Table S1 Selected bond lengths (Å) for coordination polymers **1**–**8**[a]

1[a]					
Pr(1)–O(2)#1	2.395(4)	Pr(1)–O(3)#1	2.522(4)	Pr(1)–O(7)	2.557(5)
Pr(1)–O(1)	2.489(4)	Pr(1)–O(4)#2	2.537(4)	Pr(1)–N(1)#4	2.601(5)
Pr(1)–O(5)	2.501(4)	Pr(1)–O(6)#3	2.539(5)	Pr(1)–O(3)#2	2.639(4)

2[b]			**3**(Ln=Ho)[c]	**4**(Ln=Tb)[d]
Yb(1)–O(1)	2.258(3)	Ln(1)–O(4)(2)#1	2.329(3)	2.320(4)
Yb(1)–O(4)#1	2.290(3)	Ln(1)–O(3)#2	2.356(3)	2.346(4)
Yb(1)–O(3)#2	2.292(3)	Ln(1)–O(7)	2.445(4)	2.357(4)
Yb(1)–O(8)	2.341(3)	Ln(1)–O(1)	2.297(4)	2.381(3)
Yb(1)–O(5)#3	2.349(3)	Ln(1)–O(5)	2.406(3)	2.402(4)
Yb(1)–O(6)	2.356(3)	Ln(1)–O(6)	2.389(3)	2.425(4)
Yb(1)–O(7)#4	2.376(3)	Ln(1)–O(8)	2.328(4)	2.438(4)
Yb(1)–O(7)	2.486(3)	Ln(1)–O(9)	2.414(3)	2.465(4)

	5(Ln=Tb)	**6**(Ln=Sm)	**7**(Ln=Dy)	**8**(Ln=Gd)
Ln(1)–O(10)	2.375(3)	2.397(2)	2.375(4)	2.365(3)
Ln(1)–O(9)	2.464(4)	2.421(2)	2.338(3)	2.397(3)
Ln(1)–O(2)	2.476(3)	2.439(2)	2.472(3)	2.487(2)
Ln(1)–O(5)	2.418(3)	2.456(2)	2.411(3)	2.547(3)
Ln(1)–O(3)	2.436(4)	2.468(2)	2.417(3)	2.451(3)
Ln(1)–O(4)	2.471(3)	2.504(2)	2.459(3)	2.486(2)
Ln(1)–O(1)	2.397(3)	2.510(2)	2.394(3)	2.417(2)
Ln(1)–O(11)	2.346(3)	2.513(2)	2.459(3)	2.486(3)
Ln(1)–O(6)	2.531(3)	2.559(2)	2.532(3)	2.431(3)

[a] Symmetry transformations used to generate equivalent atoms: (a) #1: −x+1, −y+2, −z+1; #2: x−1, y, z; #3: −x, −y+1, −z; #4: −x+1,−y+2,−z; (b) #1: −x−1, −y, −z; #2: x+1, y, z; #3: −x−1, −y+1, −z; #4: −x, −y, −z; (c) #1: x−1, y, z; #2: −x+1,−y+1,−z; (d) #1: −x+1, −y+1, −z+1; #2: −x, −y+1, −z+1.

Table S2 Selected bond angles (°) for coordination polymers **1**–**8**[a]

1[a]							
O(2)#1–Pr(1)–O(1)	76.04(14)	O(3)#1–Pr(1)–O(4)#2	104.78(14)	O(3)#1–Pr(1)–O(7)	74.65(14)	O(7)–Pr(1)–N(1)#4	139.03(15)
O(2)#1–Pr(1)–O(5)	130.37(13)	O(2)#1–Pr(1)–O(6)#3	67.53(13)	O(4)#2–Pr(1)–O(7)	110.48(15)	O(2)#1–Pr(1)–O(3)#2	140.31(13)
O(1)–Pr(1)–O(5)	133.55(13)	O(1)–Pr(1)–O(6)#3	132.36(14)	O(6)#3–Pr(1)–O(7)	72.06(14)	O(1)–Pr(1)–O(3)#2	95.47(15)
O(2)#1–Pr(1)–O(3)#1	69.62(13)	O(5)–Pr(1)–O(6)#3	63.92(12)	O(2)#1–Pr(1)–N(1)#4	84.64(15)	O(5)–Pr(1)–O(3)#2	83.48(13)
O(1)–Pr(1)–O(3)#1	70.61(13)	O(3)#1–Pr(1)–O(6)#3	120.13(12)	O(1)–Pr(1)–N(1)#4	75.80(15)	O(3)#1–Pr(1)–O(3)#2	71.00(14)
O(5)–Pr(1)–O(3)#1	147.40(13)	O(4)#2–Pr(1)–O(6)#3	133.02(14)	O(5)–Pr(1)–N(1)#4	71.01(15)	O(4)#2–Pr(1)–O(3)#2	49.91(12)
O(2)#1–Pr(1)–O(4)#2	148.74(14)	O(2)#1–Pr(1)–O(7)	97.88(16)	O(3)#1–Pr(1)–N(1)#4	141.49(15)	O(6)#3–Pr(1)–O(3)#2	132.16(13)
O(1)–Pr(1)–O(4)#2	73.24(14)	O(1)–Pr(1)–O(7)	144.67(14)	O(4)#2–Pr(1)–N(1)#4	82.46(14)	O(7)–Pr(1)–O(3)#2	66.83(15)
O(5)–Pr(1)–O(4)#2	71.02(14)	O(5)–Pr(1)–O(7)	76.84(15)	O(6)#3–Pr(1)–N(1)#4	71.33(14)	N(1)#4–Pr(1)–O(3)#2	131.50(13)
2[b]							
O(1)–Yb(1)–O(4)#1	114.83(12)	O(4)#1–Yb(1)–O(5)#3	72.70(12)	O(5)#3–Yb(1)–O(6)	69.64(11)	O(1)–Yb(1)–O(7)	76.07(11)
O(1)–Yb(1)–O(3)#2	77.52(12)	O(3)#2–Yb(1)–O(5)#3	125.51(11)	O(1)–Yb(1)–O(7)#4	143.11(11)	O(4)#1–Yb(1)–O(7)	71.22(11)
O(4)#1–Yb(1)–O(3)#2	138.64(11)	O(8)–Yb(1)–O(5)#3	73.96(12)	O(4)#1–Yb(1)–O(7)#4	76.73(11)	O(3)#2–Yb(1)–O(7)	74.46(11)
O(1)–Yb(1)–O(8)	83.92(12)	O(1)–Yb(1)–O(6)	72.91(11)	O(3)#2–Yb(1)–O(7)#4	72.79(11)	O(8)–Yb(1)–O(7)	143.88(11)
O(4)#1–Yb(1)–O(8)	144.90(12)	O(4)#1–Yb(1)–O(6)	75.93(11)	O(8)–Yb(1)–O(7)#4	106.63(11)	O(5)#3–Yb(1)–O(7)	138.90(11)
O(3)#2–Yb(1)–O(8)	72.00(11)	O(3)#2–Yb(1)–O(6)	142.62(11)	O(5)#3–Yb(1)–O(7)#4	77.91(11)	O(6)–Yb(1)–O(7)	118.59(10)
O(1)–Yb(1)–O(5)#3	138.39(11)	O(8)–Yb(1)–O(6)	82.51(11)	O(6)–Yb(1)–O(7)#4	142.41(11)	O(7)#4–Yb(1)–O(7)	75.28(11)
3[c]							
O(1)–Ho(1)–O(8)	139.62(13)	O(8)–Ho(1)–O(6)	71.16(13)	O(6)–Ho(1)–O(5)	67.30(11)	O(1)–Ho(1)–O(7)	73.34(13)
O(1)–Ho(1)–O(2)#1	144.18(13)	O(2)#1–Ho(1)–O(6)	107.73(13)	O(1)–Ho(1)–O(9)	69.19(12)	O(8)–Ho(1)–O(7)	140.82(13)
O(8)–Ho(1)–O(2)#1	76.20(13)	O(3)#2–Ho(1)–O(6)	143.97(12)	O(8)–Ho(1)–O(9)	71.94(13)	O(2)#1–Ho(1)–O(7)	74.21(13)
O(1)–Ho(1)–O(3)#2	99.70(13)	O(1)–Ho(1)–O(5)	81.48(13)	O(2)#1–Ho(1)–O(9)	144.25(12)	O(3)#2–Ho(1)–O(7)	72.55(12)
O(8)–Ho(1)–O(3)#2	79.66(12)	O(8)–Ho(1)–O(5)	119.72(13)	O(3)#2–Ho(1)–O(9)	74.23(12)	O(6)–Ho(1)–O(7)	142.95(12)
O(2)#1–Ho(1)–O(3)#2	84.59(12)	O(2)#1–Ho(1)–O(5)	77.13(12)	O(6)–Ho(1)–O(9)	76.91(12)	O(5)–Ho(1)–O(7)	77.60(12)
O(1)–Ho(1)–O(6)	89.64(14)	O(3)#2–Ho(1)–O(5)	148.28(12)	O(5)–Ho(1)–O(9)	133.45(12)	O(9)–Ho(1)–O(7)	123.77(12)
4[d]							
O(4)#1–Tb(1)–O(3)#2	144.05(13)	O(3)#2–Tb(1)–O(5)	106.85(13)	O(5)–Tb(1)–O(6)	66.70(12)	O(4)#1–Tb(1)–O(9)	73.43(13)
O(4)#1–Tb(1)–O(7)	139.55(14)	O(7)–Tb(1)–O(5)	71.00(14)	O(4)#1–Tb(1)–O(8)	69.30(13)	O(3)#2–Tb(1)–O(9)	74.40(13)
O(3)#2–Tb(1)–O(7)	76.39(14)	O(1)–Tb(1)–O(5)	143.60(13)	O(3)#2–Tb(1)–O(8)	144.67(13)	O(7)–Tb(1)–O(9)	141.03(14)
O(4)#1–Tb(1)–O(1)	100.50(13)	O(4)#1–Tb(1)–O(6)	80.51(13)	O(7)–Tb(1)–O(8)	71.86(13)	O(1)–Tb(1)–O(9)	73.26(13)
O(3)#2–Tb(1)–O(1)	85.13(13)	O(3)#2–Tb(1)–O(6)	77.35(13)	O(1)–Tb(1)–O(8)	74.14(13)	O(5)–Tb(1)–O(9)	142.72(13)
O(7)–Tb(1)–O(1)	79.11(13)	O(7)–Tb(1)–O(6)	119.97(13)	O(5)–Tb(1)–O(8)	77.11(12)	O(6)–Tb(1)–O(9)	77.71(12)
O(4)#1–Tb(1)–O(5)	89.59(14)	O(1)–Tb(1)–O(6)	149.22(13)	O(6)–Tb(1)–O(8)	132.58(13)	O(8)–Tb(1)–O(9)	123.93(12)

	5(Ln=Tb)	**6**(Ln=Sm)	**7**(Ln=Dy)	**8**(Ln=Gd)		**5**(Ln=Tb)	**6**(Ln=Sm)	**7**(Ln=Dy)	**8**(Ln=Gd)
O(10)–Ln(1)–O(9)	136.02(12)	75.78(9)	75.56(12)	76.21(11)	O(5)–Ln(1)–O(1)	126.82(11)	148.99(9)	126.88(10)	74.60(8)
O(10)–Ln(1)–O(2)	71.47(13)	138.05(8)	71.90(11)	84.60(9)	O(3)–Ln(1)–O(1)	82.87(11)	123.97(8)	82.68(10)	82.98(8)
O(9)–Ln(1)–O(2)	70.18(12)	90.42(9)	84.41(10)	72.03(10)	O(4)–Ln(1)–O(1)	133.72(11)	139.01(8)	133.77(11)	133.57(8)
O(10)–Ln(1)–O(5)	76.89(14)	89.39(8)	76.39(12)	132.55(9)	O(10)–Ln(1)–O(11)	76.27(14)	79.25(8)	136.42(11)	79.21(10)
O(9)–Ln(1)–O(5)	138.65(12)	76.90(9)	88.39(11)	69.58(9)	O(9)–Ln(1)–O(11)	79.84(13)	136.60(8)	79.96(12)	136.45(9)
O(2)–Ln(1)–O(5)	148.35(13)	126.31(7)	148.28(12)	113.57(8)	O(2)–Ln(1)–O(11)	85.16(12)	85.02(8)	70.29(11)	70.34(9)
O(10)–Ln(1)–O(3)	149.20(12)	126.99(7)	149.09(11)	127.50(9)	O(5)–Ln(1)–O(11)	88.13(14)	137.83(8)	138.51(11)	147.43(9)
O(9)–Ln(1)–O(3)	73.07(12)	149.64(8)	128.02(10)	148.90(9)	O(3)–Ln(1)–O(11)	127.36(11)	72.57(8)	72.98(12)	73.21(9)
O(2)–Ln(1)–O(3)	124.15(12)	83.29(7)	124.25(10)	124.28(9)	O(4)–Ln(1)–O(11)	75.44(12)	70.02(8)	70.24(11)	70.21(9)
O(5)–Ln(1)–O(3)	83.88(14)	83.04(9)	83.95(13)	79.36(9)	O(1)–Ln(1)–O(11)	138.52(12)	70.90(8)	84.46(11)	84.81(9)
O(10)–Ln(1)–O(4)	135.31(15)	75.83(8)	134.63(12)	75.97(9)	O(10)–Ln(1)–O(6)	70.13(11)	132.42(8)	70.16(11)	88.84(10)
O(9)–Ln(1)–O(4)	70.37(12)	134.37(9)	75.86(11)	134.91(12)	O(9)–Ln(1)–O(6)	146.90(11)	70.03(8)	132.43(11)	76.42(11)
O(2)–Ln(1)–O(4)	138.40(12)	133.74(7)	138.24(10)	138.51(9)	O(2)–Ln(1)–O(6)	113.66(11)	74.86(7)	113.85(10)	148.43(10)
O(5)–Ln(1)–O(4)	68.33(12)	67.83(8)	68.31(11)	106.49(8)	O(5)–Ln(1)–O(6)	52.42(10)	51.66(7)	52.46(10)	52.24(8)
O(3)–Ln(1)–O(4)	53.30(11)	52.73(7)	53.57(10)	53.00(8)	O(3)–Ln(1)–O(6)	79.08(11)	79.67(7)	78.96(10)	83.64(11)
O(10)–Ln(1)–O(1)	89.60(15)	85.29(8)	90.23(13)	137.98(9)	O(4)–Ln(1)–O(6)	106.50(11)	106.12(7)	106.55(11)	68.27(9)
O(9)–Ln(1)–O(1)	84.47(12)	72.17(9)	138.04(11)	90.01(12)	O(1)–Ln(1)–O(6)	74.51(11)	113.37(7)	74.54(11)	126.68(9)
O(2)–Ln(1)–O(1)	53.37(10)	52.78(7)	53.64(9)	53.39(8)	O(11)–Ln(1)–O(6)	132.40(12)	147.36(7)	146.78(11)	138.42(9)

[a] Symmetry transformations used to generate equivalent atoms: (a) #1: −x+1, −y+2, −z+1; #2: x−1, y, z; #3: −x, −y+1, −z; #4: −x+1,−y+2,−z; (b) #1: −x−1, −y, −z; #2: x+1, y, z; #3: −x−1, −y+1, −z; #4: −x, −y, −z; (c) #1: x−1, y, z; #2: −x+1,−y+1,−z; (d) #1: −x+1, −y+1, −z+1; #2: −x, −y+1, −z+1.

Table S3 Important hydrogen bond interactions in coordination polymers **1**–**8**[a]

		1		
O7−H7A···OW1	0.850	2.204	122.29	2.754
O7−H7B···O1 [a]	0.850	2.410	116.55	2.892
N2−H2A···O5 1 [a]	0.860	1.922	156.84	2.733
OW1−HW1A···O6 [b]	0.850	2.359	132.39	2.998
		2		
O7−H7A···O6 [c]	0.970	1.968	147.03	2.831
O7−H7B···O2	0.970	1.737	141.02	2.564
O8−H8A···N2 [d]	0.960	1.863	150.13	2.738
O8−H8B···O2 [e]	0.960	1.772	162.08	2.701
N1−H1A···O8 [f]	0.860	2.416	141.73	3.137
		3		
O7−H7B···O3	0.850	2.163	144.72	2.898
O8−H8B···N1 [g]	0.850	2.323	113.25	2.770
O9−H9A···O4 [h]	0.850	2.211	127.43	2.810
N1−H1A···O8 [g]	0.860	2.129	131.05	2.770
N1−H1A···O9 [i]	0.860	2.471	115.38	2.944
		4		
O7−H7B···O2	0.960	1.741	145.41	2.589
O7−H7C···N1 [b]	0.960	2.281	110.34	2.765
O8−H8A···O2 [j]	0.960	2.137	124.64	2.797
O9−H9B···O4	0.960	2.317	162.54	3.246
O9−H9B···O3	0.960	2.440	141.08	3.243
O9−H9C···O1 [g]	0.960	2.077	143.05	2.902
N2−H2A···O6 [k]	0.860	2.004	175.20	2.862
		5		
O7−H7···O10 [l]	0.820	1.853	161.06	2.642
O9−H9B···O1 [m]	0.850	2.373	121.47	2.909
O9−H9B···O3 [m]	0.850	2.500	125.16	3.070
O10−H10C···O8	0.850	2.354	112.91	2.797
O11−H11A···OW1	0.850	2.185	120.43	2.716
O11−H11B···O8 [n]	0.850	1.998	135.84	2.674
N1−H1A···OW3 [o]	0.860	1.983	164.19	2.820
N3−H3A···OW2	0.860	1.792	170.63	2.644
OW1−HW1A···O3 [m]	0.850	2.488	129.73	3.101
OW1−HW1A···O1 [p]	0.850	2.660	115.99	3.127
OW2−HW2B···N2	0.850	2.060	138.09	2.752
OW2−HW2C···O2 [q]	0.850	2.185	124.49	2.757
OW3−HW3B···O7 [r]	0.850	1.807	173.48	2.653
OW3−HW3C···O4 [s]	0.850	2.167	138.52	2.859
OW3−HW3C···O5 [s]	0.850	2.282	134.28	2.940
		6		
D−H···A	d(D−H)	d(H···A)	<DHA	d(D···A)
O7−H7···O9 [t]	0.820	1.859	162.17	2.652
O9−H9B···O8	0.850	2.350	113.75	2.802
O10−H10A···OW3	0.850	2.240	114.42	2.705
O10−H10C···O8 [m]	0.850	2.056	129.21	2.676
O11−H11A···OW1	0.850	2.219	159.72	3.031

O11−H11B···O2 [n]	0.850	2.360	122.86	2.910
O11−H11B···O3 [n]	0.850	2.503	123.40	3.055
N1−H1A···OW1 [u]	0.860	1.817	168.70	2.665
N3−H3A···OW2 [q]	0.860	1.990	164.83	2.829
OW1−HW1A···N4 [s]	0.850	2.268	116.38	2.753
OW2−HW2A···O7 [p]	0.850	1.897	148.88	2.661
OW2−HW2C···O4	0.850	2.060	159.77	2.872
OW3−HW3A···O6 [p]	0.850	2.373	148.52	3.129
OW3−HW3B···O3 [n]	0.850	2.383	146.05	3.124
OW3−HW3B···O2 [p]	0.850	2.505	130.29	3.123
7				
O8−H8···O9 [l]	0.820	2.007	138.12	2.674
O9−H9A···OW3	0.850	2.248	114.29	2.711
O10−H10A···O7 [n]	0.850	1.857	154.39	2.649
O10−H10C···O8	0.850	2.345	112.96	2.788
O11−H11A···OW1	0.850	2.199	160.37	3.013
O11−H11B···O1 [m]	0.850	2.335	124.34	2.900
O11−H11B···O3 [m]	0.850	2.521	123.80	3.076
N1−H1A···OW2 [v]	0.860	1.991	164.78	2.830
N3−H3A···OW1 [w]	0.860	1.804	170.19	2.655
OW1−HW1A···N2 [x]	0.850	2.274	116.39	2.759
OW2−HW2B···O4	0.850	2.066	156.09	2.864
OW2−HW2C···O7 [p]	0.850	2.017	133.09	2.671
OW3−HW3A···O6 [p]	0.850	2.387	147.59	3.138
OW3−HW3B···O3 [m]	0.850	2.367	146.80	3.113
OW3−HW3B···O1 [p]	0.850	2.547	129.00	3.152
8				
O8−H8···O10 [b]	0.820	2.014	137.65	2.678
O9−H9A···O7 [t]	0.850	1.864	154.75	2.658
O10−H10A···OW3	0.850	2.255	114.47	2.719
O11−H11C···O1 [l]	0.850	2.358	123.34	2.913
O11−H11C···O3 [l]	0.850	2.511	123.49	3.063
N1−H1A···OW1 [n]	0.860	2.044	136.84	2.735
N4−H4A···OW2 [y]	0.860	1.864	167.77	2.711
OW1−HW1A···N3	0.850	1.837	161.65	2.657
OW1−HW1C···O11 [u]	0.850	2.232	150.46	3.001
OW2−HW2B···O4	0.850	2.050	160.44	2.865
OW2−HW2C···N2 [u]	0.850	2.142	138.41	2.834
OW3−HW3A···O5 [e]	0.850	2.370	148.53	3.127

[a] Symmetry transformations used to generate equivalent atoms: (a) −x, −y+2, −z+1; (b) x, y, z+1; (c) −x−1, −y, −z; (d) −x, −y, −z−1; (e) x, y+1, z; (f) −x−1, −y, −z−1; (g) −x+1, −y+1, −z+1; (h) x−1, y−1, z; (i) −x+2, −y+1, −z+1; (j) −x, −y, −z+1; (k) x−1, y−1, z−1; (l) −x, y+1/2, −z+1/2; (m) −x+1, y−1/2, −z+1/2; (n) −x, y−1/2, −z+1/2; (o) x+1, y−1, z; (p) x, y−1, z; (q) x, −y+1/2, z−1/2; (r) −x, −y+2, −z; (s) −x, −y+1, −z; (t) −x+1, y+1/2, −z+1/2; (u) x, −y+1/2, z+1/2; (v) x, −y+3/2, z+1/2; (w) x, −y+3/2, z−1/2; (x) −x+1, −y+2, −z+1; (y) −x+1, −y, −z+1.

Table S4 Thermal decomposition data for coordination polymers **1**–**8**

Stage	Temperature Range (°C)	Mass loss (%) obsd	Mass loss (%) calcd	Probable composition of removed groups
				1
I	110–250	9.05	8.48	1 free water molecules and 1 coordination water molecules
II	350–600	51.87	52.73	1 H_3BIDC and 0.5 H_2ox
				2
I	65–250	8.26	7.89	2 free water molecules
II	350–600	48.39	49.02	1 H_3BIDC and 0.5 H_2ox
				3
I	120–320	11.09	11.57	3 coordination water molecules
II	380–600	48.60	47.98	1 H_3BIDC and 0.5 H_2ox
				4
I	120–330	7.34	7.81	2 coordination water molecules
II	330–600	51.83	52.52	1 coordination water molecules, 1 H_3BIDC and 0.5 H_2ox
				5
I	100–300	15.82	15.98	3 free water molecules and 3 coordination water molecules
II	300–600	56.47	56.97	2 H_3BIDC
				6
I	105–300	12.14	12.14	3 free water molecules and 1.5 coordination water molecules
II	350–600	62.00	61.75	1.5 coordination water molecules and 2 H_3BIDC
				7
I	110–300	12.86	13.25	3 free water molecules and 2 coordination water molecules
II	350–600	61.12	59.32	1 coordination water molecules and 2 H_3BIDC
				8
I	110–300	13.37	13.49	3 free water molecules and 2 coordination water molecules
II	350–600	60.58	59.78	1 coordination water molecules and 2 H_3BIDC

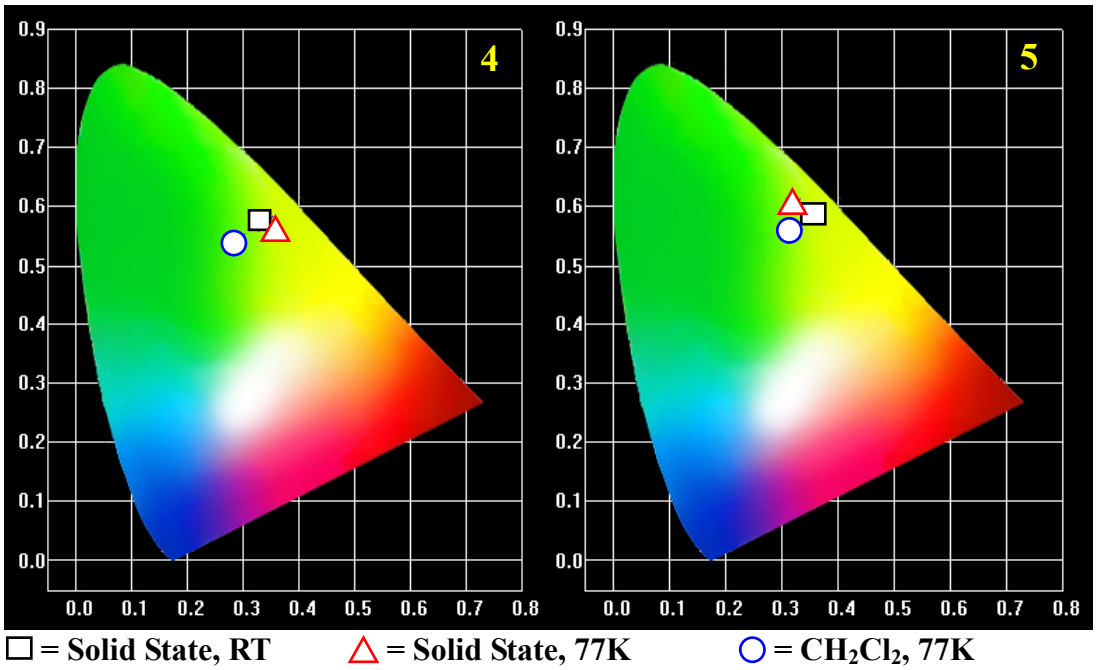

Fig. S1 The color coordinate diagram of coordination polymers **4** (Left) and **5** (Right).

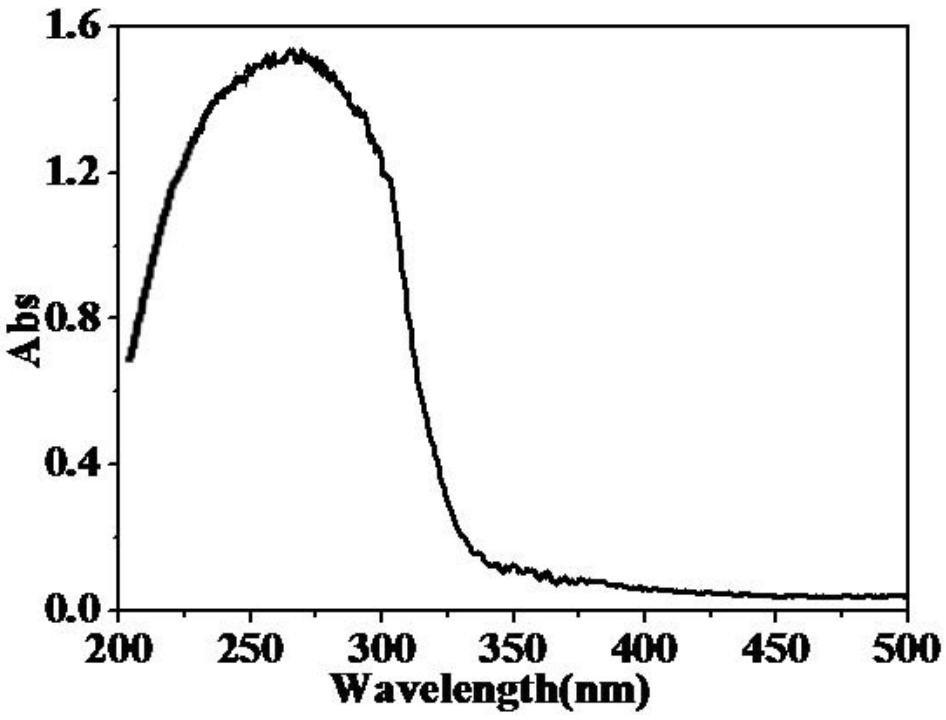

Fig. S2 UV – Vis absorption spectrum of the H_3BIDC ligand in solid–state.

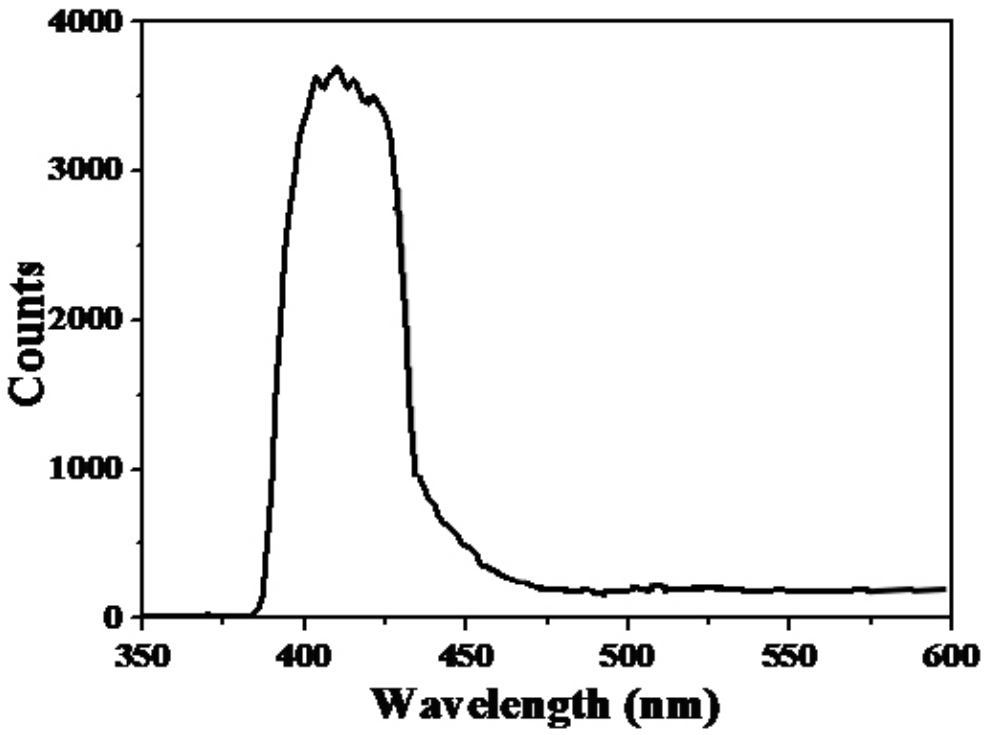

Fig. S3 Phosphorescence spectra of coordination polymer **8** in the solid–state at low–temperature.

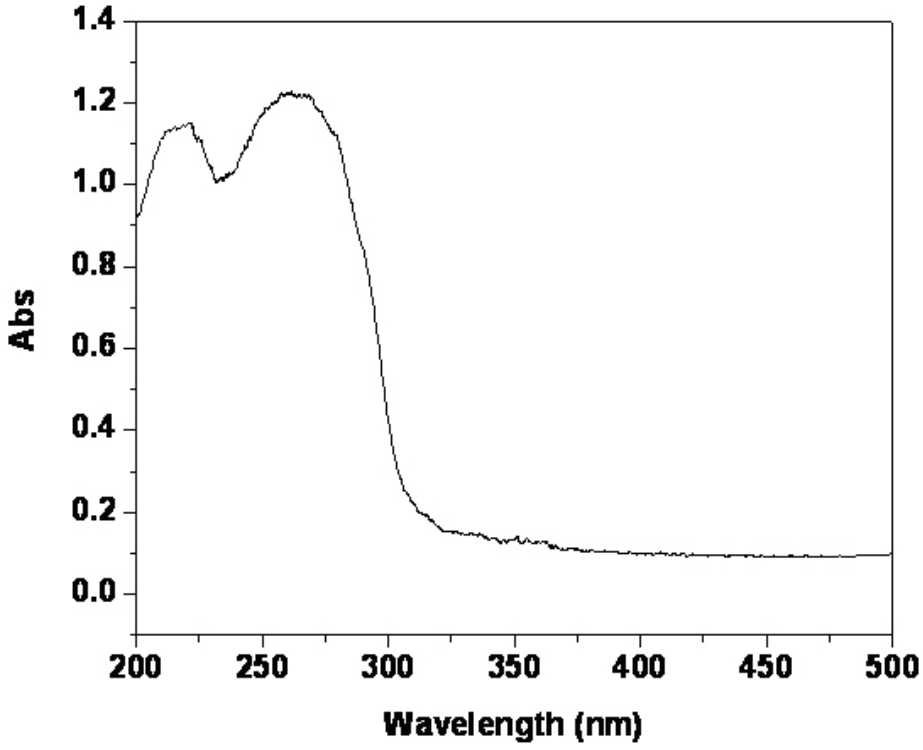

Fig. S4 UV – Vis absorption spectrum of the oxalic acid ligand in solid–state.

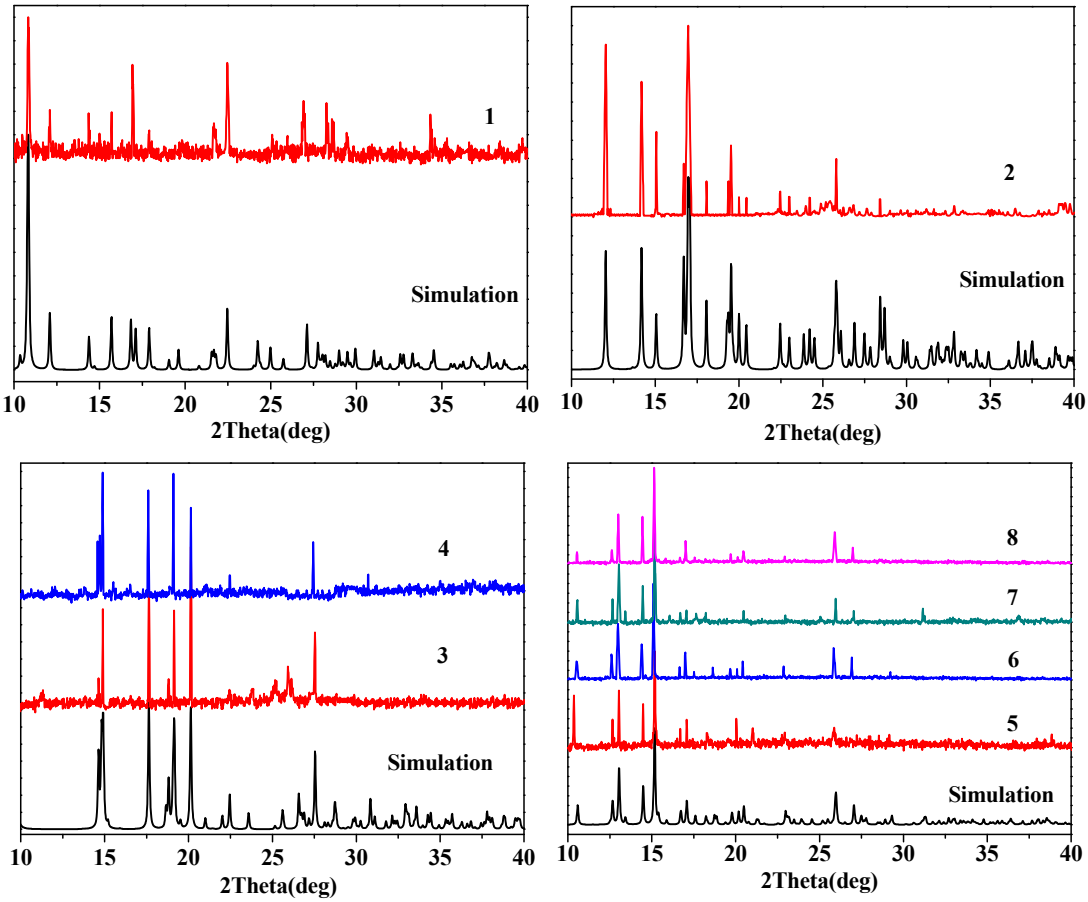

Fig. S5 PXRD patterns of **1**–**8** compared with a simulated pattern.

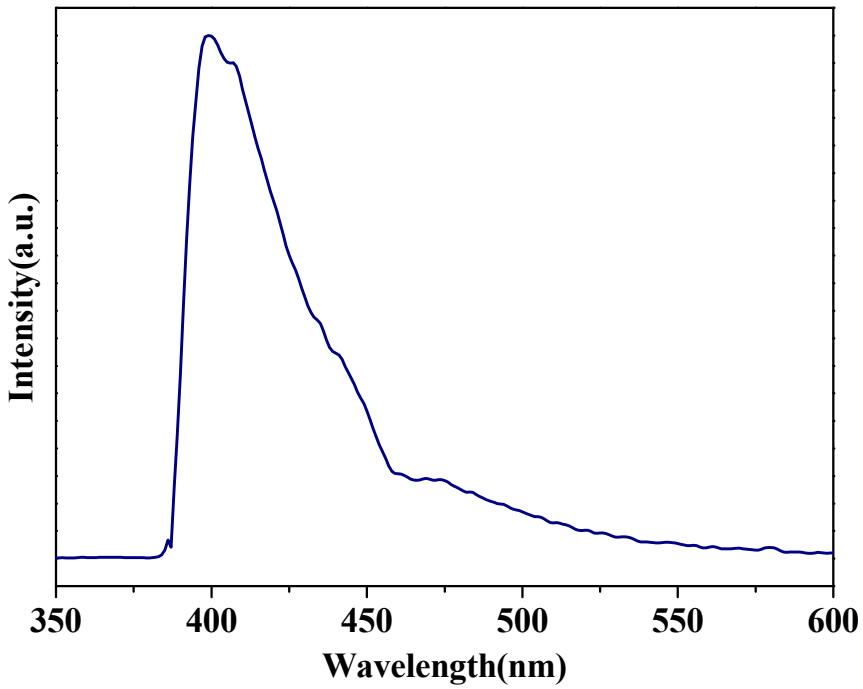

Fig. S6 The emission spectrum of the H_3BIDC ligand in solid–state at 298 K.

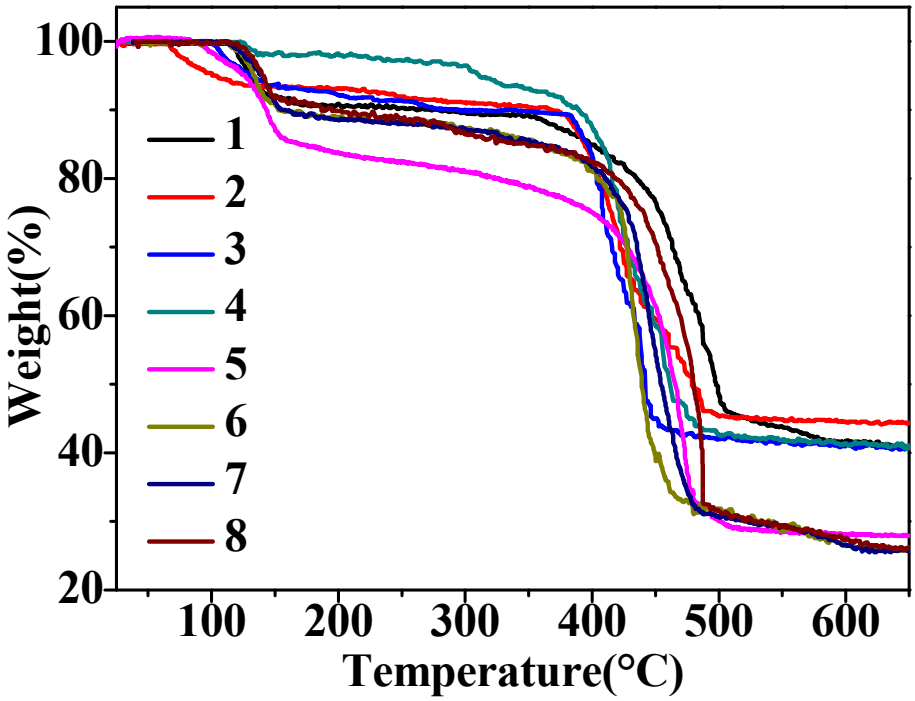

Fig. S7 Thermogravimetric curves of coordination polymers **1**–**8**.