4)	Gd(1)-O(8)	2.390(3)
Gd(1)-O(7)#3	2.397(3)	Gd(1)-O(2)	2.495(4)
Gd(1)-N(1)	2.555(4)	Gd(1)-N(2)	2.612(4)
O(4)#1-Gd(1)-O(5)#2	86.05(12)	O(4)#1-Gd(1)-O(1)	80.61(13)
O(5)#2-Gd(1)-O(1)	150.44(12)	O(4)#1-Gd(1)-O(8)	75.67(12)
O(5)#2-Gd(1)-O(8)	106.39(12)	O(1)-Gd(1)-O(8)	95.74(13)
O(4)#1-Gd(1)-O(7)#3	132.60(13)	O(5)#2-Gd(1)-O(7)#3	76.72(12)
O(1)-Gd(1)-O(7)#3	130.92(12)	O(8)-Gd(1)-O(7)#3	67.81(12)
O(4)#1-Gd(1)-O(2)	124.01(13)	O(5)#2-Gd(1)-O(2)	149.51(12)
O(1)-Gd(1)-O(2)	52.96(12)	O(8)-Gd(1)-O(2)	79.47(13)
O(7)#3-Gd(1)-O(2)	78.20(12)	O(4)#1-Gd(1)-N(1)	145.28(13)
O(5)#2-Gd(1)-N(1)	86.33(13)	O(1)-Gd(1)-N(1)	89.78(13)
O(8)-Gd(1)-N(1)	138.80(13)	O(7)#3-Gd(1)-N(1)	77.86(13)
O(2)-Gd(1)-N(1)	71.62(13)	O(4)#1-Gd(1)-N(2)	81.76(13)
O(5)#2-Gd(1)-N(2)	74.56(12)	O(1)-Gd(1)-N(2)	77.49(13)
O(8)-Gd(1)-N(2)	157.24(13)	O(7)#3-Gd(1)-N(2)	132.65(13)
O(2)-Gd(1)-N(2)	111.63(13)	N(1)-Gd(1)-N(2)	63.56(14)
	4		
Tb(1)-O(14)	2.276(3)	Tb(1)-O(22)	2.284(3)
Tb(1)-O(17)	2.368(3)	Tb(1)-O(8)	2.370(3)
Tb(1)-O(6)	2.382(3)	Tb(1)-O(1)	2.486(3)
Tb(1)-N(9)	2.542(3)	Tb(1)-N(2)	2.600(3)
O(14)-Tb(1)-O(22)	85.53(10)	O(14)-Tb(1)-O(17)	80.47(10)
O(22)-Tb(1)-O(17)	150.02(10)	O(14)-Tb(1)-O(8)	75.67(9)
O(22)-Tb(1)-O(8)	106.86(10)	O(17)-Tb(1)-O(8)	95.21(10)
O(14)-Tb(1)-O(6)	132.43(10)	O(22)-Tb(1)-O(6)	76.95(9)
O(17)-Tb(1)-O(6)	131.27(10)	O(8)-Tb(1)-O(6)	68.08(9)
O(14)-Tb(1)-O(1)	124.27(10)	O(22)-Tb(1)-O(1)	149.78(9)
O(17)-Tb(1)-O(1)	53.29(9)	O(8)-Tb(1)-O(1)	79.19(10)
O(6)-Tb(1)-O(1)	78.25(10)	O(14)-Tb(1)-N(9)	145.45(10)
O(22)-Tb(1)-N(9)	86.57(10)	O(17)-Tb(1)-N(9)	90.09(10)
O(8)-Tb(1)-N(9)	138.62(10)	O(6)-Tb(1)-N(9)	77.73(10)
O(1)-Tb(1)-N(9)	71.44(10)	O(14)-Tb(1)-N(2)	81.61(10)
O(22)-Tb(1)-N(2)	74.52(10)	O(17)-Tb(1)-N(2)	77.28(10)
O(8)-Tb(1)-N(2)	156.99(10)	O(6)-Tb(1)-N(2)	132.82(10)
O(1)-Tb(1)-N(2)	111.57(10)	N(9)-Tb(1)-N(2)	63.87(11)
	5		
O(4)-Dy(1)#1	2.264(4)	O(5)-Dy(1)#2	2.275(4)
Dy(1)-O(4)#3	2.264(4)	Dy(1)-O(5)#4	2.275(4)
Dy(1)-O(6)	2.360(4)	Dy(1)-O(1)	2.367(5)
Dy(1)-O(7)	2.370(4)	Dy(1)-O(2)	2.471(5)
Dy(1)-N(2)	2.534(5)	Dy(1)-N(1)	2.588(5)

O(4)#3-Dy(1)-O(5)#4	85.50(15)	O(4)#3-Dy(1)-O(6)	75.45(15)
O(5)#4-Dy(1)-O(6)	107.03(15)	O(4)#3-Dy(1)-O(1)	80.31(16)
O(5)#4-Dy(1)-O(1)	149.67(15)	O(6)-Dy(1)-O(1)	95.19(16)
O(4)#3-Dy(1)-O(7)	132.26(16)	O(5)#4-Dy(1)-O(7)	76.92(15)
O(6)-Dy(1)-O(7)	68.25(13)	O(1)-Dy(1)-O(7)	131.68(16)
O(4)#3-Dy(1)-O(2)	124.08(15)	O(5)#4-Dy(1)-O(2)	150.00(15)
O(6)-Dy(1)-O(2)	79.07(16)	O(1)-Dy(1)-O(2)	53.45(16)
O(7)-Dy(1)-O(2)	78.48(16)	O(4)#3-Dy(1)-N(2)	145.80(16)
O(5)#4-Dy(1)-N(2)	86.89(16)	O(6)-Dy(1)-N(2)	138.44(16)
O(1)-Dy(1)-N(2)	89.96(17)	O(7)-Dy(1)-N(2)	77.69(16)
O(2)-Dy(1)-N(2)	71.23(16)	O(4)#3-Dy(1)-N(1)	81.93(16)
O(5)#4-Dy(1)-N(1)	74.71(15)	O(6)-Dy(1)-N(1)	157.03(16)
O(7)-Dy(1)-N(1)	132.77(17)	O(2)-Dy(1)-N(1)	111.27(16)
N(2)-Dy(1)-N(1)	63.90(17)		

Symmetry transformations used to generate equivalent atoms:**3**，#1 -x+1/2, y-1/2, -z+3/2; #2 x+1/2, -y+1/2, z-1/2; #3 -x, -y, -z+1. **5**，#1 -x+1/2,y+1/2,-z+1/2; #2 x+1/2, -y+1/2, z-1/2; #3 -x+1/2, y-1/2, -z+1/2; #4 x-1/2, -y+1/2, z+1/2.

Table S2 The detection limit for Fe^{3+} (the experimental data)

Complex	The detection limit for Fe^{3+} (mmol/L)*	Reference
Eu(O-cpia)(phen)	5.35	In this paper
Eu−HODA	1.3	8g
$[(CH_3)2NH_2]$ {Tb(bptc)] xsolvents	3.0	8h
{[Tb(BTB)(DMF)] ·1.5DMF ·2.5H_2O}$_n$	0.01	8i
[Eu(BTPCA)(H_2O)] ·2DMF ·3H_2O	0.18	8j
$Sm_2Cd_3(EDTA)_3(H_2O)_{11}](H_2O)_{14}$ $Eu_2Cd_3(EDTA)_3(H_2O)_{11}](H_2O)_{14}$	0.01	8k
{[$Eu_2(MFDA)_2(HCOO)_2(H_2O)_6$] ·$H_2O$}n	1.0	8l

The detection limit for Fe^{3+} (mmol/L)* is that the concentration ofFe^{3+}ion when the emission of the complex was completely quenched.

Table S3 Relaxation fitting parameters for Cole-Cole plots of using the sum of twomodified Debye functions under 2 kOe dc field of **5**

H_{dc}= 2000 Oe							
T(K)	χ_t	χ_s	b	τ_1(s)	α1	τ_2(s)	α2
2	0.36	4.73	0.67	6.74E-02	0.44	1.23E-03	0.25
2.5	0.30	4.73	0.39	5.69E-02	0.31	9.66E-04	0.27

3	0.27	3.80	0.16	6.88E-02	0.11	8.33E-04	0.29
3.5	0.34	3.21	0.10	8.61E-02	0.02	6.59E-04	0.25

T(K)	χ_t	χ_s	α	τ(s)
4	2.24	0.40	0.20	5.13E-04
4.5	2.22	0.48	0.13	3.82E-04
5	2.07	0.42	0.14	2.45E-04
5.5	1.89	0.48	0.09	1.73E-04
6	1.76	0.33	0.13	9.47E-05