Supporting Information

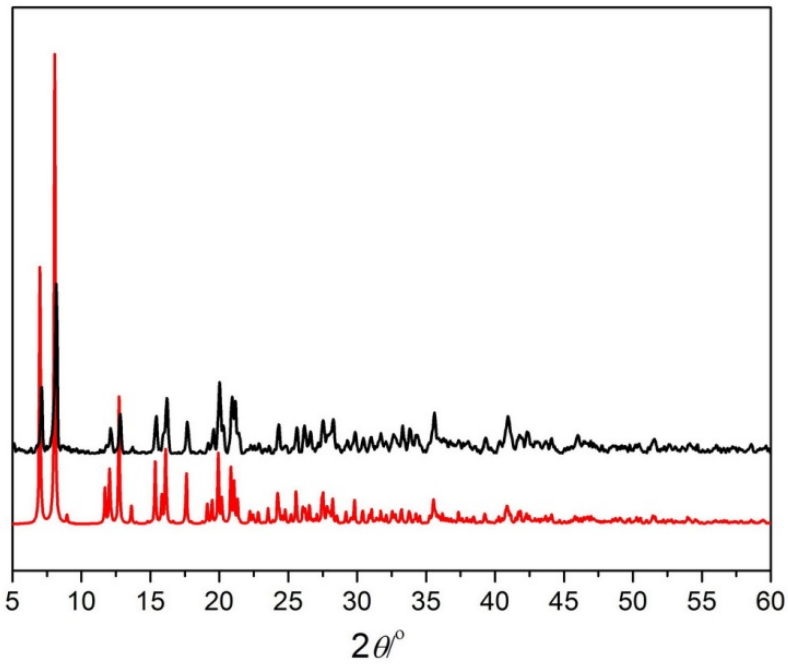
Magnetic and luminescent properties of lanthanide coordination polymers with asymmetric biphenyl-3,2′,5′-tricarboxylate

Jie Zhao,[a] Guan-Hong Zhu,[a] Li-Qiong Xie,[a] Ye-Si Wu,[a] Hai-Lun Wu,[a] Ai-Ju Zhou,[a] Zun-Yuan Wu,[a] Jing Wang*[a], Yan-Cong Chen[b] and Ming-Liang Tong[b]

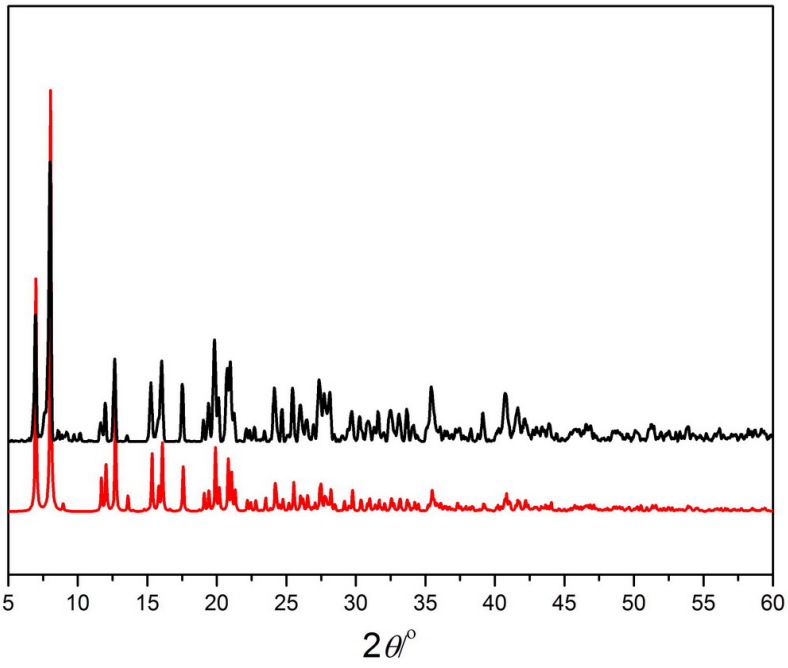
[a] *Guangzhou Key Laboratory for Environmentally Functional Materials and Technology, School of Chemistry and Chemical Engineering, Guangzhou University, Guangzhou 510006, P. R. China. Fax: 86 02039366908; Tel: 86 02039366908; E-mail: wangjgzhu@163.com*

[b] *Key Laboratory of Synthetic Bioinorganic Chemistry of Ministry of Education, School of Chemistry and Chemical Engineering, Sun Yat-Sen University, Guangzhou 510275, P. R. China*

(a)


5
10
15
20
25
30
35
40
45
50
55
60
2θ/°

(b)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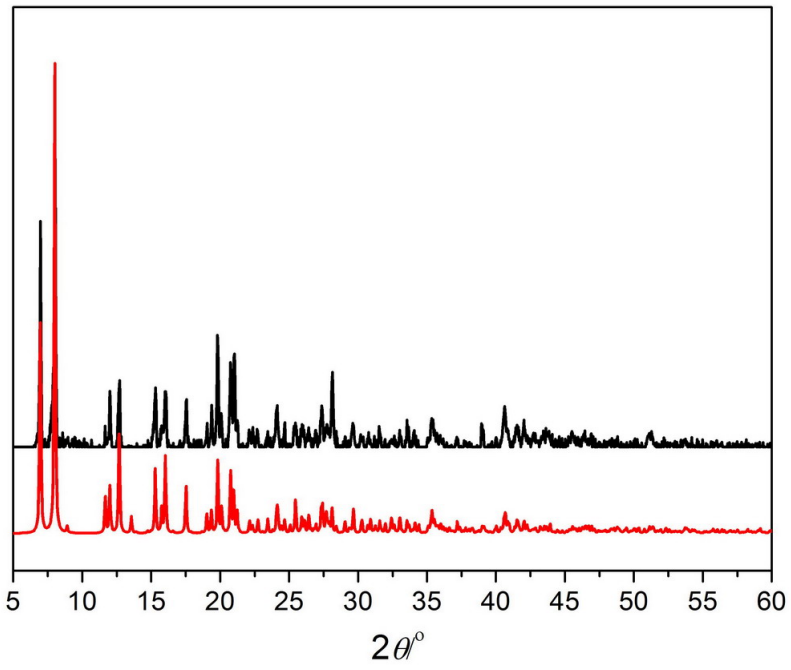
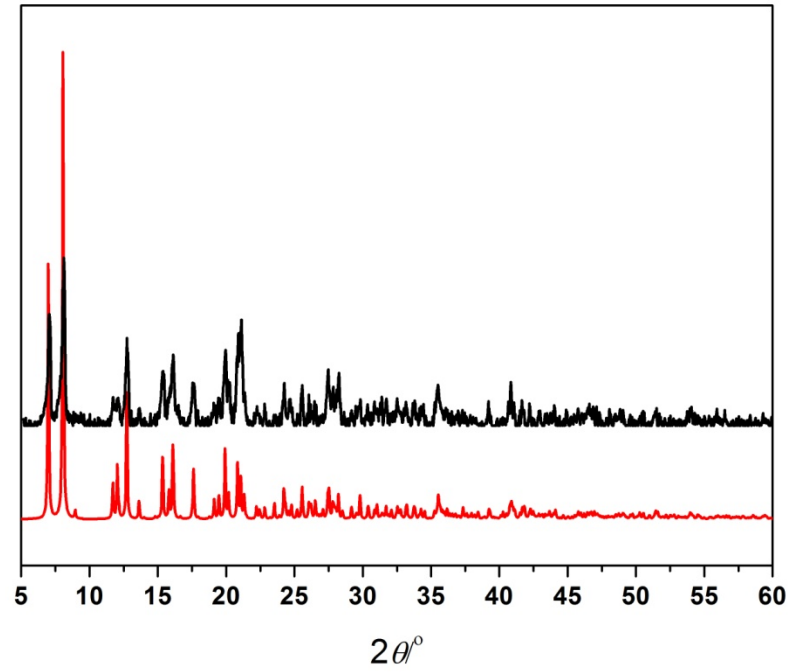
45
50
55
60
2θ/°

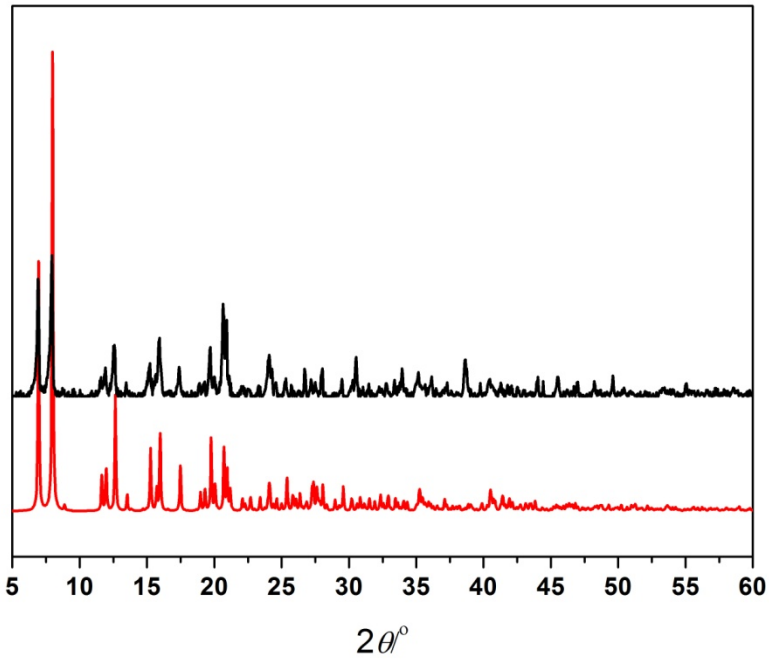
(c)


5
10
15
20
25
30
35
40
45
50
55
60
2θ/°

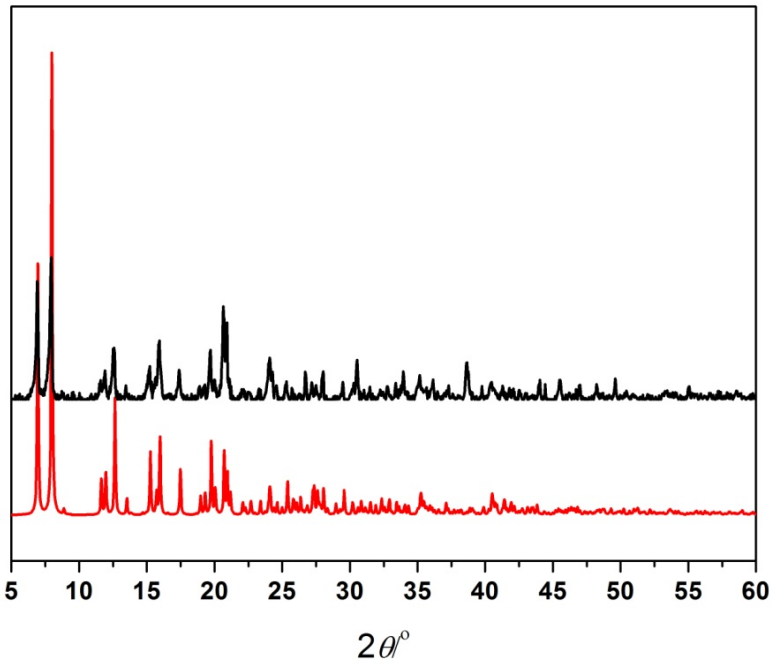
(d)


5
10
15
20
25
30
35
40
45
50
55
60
2θ/°

(e)


5
10
15
20
25
30
35
40
45
50
55
60
2θ/°

(f)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10
15
20
25
30
35
40
45
50
55
60
2θ/°

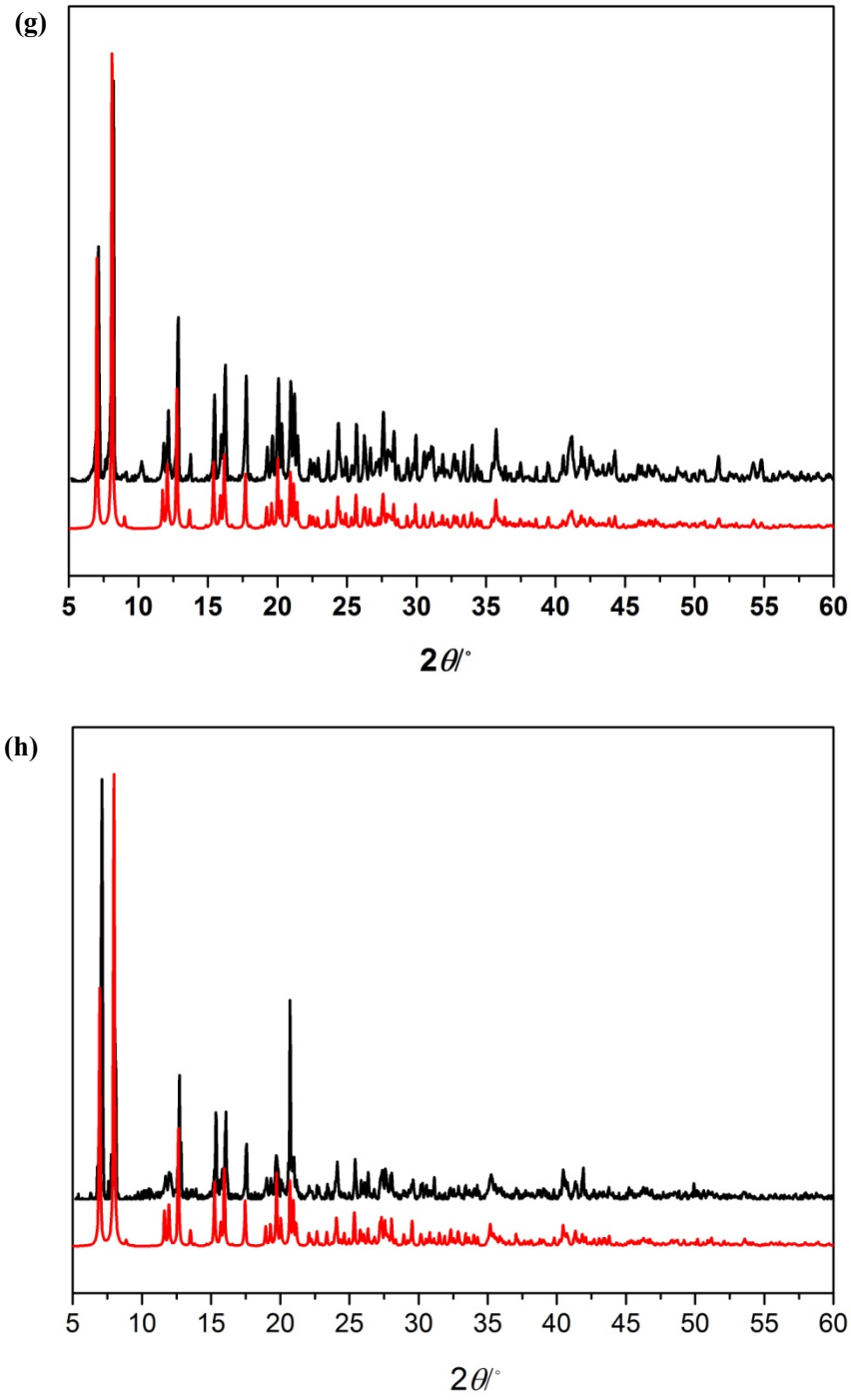
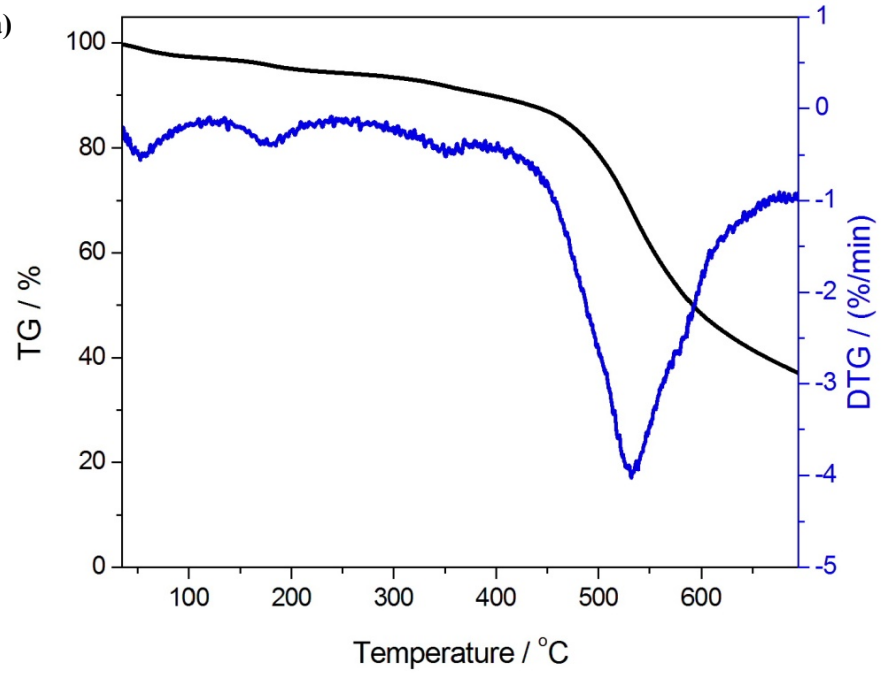


Fig. S1 Simulated (red) and experimental (black) XRPD patterns for complexes **1**(a), **2**(b), **3**(c), **4**(d), **5**(e), **6**(f), **7**(g) and **8**(h).

(a)


TG / %
DTG / (%/min)
Temperature / °C
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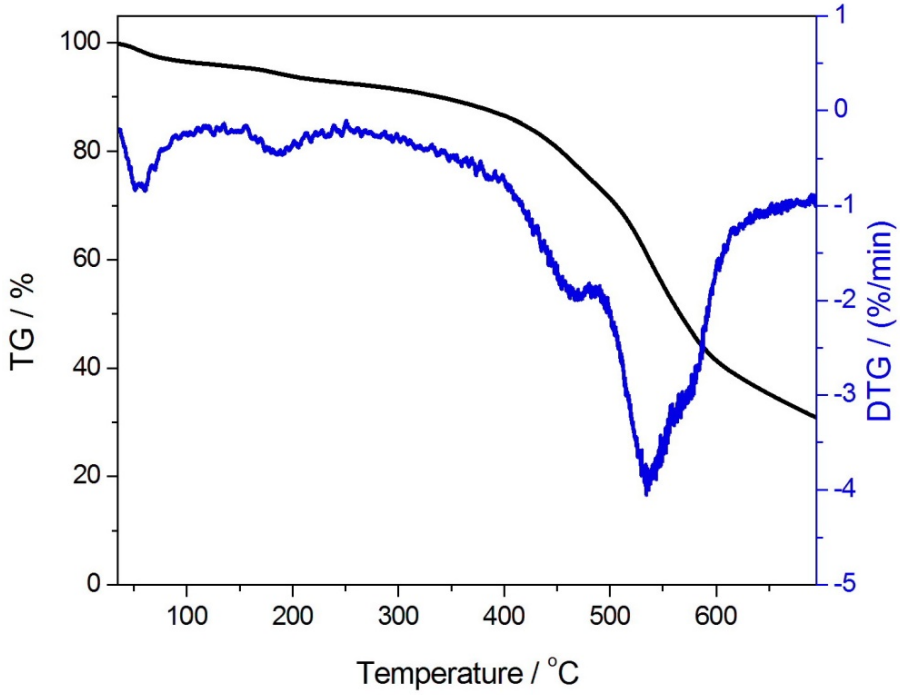
80
60
40
20
0
1
0
-1
-2
-3
-4
-5
100
200
300
400
500
600

(b)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DTG / (%/min)
Temperature / °C
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60
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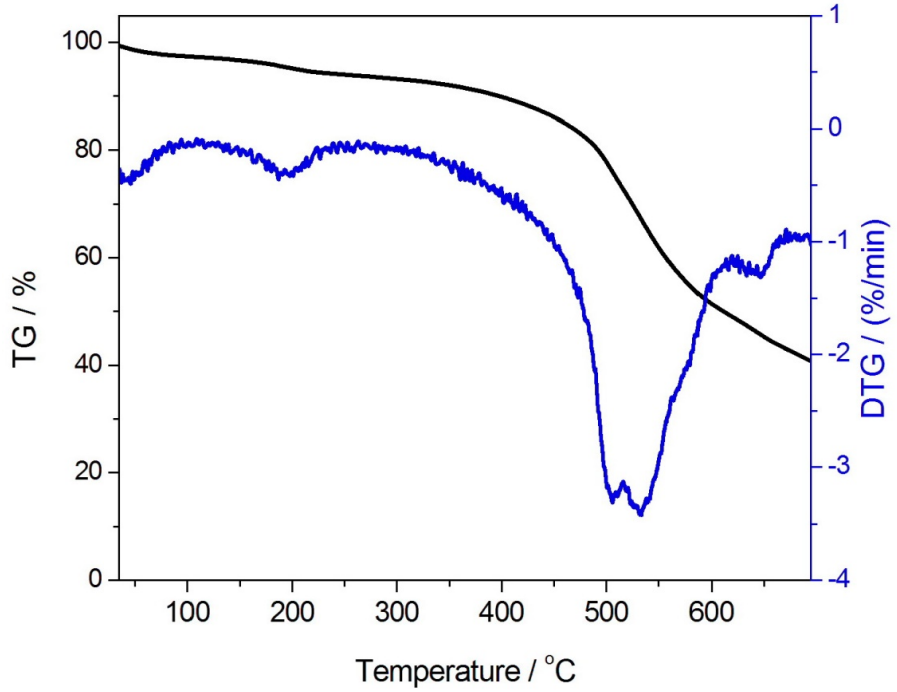
1
0
-1
-2
-3
-4
-5
100
200
300
400
500
600

(c)


TG / %
DTG / (%/min)
Temperature / °C
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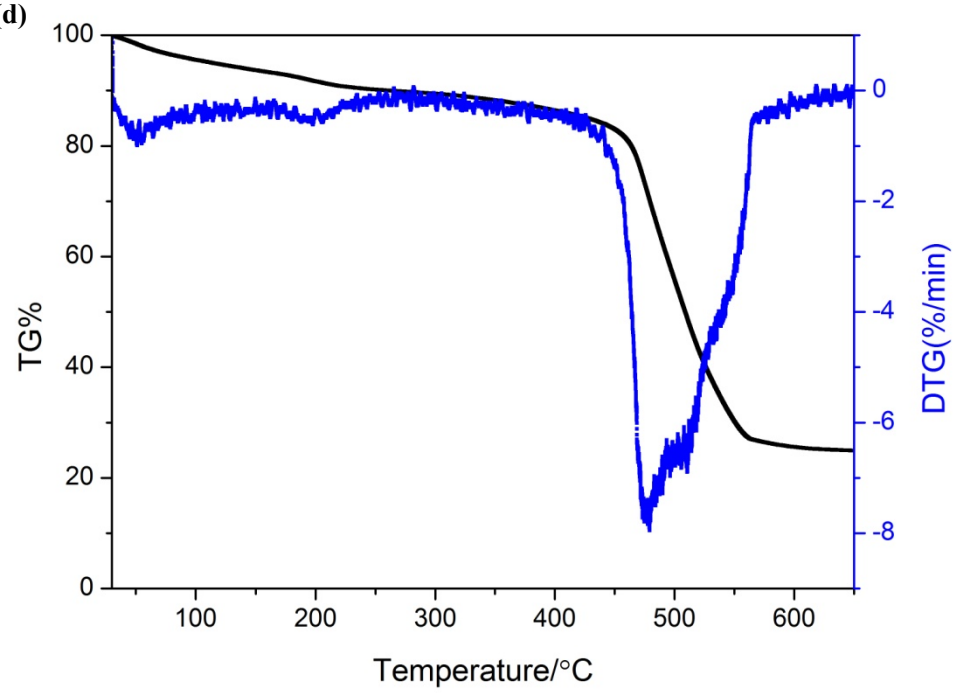
80
60
40
20
0
1
0
-1
-2
-3
-4
100
200
300
400
500
600

(d)


TG%
DTG(%/min)
Temperature/°C
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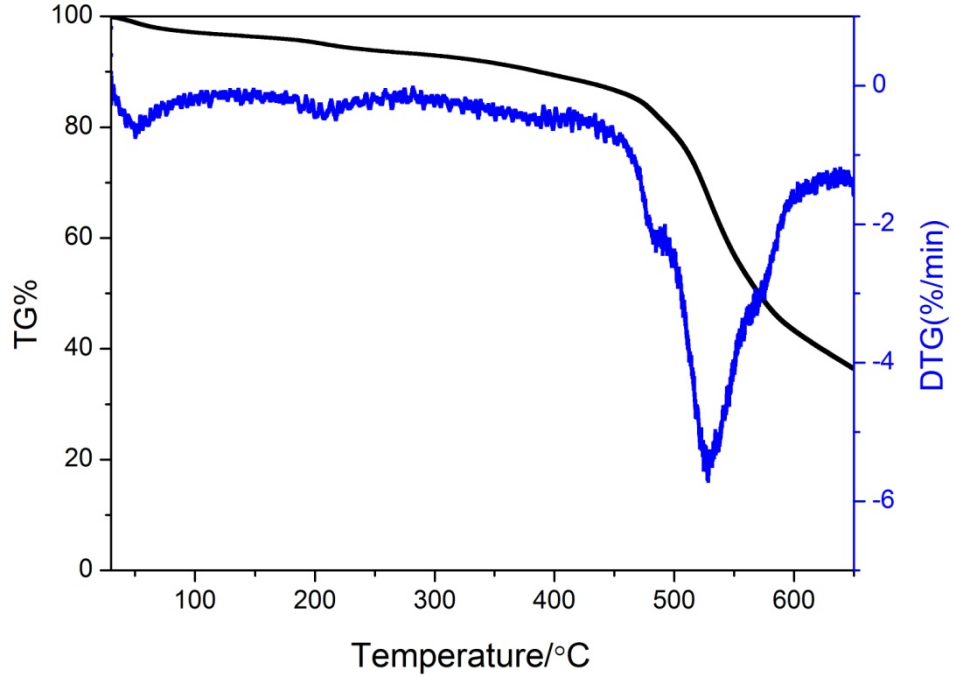
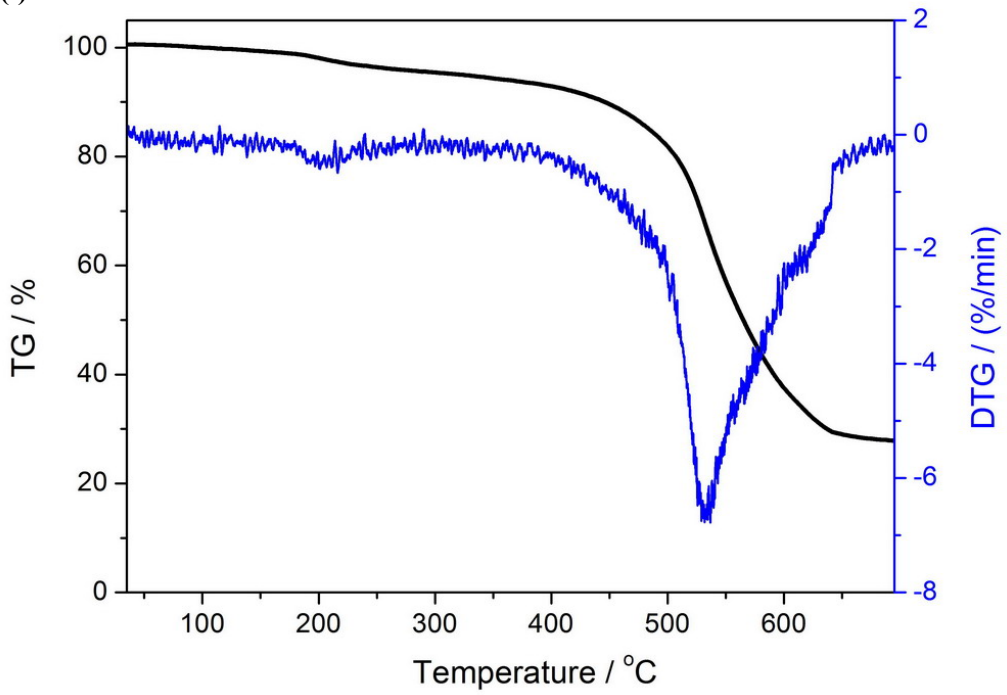
80
60
40
20
0
0
-2
-4
-6
-8
100
200
300
400
500
600

(e)


100
80
60
40
20
0
TG%
0
-2
-4
-6
DTG(%/min)
100
200
300
400
500
600
Temperature/°C

(f)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60
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20
0
TG / %
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0
-2
-4
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-8
DTG / (%/min)
100
200
300
400
500
600
Temperature / °C

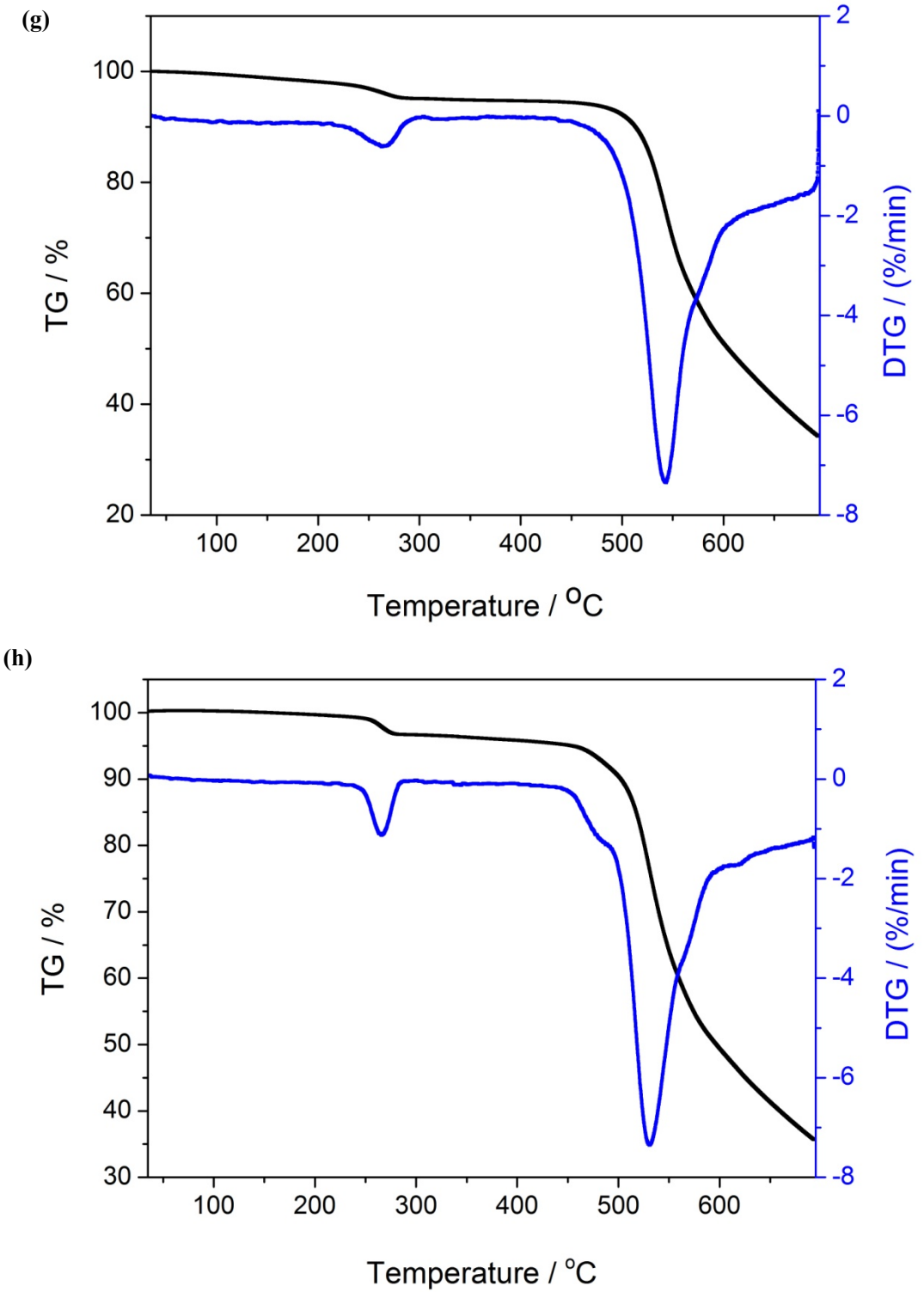


Fig. S2 Thermal gravimetric analyses (TGA) curves for complexes **1**(a), **2**(b), **3**(c), **4**(d), **5**(e), **6**(f), **7**(g) and **8**(h).

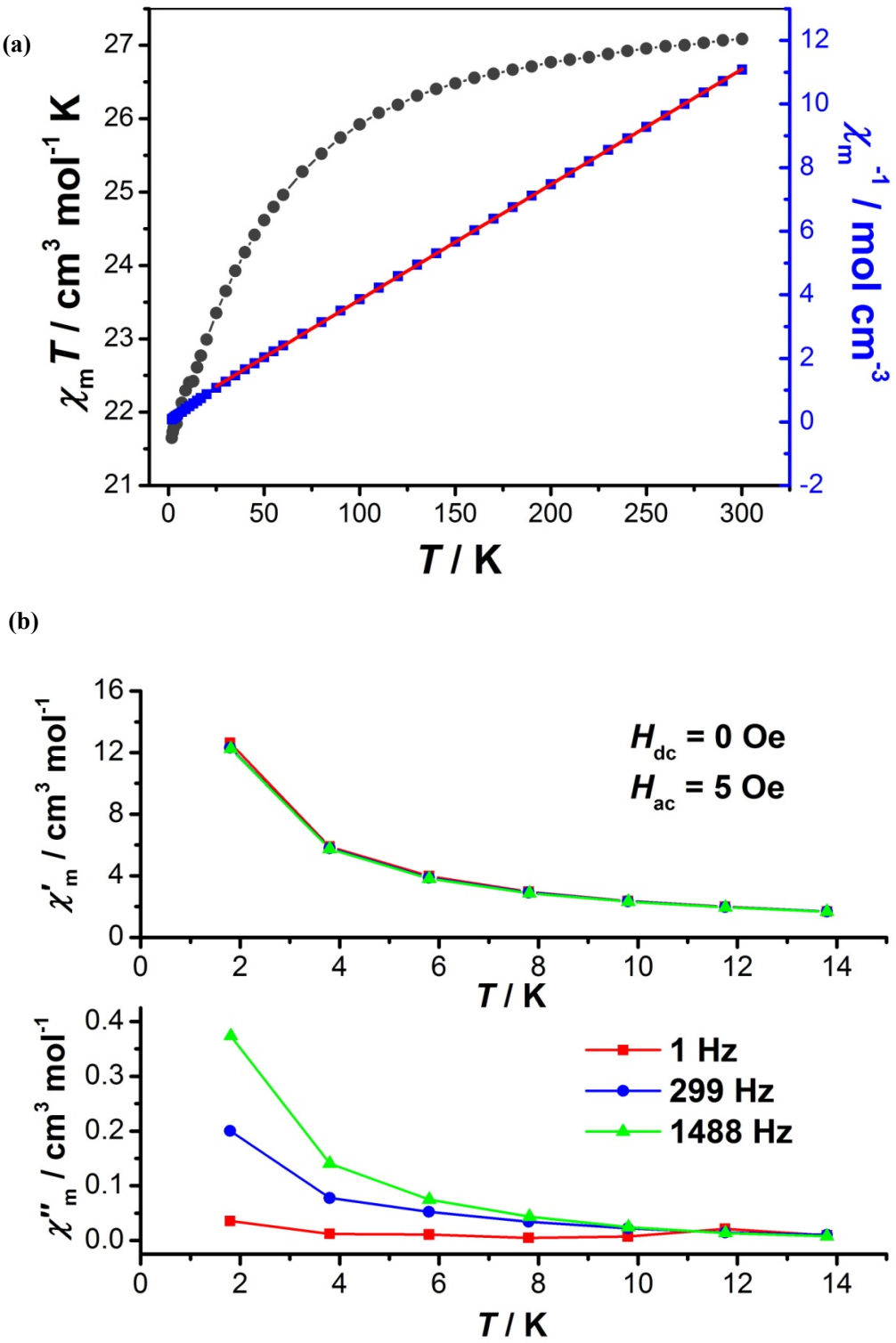


Fig. S3 (a) Temperature dependence of $\chi_m T$ (left) and χ_m^{-1} (right) in the range of 1.8-300K (the red solid line is fitted to the Curie-Weiss law); (b) temperature-dependence of in-phase (χ') and out-of-phase (χ'') ac susceptibility signals (H_{dc} = 0 Oe, H_{ac} = 5 Oe) at the indicated frequencies for **1**.

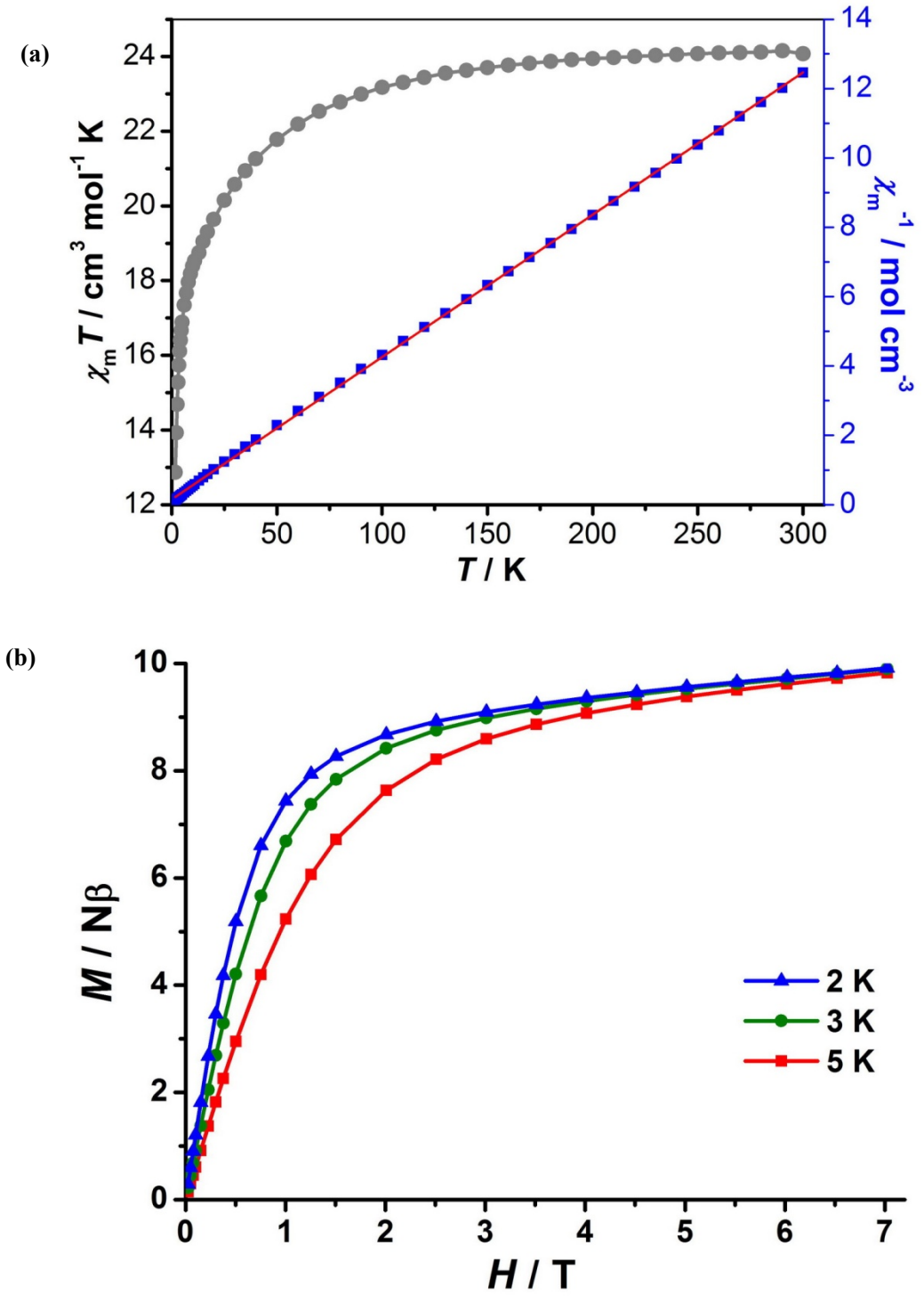


Fig. S4 (a) Temperature dependence of $\chi_m T$ (left) and χ_m^{-1} (right) in the range of 1.8-300K (the red solid line is fitted to the Curie-Weiss law); (b) *M* versus *H* plots at 2, 3, 5 K for **3**.

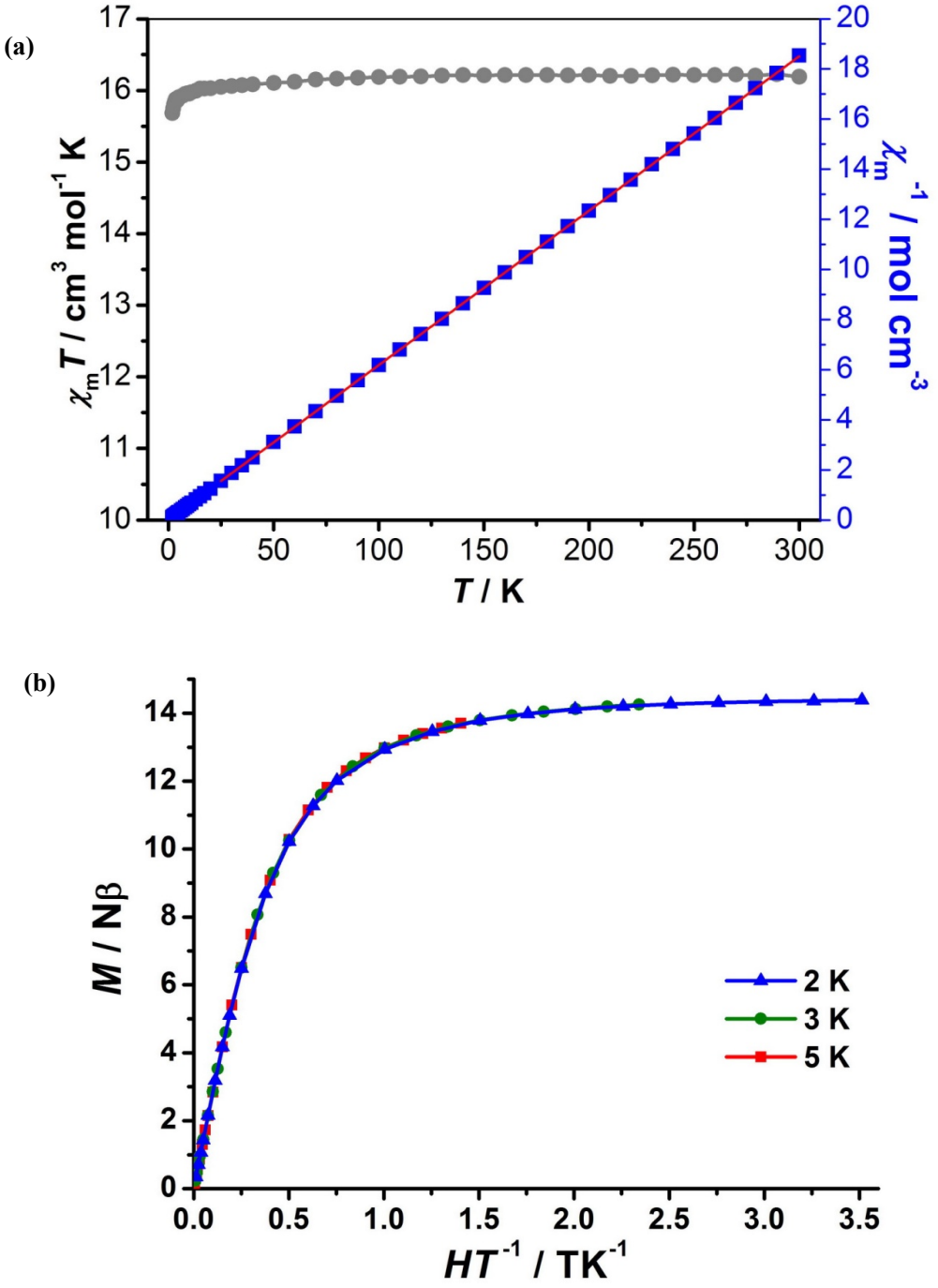
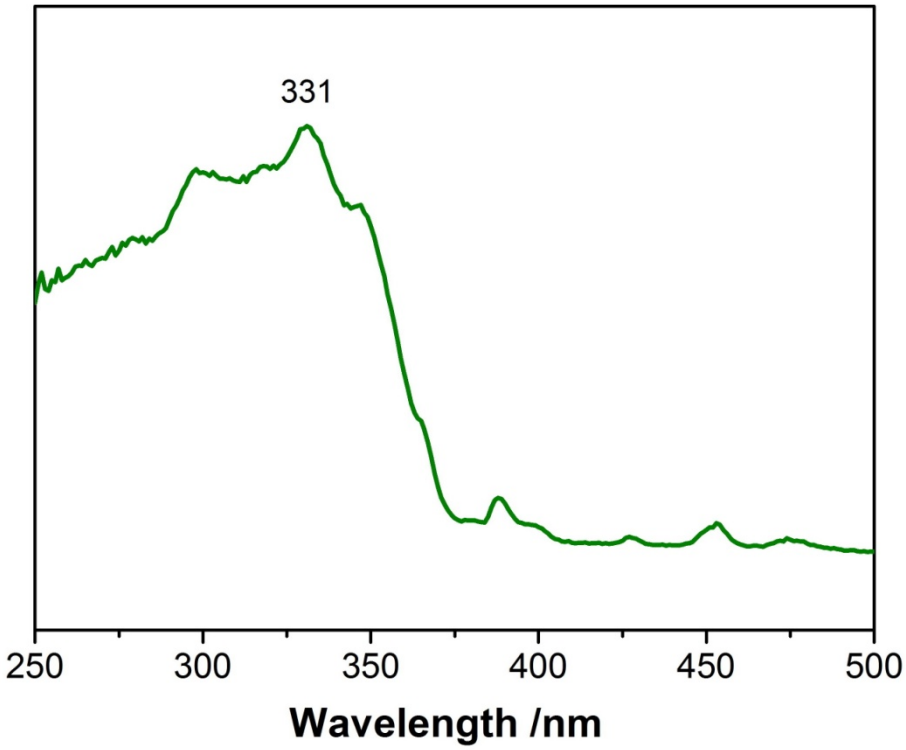
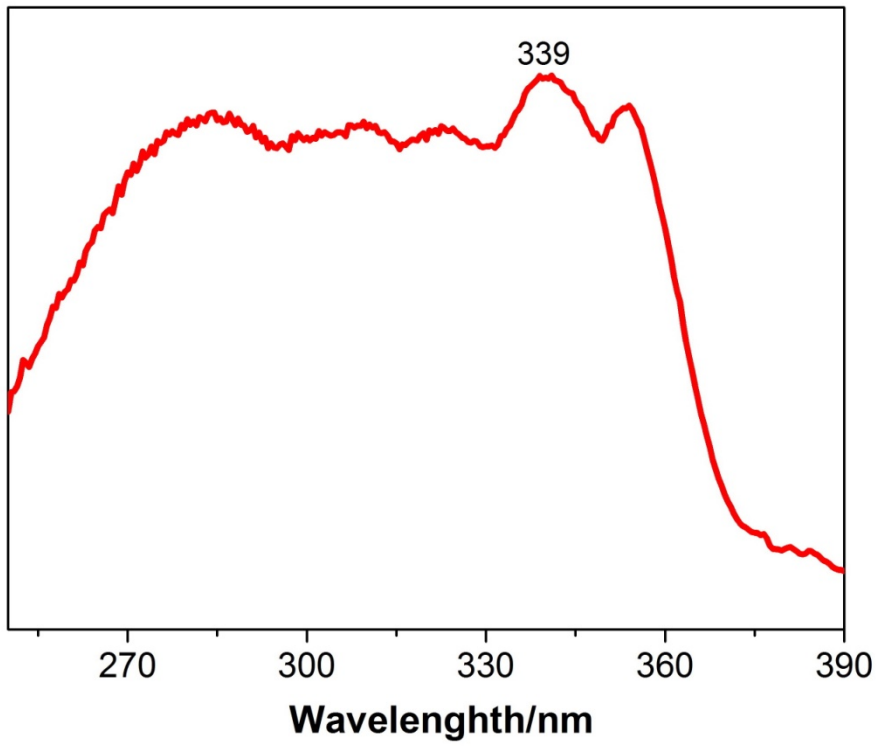


Fig. S5 (a) Temperature dependence of $\chi_m T$ (left) and χ_m^{-1} (right) in the range of 1.8-300K (the red solid line is fitted to the Curie-Weiss law); (b) *M* versus HT^{-1} plots at 2, 3, 5 K for **4**.

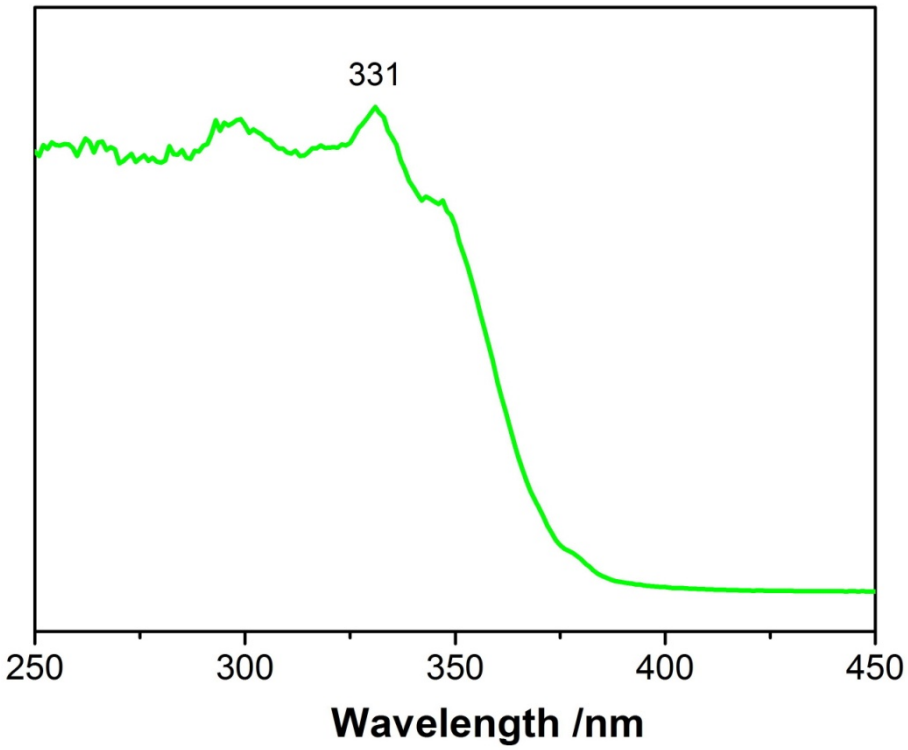
(a)


331
250
300
350
400
450
500
Wavelength /nm

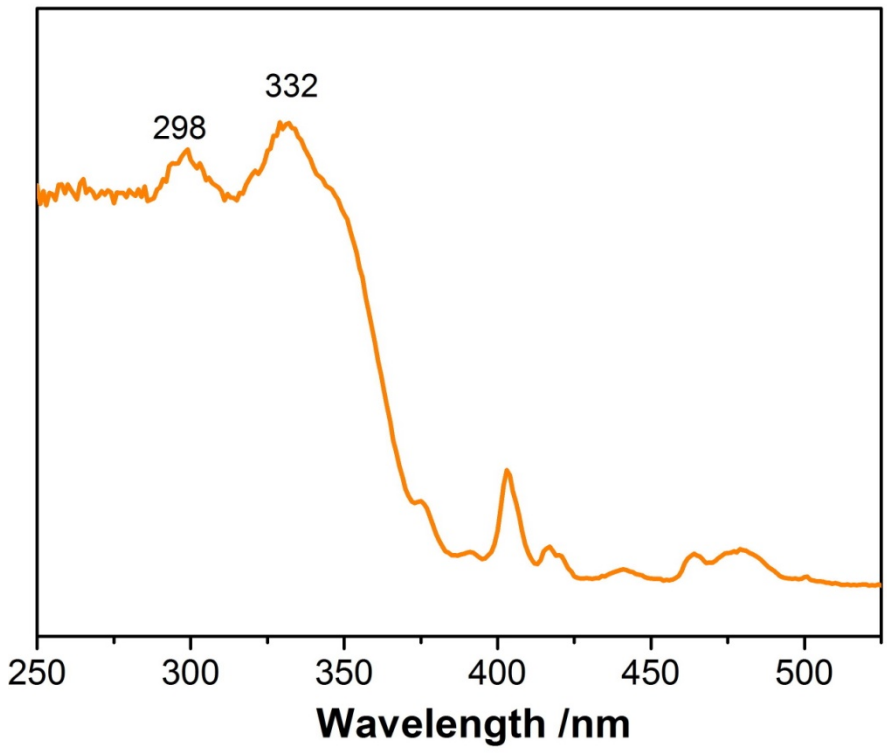
(b)


339
270
300
330
360
390
Wavelenghth/nm

(c)


331
250
300
350
400
450
Wavelength /nm

(d)


332
298
250
300
350
400
450
500
Wavelength /nm

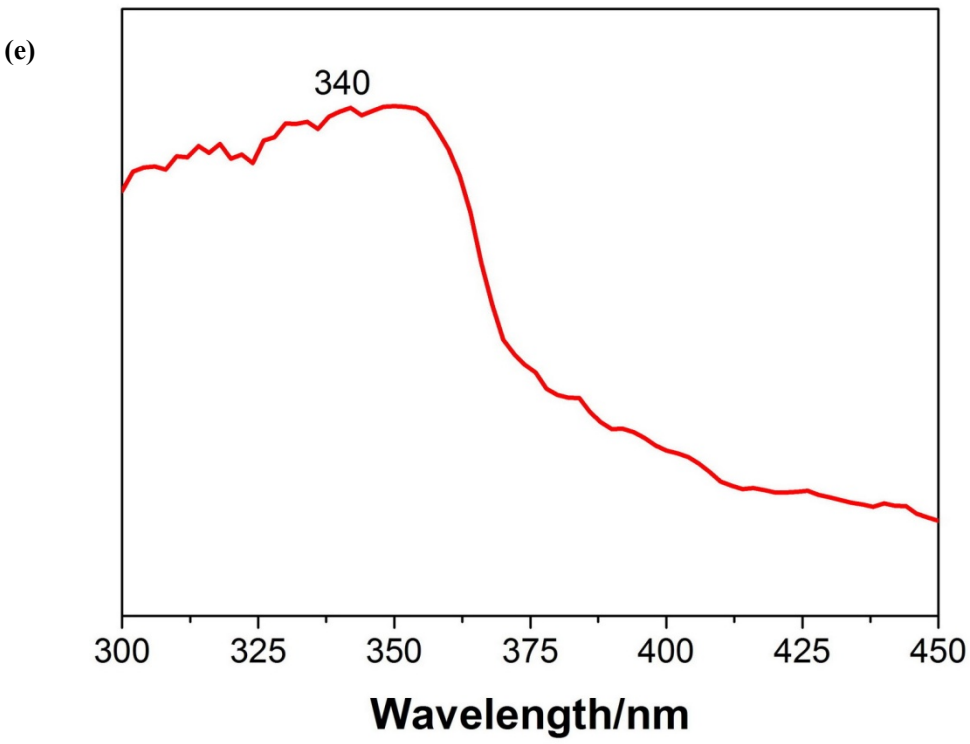


Fig. S6 The excitation spectra for complexes **1**(a), **2**(b), **3**(c), **5**(d) and **7**(e) in solid state at room temperature.

Table S1. Selected bond lengths (Å) and angles (°) for complexes **1-8**.

Complex **1**			
Dy(1)-O(5)#1	2.283(2)	Dy(1)-O(6)#4	2.3556(18)
Dy(1)-O(1)	2.326(2)	Dy(1)-O(1W)	2.430(2)
Dy(1)-O(2)#2	2.3301(19)	Dy(1)-N(1)	2.553(3)
Dy(1)-O(3)#3	2.3315(18)	Dy(1)-N(2)	2.575(3)
O(5)#1-Dy(1)-O(1)	74.92(8)	O(6)#4-Dy(1)-O(1W)	68.42(7)
O(5)#1-Dy(1)-O(2)#2	78.92(7)	O(5)#1-Dy(1)-N(1)	139.20(8)
O(1)-Dy(1)-O(2)#2	124.69(7)	O(1)-Dy(1)-N(1)	145.85(8)
O(5)#1-Dy(1)-O(3)#3	86.82(7)	O(2)#2-Dy(1)-N(1)	74.95(8)
O(1)-Dy(1)-O(3)#3	82.17(7)	O(3)#3-Dy(1)-N(1)	96.09(8)
O(2)#2-Dy(1)-O(3)#3	143.70(7)	O(6)#4-Dy(1)-N(1)	78.13(8)
O(5)#1-Dy(1)-O(6)#4	122.83(7)	O(1W)-Dy(1)-N(1)	73.79(8)
O(1)-Dy(1)-O(6)#4	81.95(8)	O(5)#1-Dy(1)-N(2)	80.32(8)
O(2)#2-Dy(1)-O(6)#4	72.86(7)	O(1)-Dy(1)-N(2)	141.58(8)
O(3)#3-Dy(1)-O(6)#4	140.73(7)	O(2)#2-Dy(1)-N(2)	77.34(7)

O(5)#1-Dy(1)-O(1W)	143.94(8)	O(3)#3-Dy(1)-N(2)	67.39(7)
O(1)-Dy(1)-O(1W)	73.18(8)	O(6)#4-Dy(1)-N(2)	136.47(8)
O(2)#2-Dy(1)-O(1W)	134.08(7)	O(1W)-Dy(1)-N(2)	116.26(8)
O(3)#3-Dy(1)-O(1W)	72.65(7)	N(1)-Dy(1)-N(2)	63.81(8)

Complex **2**			
Eu(1)-O(5)#1	2.320(3)	Eu(1)-O(6)#4	2.391(2)
Eu(1)-O(1)	2.363(3)	Eu(1)-O(1W)	2.470(3)
Eu(1)-O(3)#2	2.368(2)	Eu(1)-N(1)	2.594(3)
Eu(1)-O(2)#3	2.370(3)	Eu(1)-N(2)	2.611(3)
O(5)#1-Eu(1)-O(1)	74.84(10)	O(6)#4-Eu(1)-O(1W)	68.24(9)
O(5)#1-Eu(1)-O(3)#2	87.58(9)	O(5)#1-Eu(1)-N(1)	138.86(11)
O(1)-Eu(1)-O(3)#2	82.20(9)	O(1)-Eu(1)-N(1)	146.27(10)
O(5)#1-Eu(1)-O(2)#3	79.16(9)	O(3)#2-Eu(1)-N(1)	95.62(10)
O(1)-Eu(1)-O(2)#3	125.23(9)	O(2)#3-Eu(1)-N(1)	74.29(10)
O(3)#2-Eu(1)-O(2)#3	143.76(9)	O(6)#4-Eu(1)-N(1)	77.77(10)
O(5)#1-Eu(1)-O(6)#4	123.16(9)	O(1W)-Eu(1)-N(1)	74.45(10)
O(1)-Eu(1)-O(6)#4	82.60(10)	O(5)#1-Eu(1)-N(2)	80.99(10)
O(3)#2-Eu(1)-O(6)#4	140.15(9)	O(1)-Eu(1)-N(2)	141.68(10)
O(2)#3-Eu(1)-O(6)#4	72.79(9)	O(3)#2-Eu(1)-N(2)	67.33(9)
O(5)#1-Eu(1)-O(1W)	143.71(10)	O(2)#3-Eu(1)-N(2)	77.29(10)
O(1)-Eu(1)-O(1W)	72.87(10)	O(6)#4-Eu(1)-N(2)	135.72(10)
O(3)#2-Eu(1)-O(1W)	72.12(9)	O(1W)-Eu(1)-N(2)	115.96(10)
O(2)#3-Eu(1)-O(1W)	134.01(9)	N(1)-Eu(1)-N(2)	63.00(10)

Complex **3**			
Tb(1)-O(5)#1	2.297(2)	Tb(1)-O(6)#4	2.367(2)
Tb(1)-O(1)	2.338(2)	Tb(1)-O(1W)	2.442(2)
Tb(1)-O(3)#2	2.343(2)	Tb(1)-N(1)	2.569(2)
Tb(1)-O(2)#3	2.339(2)	Tb(1)-N(2)	2.577(3)
O(5)#1-Tb(1)-O(1)	74.86(8)	O(6)#4-Tb(1)-O(1W)	68.44(8)
O(5)#1-Tb(1)-O(3)#2	86.89(7)	O(5)#1-Tb(1)-N(1)	139.15(8)
O(1)-Tb(1)-O(3)#2	82.01(8)	O(1)-Tb(1)-N(1)	145.97(8)
O(5)#1-Tb(1)-O(2)#3	79.15(7)	O(3)#2-Tb(1)-N(1)	96.20(8)
O(1)-Tb(1)-O(2)#3	124.92(8)	O(2)#3-Tb(1)-N(1)	74.60(8)
O(3)#2-Tb(1)-O(2)#3	143.83(8)	O(6)#4-Tb(1)-N(1)	77.96(8)
O(5)#1-Tb(1)-O(6)#4	122.92(7)	O(1W)-Tb(1)-N(1)	74.12(8)
O(1)-Tb(1)-O(6)#4	82.16(8)	O(5)#1-Tb(1)-N(2)	80.67(8)

O(3)#2-Tb(1)-O(6)#4	140.60(8)	O(1)-Tb(1)-N(2)	141.65(8)
O(2)#3-Tb(1)-O(6)#4	72.76(8)	O(3)#2-Tb(1)-N(2)	67.45(8)
O(5)#1-Tb(1)-O(1W)	143.70(8)	O(2)#3-Tb(1)-N(2)	77.38(8)
O(1)-Tb(1)-O(1W)	72.97(8)	O(6)#4-Tb(1)-N(2)	136.19(8)
O(3)#2-Tb(1)-O(1W)	72.47(7)	O(1W)-Tb(1)-N(2)	116.10(8)
O(2)#3-Tb(1)-O(1W)	134.06(7)	N(1)-Tb(1)-N(2)	63.52(8)

Complex **4**			
Gd(1)-O(5)#1	2.303(2)	Gd(1)-O(6)#4	2.383(2)
Gd(1)-O(1)	2.349(3)	Gd(1)-O(1W)	2.460(3)
Gd(1)-O(2)#2	2.356(2)	Gd(1)-N(1)	2.569(3)
Gd(1)-O(3)#3	2.358(2)	Gd(1)-N(2)	2.589(3)
O(5)#1-Gd(1)-O(1)	74.85(9)	O(6)#4-Gd(1)-O(1W)	68.08(9)
O(5)#1-Gd(1)-O(2)#2	79.14(9)	O(5)#1-Gd(1)-N(1)	139.13(10)
O(1)-Gd(1)-O(2)#2	124.93(9)	O(1)-Gd(1)-N(1)	145.99(10)
O(5)#1-Gd(1)-O(3)#3	87.45(8)	O(2)#2-Gd(1)-N(1)	74.74(9)
O(1)-Gd(1)-O(3)#3	82.53(8)	O(3)#3-Gd(1)-N(1)	95.33(9)
O(2)#2-Gd(1)-O(3)#3	143.66(9)	O(6)#4-Gd(1)-N(1)	77.73(9)
O(5)#1-Gd(1)-O(6)#4	123.32(9)	O(1W)-Gd(1)-N(1)	74.11(10)
O(1)-Gd(1)-O(6)#4	82.44(9)	O(5)#1-Gd(1)-N(2)	80.56(10)
O(2)#2-Gd(1)-O(6)#4	72.83(9)	O(1)-Gd(1)-N(2)	141.77(10)
O(3)#3-Gd(1)-O(6)#4	140.20(9)	O(2)#2-Gd(1)-N(2)	77.10(9)
O(5)#1-Gd(1)-O(1W)	143.71(9)	O(3)#3-Gd(1)-N(2)	67.40(9)
O(1)-Gd(1)-O(1W)	72.93(9)	O(6)#4-Gd(1)-N(2)	135.79(10)
O(2)#2-Gd(1)-O(1W)	133.99(9)	O(1W)-Gd(1)-N(2)	116.44(10)
O(3)#3-Gd(1)-O(1W)	72.31(9)	N(1)-Gd(1)-N(2)	63.42(10)

Complex **5**			
Sm(1)-O(5)#1	2.334(2)	Sm(1)-O(6)#4	2.4018(18)
Sm(1)-O(1)	2.372(2)	Sm(1)-O(1W)	2.484(2)
Sm(1)-O(3)#2	2.3770(18)	Sm(1)-N(1)	2.610(3)
Sm(1)-O(2)#3	2.382(2)	Sm(1)-N(2)	2.620(3)
O(5)#1-Sm(1)-O(1)	74.88(8)	O(6)#4-Sm(1)-O(1W)	67.97(7)
O(5)#1-Sm(1)-O(3)#2	87.79(7)	O(5)#1-Sm(1)-N(1)	138.87(8)
O(1)-Sm(1)-O(3)#2	82.08(7)	O(1)-Sm(1)-N(1)	146.21(8)
O(5)#1-Sm(1)-O(2)#3	79.34(8)	O(3)#2-Sm(1)-N(1)	95.48(8)
O(1)-Sm(1)-O(2)#3	125.67(7)	O(2)#3-Sm(1)-N(1)	74.01(8)
O(3)#2-Sm(1)-O(2)#3	143.69(7)	O(6)#4-Sm(1)-N(1)	77.42(8)

O(5)#1-Sm(1)-O(6)#4	123.44(7)	O(1W)-Sm(1)-N(1)	74.72(8)
O(1)-Sm(1)-O(6)#4	82.99(8)	O(5)#1-Sm(1)-N(2)	81.41(8)
O(3)#2-Sm(1)-O(6)#4	139.91(7)	O(1)-Sm(1)-N(2)	141.84(8)
O(2)#3-Sm(1)-O(6)#4	72.80(7)	O(3)#2-Sm(1)-N(2)	67.36(7)
O(5)#1-Sm(1)-O(1W)	143.52(8)	O(2)#3-Sm(1)-N(2)	77.16(8)
O(1)-Sm(1)-O(1W)	72.49(8)	O(6)#4-Sm(1)-N(2)	135.16(8)
O(3)#2-Sm(1)-O(1W)	72.08(7)	O(1W)-Sm(1)-N(2)	115.94(8)
O(2)#3-Sm(1)-O(1W)	133.93(7)	N(1)-Sm(1)-N(2)	62.63(8)

Complex **6**			
Nd(1)-O(5)#1	2.361(3)	Nd(1)-O(6)#4	2.428(3)
Nd(1)-O(1)	2.400(3)	Nd(1)-O(1W)	2.517(3)
Nd(1)-O(3)#2	2.406(3)	Nd(1)-N(1)	2.638(4)
Nd(1)-O(2)#3	2.412(3)	Nd(1)-N(2)	2.647(4)
O(5)#1-Nd(1)-O(1)	74.63(11)	O(6)#4-Nd(1)-O(1W)	67.68(10)
O(5)#1-Nd(1)-O(3)#2	88.85(10)	O(5)#1-Nd(1)-N(1)	138.78(12)
O(1)-Nd(1)-O(3)#2	82.48(10)	O(1)-Nd(1)-N(1)	146.56(12)
O(5)#1-Nd(1)-O(2)#3	79.68(10)	O(3)#2-Nd(1)-N(1)	94.63(10)
O(1)-Nd(1)-O(2)#3	126.24(10)	O(2)#3-Nd(1)-N(1)	73.34(11)
O(3)#2-Nd(1)-O(2)#3	143.49(10)	O(6)#4-Nd(1)-N(1)	77.02(11)
O(5)#1-Nd(1)-O(6)#4	123.59(10)	O(1W)-Nd(1)-N(1)	75.36(12)
O(1)-Nd(1)-O(6)#4	83.66(10)	O(5)#1-Nd(1)-N(2)	82.08(12)
O(3)#2-Nd(1)-O(6)#4	139.35(10)	O(1)-Nd(1)-N(2)	141.85(11)
O(2)#3-Nd(1)-O(6)#4	72.64(10)	O(3)#2-Nd(1)-N(2)	67.05(10)
O(5)#1-Nd(1)-O(1W)	143.20(11)	O(2)#3-Nd(1)-N(2)	77.04(11)
O(1)-Nd(1)-O(1W)	72.11(11)	O(6)#4-Nd(1)-N(2)	134.46(11)
O(3)#2-Nd(1)-O(1W)	71.70(10)	O(1W)-Nd(1)-N(2)	115.99(12)
O(2)#3-Nd(1)-O(1W)	133.71(10)	N(1)-Nd(1)-N(2)	62.05(12)

Complex **7**			
Yb(1)-O(4)#1	2.241(3)	Yb(1)-O(3)#4	2.316(3)
Yb(1)-O(1)	2.280(3)	Yb(1)-O(1W)	2.389(3)
Yb(1)-O(2)#2	2.280(3)	Yb(1)-N(2)	2.508(4)
Yb(1)-O(6)#3	2.294(3)	Yb(1)-N(1)	2.531(4)
O(4)#1-Yb(1)-O(1)	78.56(11)	O(3)#4-Yb(1)-O(1W)	68.87(11)
O(4)#1-Yb(1)-O(2)#2	75.08(12)	O(4)#1-Yb(1)-N(2)	139.58(13)
O(1)-Yb(1)-O(2)#2	124.00(11)	O(1)-Yb(1)-N(2)	75.59(12)
O(4)#1-Yb(1)-O(6)#3	85.67(11)	O(2)#2-Yb(1)-N(2)	145.33(12)

O(1)-Yb(1)-O(6)#3	143.53(12)	O(6)#3-Yb(1)-N(2)	97.15(12)
O(2)#2-Yb(1)-O(6)#3	82.07(11)	O(3)#4-Yb(1)-N(2)	78.41(12)
O(4)#1-Yb(1)-O(3)#4	122.43(11)	O(1W)-Yb(1)-N(2)	72.81(12)
O(1)-Yb(1)-O(3)#4	73.07(12)	O(4)#1-Yb(1)-N(1)	79.68(13)
O(2)#2-Yb(1)-O(3)#4	81.01(11)	O(1)-Yb(1)-N(1)	77.38(12)
O(6)#3-Yb(1)-O(3)#4	141.45(12)	O(2)#2-Yb(1)-N(1)	141.61(12)
O(4)#1-Yb(1)-O(1W)	144.39(12)	O(6)#3-Yb(1)-N(1)	67.49(12)
O(1)-Yb(1)-O(1W)	134.27(11)	O(3)#4-Yb(1)-N(1)	137.34(12)
O(2)#2-Yb(1)-O(1W)	73.86(12)	O(1W)-Yb(1)-N(1)	116.06(12)
O(6)#3-Yb(1)-O(1W)	73.23(11)	N(2)-Yb(1)-N(1)	64.75(13)

Complex **8**			
Pr(1)-O(5)#1	2.383(3)	Pr(1)-O(6)#4	2.442(3)
Pr(1)-O(1)	2.419(3)	Pr(1)-O(1W)	2.534(4)
Pr(1)-O(3)#2	2.419(3)	Pr(1)-N(2)	2.658(5)
Pr(1)-O(2)#3	2.429(3)	Pr(1)-N(1)	2.662(4)
O(5)#1-Pr(1)-O(1)	73.96(13)	O(6)#4-Pr(1)-O(1W)	67.56(12)
O(5)#1-Pr(1)-O(3)#2	89.19(12)	O(5)#1-Pr(1)-N(2)	82.80(14)
O(1)-Pr(1)-O(3)#2	82.25(12)	O(1)-Pr(1)-N(2)	141.74(13)
O(5)#1-Pr(1)-O(2)#3	79.98(12)	O(3)#2-Pr(1)-N(2)	67.20(12)
O(1)-Pr(1)-O(2)#3	126.47(12)	O(2)#3-Pr(1)-N(2)	76.95(13)
O(3)#2-Pr(1)-O(2)#3	143.59(12)	O(6)#4-Pr(1)-N(2)	133.60(13)
O(5)#1-Pr(1)-O(6)#4	124.11(12)	O(1W)-Pr(1)-N(2)	115.96(14)
O(1)-Pr(1)-O(6)#4	84.61(12)	O(5)#1-Pr(1)-N(1)	139.36(14)
O(3)#2-Pr(1)-O(6)#4	138.74(12)	O(1)-Pr(1)-N(1)	146.61(13)
O(2)#3-Pr(1)-O(6)#4	72.67(12)	O(3)#2-Pr(1)-N(1)	93.93(13)
O(5)#1-Pr(1)-O(1W)	142.37(13)	O(2)#3-Pr(1)-N(1)	73.72(13)
O(1)-Pr(1)-O(1W)	71.84(13)	O(6)#4-Pr(1)-N(1)	76.55(13)
O(3)#2-Pr(1)-O(1W)	71.18(11)	O(1W)-Pr(1)-N(1)	75.53(14)
O(2)#3-Pr(1)-O(1W)	134.08(12)	N(2)-Pr(1)-N(1)	61.60(14)

Symmetry code: #1 x,y+1,z; #2 -x+1/2,-y+1/2,-z; #3 -x+1/2,y+1/2,-z+1/2 ; #4 -x+1/2,-y-1/2,-z for **1-8**.