Electronic supplementary information

A series of lanthanide-transition metal coordination polymers with mixed ligands: syntheses, structures, photoluminescence and magnetic properties

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Table S1. Selected bonds lengths (Å) and angles (°) for compounds **1-6**

Compound 1^a

Co(1)-O(3)	1.949(4)	N(3)-Co(1)-N(4)	76.46(17)	O(9)-Y(1)-O(5)	122.45(10)
Co(1)-N(1)	2.050(4)	N(2)-Co(1)-N(4)	76.17(18)	O(2)-Y(2)-O(8)$^{\#2}$	76.43(13)
Co(1)-N(3)	2.053(4)	O(16)$^{\#1}$-Y(1)-O(1)	101.79(14)	O(2)-Y(2)-O(15)$^{\#2}$	146.28(12)
Co(1)-N(2)	2.072(5)	O(16)$^{\#1}$-Y(1)-O(7)$^{\#2}$	76.90(13)	O(8)$^{\#2}$-Y(2)-O(15)$^{\#2}$	74.70(12)
Co(1)-N(4)	2.238(4)	O(1)-Y(1)-O(7)$^{\#2}$	81.48(13)	O(2)-Y(2)-O(5)	85.92(11)
Y(1)-O(16)$^{\#1}$	2.227(3)	O(16)$^{\#1}$-Y(1)-O(10)	81.25(13)	O(8)$^{\#2}$-Y(2)-O(5)	87.31(11)
Y(1)-O(1)	2.236(3)	O(1)-Y(1)-O(10)	73.98(12)	O(15)$^{\#2}$-Y(2)-O(5)	75.72(11)
Y(1)-O(7)$^{\#2}$	2.294(3)	O(7)$^{\#2}$-Y(1)-O(10)	142.83(13)	O(2)-Y(2)-O(13)	130.77(12)
Y(1)-O(10)	2.324(3)	O(16)$^{\#1}$-Y(1)-O(6)	148.06(13)	O(8)$^{\#2}$-Y(2)-O(13)	151.62(12)
Y(1)-O(6)	2.378(3)	O(1)-Y(1)-O(6)	101.79(14)	O(15)$^{\#2}$-Y(2)-O(13)	81.10(11)
Y(1)-OW1	2.391(3)	O(7)$^{\#2}$-Y(1)-O(6)	127.89(12)	O(5)-Y(2)-O(13)	101.01(11)
Y(1)-O(9)	2.484(3)	O(10)-Y(1)-O(6)	84.88(12)	O(2)-Y(2)-O(11)$^{\#3}$	106.93(14)
Y(1)-O(5)	2.549(3)	O(16)$^{\#1}$-Y(1)-OW1	84.18(13)	O(8)#2-Y(2)-O(11)$^{\#3}$	79.11(13)

Y(2)-O(2)	2.286(3)	O(1)-Y(1)-OW1	158.80(12)	O(15)#2-Y(2)-O(11)#3	84.33(13)
Y(2)-O(8)#2	2.300(3)	O(7)#2-Y(1)-OW1	80.12(12)	O(5)-Y(2)-O(11)#3	158.28(12)
Y(2)-O(15)#2	2.318(3)	O(10)-Y(1)-OW1	127.21(12)	O(13)-Y(2)-O(11)#3	84.01(13)
Y(2)-O(5)	2.369(3)	O(6)-Y(1)-OW1	81.56(13)	O(2)-Y(2)-O(12)#3	74.41(12)
Y(2)-O(13)	2.378(3)	O(16)#1-Y(1)-O(9)	76.57(12)	O(8)#2-Y(2)-O(12)#3	111.41(12)
Y(2)-O(11)#3	2.390(3)	O(1)-Y(1)-O(9)	127.96(12)	O(15)#2-Y(2)-O(12)#3	132.96(12)
Y(2)-O(12)#3	2.424(3)	O(7)#2-Y(1)-O(9)	143.81(12)	O(5)-Y(2)-O(12)#3	148.07(11)
Y(2)-O(14)	2.443(3)	O(10)-Y(1)-O(9)	54.18(11)	O(13)-Y(2)-O(12)#3	75.06(12)
O(3)-Co(1)-N(1)	108.61(17)	O(6)-Y(1)-O(9)	71.98(11)	O(11)#3-Y(2)-O(12)#3	53.65(12)
O(3)-Co(1)-N(3)	109.02(17)	OW1-Y(1)-O(9)	73.12(11)	O(2)-Y(2)-O(14)	81.25(12)
N(1)-Co(1)-N(3)	116.39(18)	O(16)#1-Y(1)-O(5)	153.18(12)	O(8)#2-Y(2)-O(14)	153.98(12)
O(3)-Co(1)-N(2)	91.60(18)	O(1)-Y(1)-O(5)	81.64(12)	O(15)#2-Y(2)-O(14)	120.87(11)
N(1)-Co(1)-N(2)	108.58(17)	O(7)#2-Y(1)-O(5)	77.35(11)	O(5)-Y(2)-O(14)	77.85(11)
N(3)-Co(1)-N(2)	119.47(18)	O(10)-Y(1)-O(5)	124.68(12)	O(13)-Y(2)-O(14)	53.77(11)
O(3)-Co(1)-N(4)	167.67(18)	O(6)-Y(1)-O(5)	52.48(10)	O(11)#3-Y(2)-O(14)	120.69(12)
N(1)-Co(1)-N(4)	77.40(17)	OW1-Y(1)-O(5)	84.14(11)	O(12)#3-Y(2)-O(14)	74.53(11)

Compound 2[b]

Zn-O(3)	1.953(3)	N(3)-Zn-N(4)	76.30(13)	O(9)-Y(1)-O(5)	121.94(7)
Zn-N(1)	2.057(3)	N(2)-Zn-N(4)	75.90(13)	O(2)-Y(2)-O(8)#2	76.32(10)
Zn-N(3)	2.062(3)	O(16)#1-Y(1)-O(1)	100.92(11)	O(2)-Y(2)-O(15)#2	145.51(9)
Zn-N(2)	2.092(3)	O(16)#1-Y(1)-O(7)#2	76.84(9)	O(8)#2-Y(2)-O(15)#2	74.24(9)
Zn-N(4)	2.291(3)	O(1)-Y(1)-O(7)#2	81.73(10)	O(2)-Y(2)-O(5)	86.09(9)
Y(1)-O(16)#1	2.226(2)	O(16)#1-Y(1)-O(10)	80.98(9)	O(8)#2-Y(2)-O(5)	87.83(8)
Y(1)-O(1)	2.243(3)	O(1)-Y(1)-O(10)	74.52(9)	O(15)#2-Y(2)-O(5)	75.29(9)
Y(1)-O(7)#2	2.303(2)	O(7)#2-Y(1)-O(10)	143.59(10)	O(2)-Y(2)-O(13)	131.47(9)
Y(1)-O(10)	2.326(3)	O(16)#1-Y(1)-O(6)	148.35(10)	O(8)#2-Y(2)-O(13)	150.91(9)
Y(1)-O(6)	2.387(2)	O(1)-Y(1)-O(6)	101.90(10)	O(15)#2-Y(2)-O(13)	81.21(8)
Y(1)-OW1	2.394(3)	O(7)#2-Y(1)-O(6)	128.05(9)	O(5)-Y(2)-O(13)	100.94(8)
Y(1)-O(9)	2.491(2)	O(10)-Y(1)-O(6)	84.29(9)	O(2)-Y(2)-O(11)#3	107.34(11)
Y(1)-O(5)	2.544(2)	O(16)#1-Y(1)-OW1	83.74(10)	O(8)#2-Y(2)-O(11)#3	79.13(9)

Y(2)-O(2)	2.295(3)	O(1)-Y(1)-OW1	159.27(9)	O(15)$^{#2}$-Y(2)-O(11)$^{#3}$	84.34(10)
Y(2)-O(8)$^{#2}$	2.295(2)	O(7)$^{#2}$-Y(1)-OW1	79.69(10)	O(5)-Y(2)-O(11)$^{#3}$	158.21(9)
Y(2)-O(15)$^{#2}$	2.323(3)	O(10)-Y(1)-OW1	126.20(9)	O(13)-Y(2)-O(11)$^{#3}$	83.21(10)
Y(2)-O(5)	2.375(2)	O(6)-Y(1)-OW1	82.64(10)	O(2)-Y(2)-O(12)$^{#3}$	74.44(9)
Y(2)-O(13)	2.377(2)	O(16)$^{#1}$-Y(1)-O(9)	76.86(9)	O(8)$^{#2}$-Y(2)-O(12)$^{#3}$	111.17(9)
Y(2)-O(11)$^{#3}$	2.403(3)	O(1)-Y(1)-O(9)	128.61(9)	O(15)$^{#2}$-Y(2)-O(12)$^{#3}$	133.52(9)
Y(2)-O(12)$^{#3}$	2.418(3)	O(7)$^{#2}$-Y(1)-O(9)	143.08(9)	O(5)-Y(2)-O(12)$^{#3}$	147.97(9)
Y(2)-O(14)	2.448(2)	O(10)-Y(1)-O(9)	54.24(9)	O(13)-Y(2)-O(12)$^{#3}$	75.21(9)
O(3)-Zn-N(1)	108.36(13)	O(6)-Y(1)-O(9)	71.80(8)	O(11)$^{#3}$-Y(2)-O(12)$^{#3}$	53.81(9)
O(3)-Zn-N(3)	109.85(14)	OW1-Y(1)-O(9)	72.10(9)	O(2)-Y(2)-O(14)	82.01(9)
N(1)-Zn-N(3)	116.67(13)	O(16)$^{#1}$-Y(1)-O(5)	153.18(9)	O(8)$^{#2}$-Y(2)-O(14)	154.72(9)
O(3)-Zn-N(2)	91.07(13)	O(1)-Y(1)-O(5)	82.35(9)	O(15)$^{#2}$-Y(2)-O(14)	120.68(9)
N(1)-Zn-N(2)	108.81(13)	O(7)$^{#2}$-Y(1)-O(5)	77.34(8)	O(5)-Y(2)-O(14)	77.76(8)
N(3)-Zn-N(2)	118.79(14)	O(10)-Y(1)-O(5)	125.01(8)	O(13)-Y(2)-O(14)	53.77(8)
O(3)-Zn-N(4)	166.91(13)	O(6)-Y(1)-O(5)	52.55(7)	O(11)$^{#3}$-Y(2)-O(14)	120.30(9)
N(1)-Zn-N(4)	77.60(13)	OW1-Y(1)-O(5)	84.67(8)	O(12)$^{#3}$-Y(2)-O(14)	74.58(9)

Compound 3^{c}

Co(1)-O(3)	1.955(7)	N(3)-Co(1)-N(4)	76.0(4)	O(9)-Er(1)-O(5)	122.1(2)
Co(1)-N(1)	2.058(10)	N(2)-Co(1)-N(4)	76.5(4)	O(2)-Er(2)-O(8)$^{#2}$	75.9(3)
Co(1)-N(3)	2.072(10)	O(16)$^{#1}$-Er(1)-O(1)	101.1(3)	O(2)-Er(2)-O(15)$^{#2}$	146.0(3)
Co(1)-N(2)	2.091(10)	O(16)$^{#1}$-Er(1)-O(7)$^{#2}$	76.7(3)	O(8)#2-Er(2)-O(15)$^{#2}$	74.8(3)
Co(1)-N(4)	2.235(10)	O(1)-Er(1)-O(7)$^{#2}$	82.1(3)	O(2)-Er(2)-O(5)	85.8(3)
Er(1)-O(16)$^{#1}$	2.212(7)	O(16)$^{#1}$-Er(1)-O(10)	80.8(3)	O(8)$^{#2}$-Er(2)-O(5)	87.6(2)
Er(1)-O(1)	2.233(7)	O(1)-Er(1)-O(10)	73.9(3)	O(15)$^{#2}$-Er(2)-O(5)	76.1(3)
Er(1)-O(7)$^{#2}$	2.287(8)	O(7)$^{#2}$-Er(1)-O(10)	143.1(3)	O(2)-Er(2)-O(13)	131.5(3)
Er(1)-O(10)	2.339(8)	O(16)$^{#1}$-Er(1)-OW1	83.7(3)	O(8)$^{#2}$-Er(2)-O(13)	151.4(3)
Er(1)-OW1	2.377(7)	O(1)-Er(1)-OW1	159.7(3)	O(15)$^{#2}$-Er(2)-O(13)	80.8(2)
Er(1)-O(6)	2.381(7)	O(7)$^{#2}$-Er(1)-OW1	79.8(3)	O(5)-Er(2)-O(13)	100.9(2)
Er(1)-O(9)	2.478(7)	O(10)-Er(1)-OW1	126.4(3)	O(2)-Er(2)-O(11)$^{#3}$	107.4(3)
Er(1)-O(5)	2.536(7)	O(16)$^{#1}$-Er(1)-O(6)	148.0(3)	O(8)$^{#2}$-Er(2)-O(11)$^{#3}$	79.6(3)

Er(2)-O(2)	2.290(8)	O(1)-Er(1)-O(6)	101.9(3)	O(15)$^{#2}$-Er(2)-O(11)$^{#3}$	83.8(3)
Er(2)-O(8)$^{#2}$	2.291(7)	O(7)$^{#2}$-Er(1)-O(6)	128.4(3)	O(5)-Er(2)-O(11)$^{#3}$	158.5(3)
Er(2)-O(15)$^{#2}$	2.328(8)	O(10)-Er(1)-O(6)	84.5(3)	O(13)-Er(2)-O(11)$^{#3}$	83.2(3)
Er(2)-O(5)	2.369(7)	OW1-Er(1)-O(6)	82.5(3)	O(2)-Er(2)-O(12)$^{#3}$	74.1(3)
Er(2)-O(13)	2.374(7)	O(16)$^{#1}$-Er(1)-O(9)	76.7(3)	O(8)$^{#2}$-Er(2)-O(12)$^{#3}$	111.0(3)
Er(2)-O(11)$^{#3}$	2.395(8)	O(1)-Er(1)-O(9)	128.0(3)	O(15)$^{#2}$-Er(2)-O(12)$^{#3}$	133.2(3)
Er(2)-O(12)$^{#3}$	2.428(8)	O(7)$^{#2}$-Er(1)-O(9)	143.1(3)	O(5)-Er(2)-O(12)$^{#3}$	147.5(3)
Er(2)-O(14)	2.438(7)	O(10)-Er(1)-O(9)	54.3(2)	O(13)-Er(2)-O(12)$^{#3}$	75.7(3)
O(3)-Co(1)-N(1)	108.6(4)	OW1-Er(1)-O(9)	72.2(3)	O(11)$^{#3}$-Er(2)-O(12)$^{#3}$	53.9(3)
O(3)-Co(1)-N(3)	109.0(4)	O(6)-Er(1)-O(9)	71.7(2)	O(2)-Er(2)-O(14)	81.7(3)
N(1)-Co(1)-N(3)	116.7(4)	O(16)$^{#1}$-Er(1)-O(5)	153.4(3)	O(8)$^{#2}$-Er(2)-O(14)	153.9(3)
O(3)-Co(1)-N(2)	91.9(4)	O(1)-Er(1)-O(5)	82.2(3)	O(15)$^{#2}$-Er(2)-O(14)	120.9(3)
N(1)-Co(1)-N(2)	109.4(4)	O(7)$^{#2}$-Er(1)-O(5)	77.7(2)	O(5)-Er(2)-O(14)	77.4(2)
N(3)-Co(1)-N(2)	118.1(4)	O(10)-Er(1)-O(5)	124.8(3)	O(13)-Er(2)-O(14)	54.1(2)
O(3)-Co(1)-N(4)	168.3(4)	OW1-Er(1)-O(5)	84.9(2)	O(11)$^{#3}$-Er(2)-O(14)	120.4(3)
N(1)-Co(1)-N(4)	77.2(4)	O(6)-Er(1)-O(5)	52.7(2)	O(12)$^{#3}$-Er(2)-O(14)	74.6(3)

Compound 4^d

Zn(1)-O(3)	1.947(3)	N(3)-Zn(1)-N(4)	76.32(15)	O(9)-Er(1)-O(5)	122.59(9)
Zn(1)-N(1)	2.060(4)	N(2)-Zn(1)-N(4)	75.72(16)	O(2)-Er(2)-O(8)$^{#2}$	76.43(12)
Zn(1)-N(3)	2.061(4)	O(16)$^{#1}$-Er(1)-O(1)	101.49(13)	O(2)-Er(2)-O(15)$^{#2}$	146.48(11)
Zn(1)-N(2)	2.099(4)	O(16)$^{#1}$-Er(1)-O(7)$^{#2}$	76.91(12)	O(8)$^{#2}$-Er(2)-O(15)$^{#2}$	74.96(11)
Zn(1)-N(4)	2.287(4)	O(1)-Er(1)-O(7)$^{#2}$	81.88(13)	O(2)-Er(2)-O(13)	130.52(11)
Er(1)-O(16)$^{#1}$	2.211(3)	O(16)$^{#1}$-Er(1)-O(10)	81.19(12)	O(8)$^{#2}$-Er(2)-O(13)	151.87(11)
Er(1)-O(1)	2.229(3)	O(1)-Er(1)-O(10)	73.73(11)	O(15)$^{#2}$-Er(2)-O(13)	81.10(10)
Er(1)-O(7)$^{#2}$	2.292(3)	O(7)$^{#2}$-Er(1)-O(10)	143.04(12)	O(2)-Er(2)-O(5)	86.05(11)
Er(1)-O(10)	2.318(3)	O(16)$^{#1}$-Er(1)-O(6)	148.09(12)	O(8)$^{#2}$-Er(2)-O(5)	87.54(10)
Er(1)-O(6)	2.368(3)	O(1)-Er(1)-O(6)	101.92(13)	O(15)$^{#2}$-Er(2)-O(5)	75.67(10)
Er(1)-OW1	2.376(3)	O(7)$^{#2}$-Er(1)-O(6)	127.80(11)	O(13)-Er(2)-O(5)	100.77(10)
Er(1)-O(9)	2.482(3)	O(10)-Er(1)-O(6)	84.88(11)	O(2)-Er(2)-O(11)$^{#3}$	107.80(13)
Er(1)-O(5)	2.539(3)	O(16)$^{#1}$-Er(1)-OW1	84.34(12)	O(8)$^{#2}$-Er(2)-O(11)$^{#3}$	79.46(12)

Er(2)-O(2)	2.282(3)	O(1)-Er(1)-OW1	159.26(11)	O(15)$^{\#2}$-Er(2)-O(11)$^{\#3}$	83.73(12)
Er(2)-O(8)$^{\#2}$	2.285(3)	O(7)$^{\#2}$-Er(1)-OW1	80.10(12)	O(13)-Er(2)-O(11)$^{\#3}$	83.49(12)
Er(2)-O(15)$^{\#2}$	2.314(3)	O(10)-Er(1)-OW1	127.00(11)	O(5)-Er(2)-O(11)$^{\#3}$	157.94(11)
Er(2)-O(13)	2.365(3)	O(6)-Er(1)-OW1	81.40(11)	O(2)-Er(2)-O(12)$^{\#3}$	74.05(12)
Er(2)-O(5)	2.367(3)	O(16)$^{\#1}$-Er(1)-O(9)	76.63(12)	O(8)$^{\#2}$-Er(2)-O(12)$^{\#3}$	111.00(12)
Er(2)-O(11)$^{\#3}$	2.377(3)	O(1)-Er(1)-O(9)	127.75(11)	O(15)$^{\#2}$-Er(2)-O(12)$^{\#3}$	133.15(11)
Er(2)-O(12)$^{\#3}$	2.416(3)	O(7)$^{\#2}$-Er(1)-O(9)	143.63(11)	O(13)-Er(2)-O(12)$^{\#3}$	75.39(12)
Er(2)-O(14)	2.447(3)	O(10)-Er(1)-O(9)	54.21(10)	O(5)-Er(2)-O(12)$^{\#3}$	148.01(10)
O(3)-Zn(1)-N(1)	108.68(17)	O(6)-Er(1)-O(9)	71.93(10)	O(11)$^{\#3}$-Er(2)-O(12)$^{\#3}$	54.05(11)
O(3)-Zn(1)-N(3)	109.45(16)	OW1-Er(1)-O(9)	72.88(10)	O(2)-Er(2)-O(14)	80.88(11)
N(1)-Zn(1)-N(3)	116.79(16)	O(16)$^{\#1}$-Er(1)-O(5)	153.22(11)	O(8)$^{\#2}$-Er(2)-O(14)	153.70(11)
O(3)-Zn(1)-N(2)	91.16(16)	O(1)-Er(1)-O(5)	81.69(11)	O(15)$^{\#2}$-Er(2)-O(14)	120.98(10)
N(1)-Zn(1)-N(2)	107.81(16)	O(7)$^{\#2}$-Er(1)-O(5)	77.26(10)	O(13)-Er(2)-O(14)	53.85(9)
N(3)-Zn(1)-N(2)	119.65(17)	O(10)-Er(1)-O(5)	124.61(10)	O(5)-Er(2)-O(14)	77.71(10)
O(3)-Zn(1)-N(4)	166.74(16)	O(6)-Er(1)-O(5)	52.61(9)	O(11)$^{\#3}$-Er(2)-O(14)	120.63(11)
N(1)-Zn(1)-N(4)	77.79(16)	OW1-Er(1)-O(5)	84.41(10)	O(12)$^{\#3}$-Er(2)-O(14)	74.63(11)

Compound 5^{e}

Co(1)-O(3)	1.959(13)	O(1)-Sm(1)-O(10)	71.3(5)	O(15)$^{\#2}$-Sm(2)-O(2')	131.9(6)
Co(1)-N(3)	2.046(7)	O(16)$^{\#1}$-Sm(1)-O(10)	79.7(4)	O(8)$^{\#2}$-Sm(2)-O(5)	94.4(4)
Co(1)-O(4')	2.05(3)	O(7)$^{\#2}$-Sm(1)-O(10)	145.4(4)	O(15)$^{\#2}$-Sm(2)-O(5)	75.4(4)
Co(1)-N(1)	2.052(6)	O(1)-Sm(1)-OW1	161.6(5)	O(2')-Sm(2)-O(5)	62.4(6)
Co(1)-N(2)	2.062(8)	O(16)$^{\#1}$-Sm(1)-OW1	86.3(4)	O(8)$^{\#2}$-Sm(2)-O(13)	151.6(4)
Co(1)-N(4)	2.217(11)	O(7)$^{\#2}$-Sm(1)-OW1	79.2(3)	O(15)$^{\#2}$-Sm(2)-O(13)	81.5(3)
Sm(1)-O(1)	2.200(14)	O(10)-Sm(1)-OW1	126.5(4)	O(2')-Sm(2)-O(13)	125.2(6)
Sm(1)-O(16)$^{\#1}$	2.277(10)	O(1)-Sm(1)-O(6)	106.6(6)	O(5)-Sm(2)-O(13)	99.1(3)
Sm(1)-O(7)$^{\#2}$	2.385(10)	O(16)$^{\#1}$-Sm(1)-O(6)	148.5(4)	O(8)$^{\#2}$-Sm(2)-O(2)	71.7(6)
Sm(1)-O(10)	2.419(9)	O(7)$^{\#2}$-Sm(1)-O(6)	126.2(3)	O(15)$^{\#2}$-Sm(2)-O(2)	145.8(6)
Sm(1)-OW1	2.425(8)	O(10)-Sm(1)-O(6)	83.9(3)	O(2')-Sm(2)-O(2)	30.1(6)
Sm(1)-O(6)	2.480(9)	OW1-Sm(1)-O(6)	82.1(3)	O(5)-Sm(2)-O(2)	91.4(5)
Sm(1)-O(9)	2.514(9)	O(1)-Sm(1)-O(9)	124.5(4)	O(13)-Sm(2)-O(2)	132.3(5)

Sm(1)-O(5)	2.607(9)	O(16)$^{\#1}$-Sm(1)-O(9)	77.1(4)	O(8)$^{\#2}$-Sm(2)-O(12)$^{\#3}$	103.3(4)
Sm(1)-O(2')	2.82(2)	O(7)$^{\#2}$-Sm(1)-O(9)	144.8(3)	O(15)$^{\#2}$-Sm(2)-O(12)$^{\#3}$	132.3(4)
Sm(1)-O(1')	2.84(3)	O(10)-Sm(1)-O(9)	53.1(3)	O(2')-Sm(2)-O(12)$^{\#3}$	94.8(6)
Sm(2)-O(8)$^{\#2}$	2.324(11)	OW1-Sm(1)-O(9)	73.4(3)	O(5)-Sm(2)-O(12)$^{\#3}$	149.4(3)
Sm(2)-O(15)$^{\#2}$	2.355(10)	O(6)-Sm(1)-O(9)	71.6(3)	O(13)-Sm(2)-O(12)$^{\#3}$	76.8(4)
Sm(2)-O(2')	2.36(2)	O(1)-Sm(1)-O(5)	92.0(5)	O(2)-Sm(2)-O(12)$^{\#3}$	71.2(5)
Sm(2)-O(5)	2.412(9)	O(16)$^{\#1}$-Sm(1)-O(5)	154.6(3)	O(8)$^{\#2}$-Sm(2)-O(11')$^{\#3}$	67.3(6)
Sm(2)-O(13)	2.434(10)	O(7)$^{\#2}$-Sm(1)-O(5)	76.6(3)	O(15)$^{\#2}$-Sm(2)-O(11')$^{\#3}$	89.7(5)
Sm(2)-O(2)	2.441(17)	O(10)-Sm(1)-O(5)	125.4(4)	O(2')-Sm(2)-O(11')$^{\#3}$	122.6(7)
Sm(2)-O(12)$^{\#3}$	2.476(10)	OW1-Sm(1)-O(5)	81.0(3)	O(5)-Sm(2)-O(11')$^{\#3}$	158.7(4)
Sm(2)-O(11')$^{\#3}$	2.50(2)	O(6)-Sm(1)-O(5)	50.8(3)	O(13)-Sm(2)-O(11')$^{\#3}$	93.5(5)
Sm(2)-O(11)$^{\#3}$	2.518(17)	O(9)-Sm(1)-O(5)	119.4(3)	O(2)-Sm(2)-O(11')$^{\#3}$	92.7(7)
Sm(2)-O(14)	2.558(9)	O(1)-Sm(1)-O(2')	38.0(6)	O(12)$^{\#3}$-Sm(2)-O(11')$^{\#3}$	50.6(5)
O(3)-Co(1)-N(3)	110.6(5)	O(16)$^{\#1}$-Sm(1)-O(2')	127.0(6)	O(8)$^{\#2}$-Sm(2)-O(11)$^{\#3}$	83.8(5)
O(3)-Co(1)-O(4')	35.3(9)	O(7)$^{\#2}$-Sm(1)-O(2')	75.3(5)	O(15)#2-Sm(2)-O(11)#3	79.2(5)
N(3)-Co(1)-O(4')	95.2(8)	O(10)-Sm(1)-O(2')	95.8(5)	O(2')-Sm(2)-O(11)$^{\#3}$	142.0(7)
O(3)-Co(1)-N(1)	110.2(5)	OW1-Sm(1)-O(2')	132.0(5)	O(5)-Sm(2)-O(11)$^{\#3}$	154.3(5)
N(3)-Co(1)-N(1)	116.8(3)	O(6)-Sm(1)-O(2')	81.2(5)	O(13)-Sm(2)-O(11)$^{\#3}$	73.3(5)
O(4')-Co(1)-N(1)	91.6(8)	O(9)-Sm(1)-O(2')	139.8(5)	O(2)-Sm(2)-O(11)$^{\#3}$	112.0(7)
O(3)-Co(1)-N(2)	87.8(5)	O(5)-Sm(1)-O(2')	54.0(5)	O(12)$^{\#3}$-Sm(2)-O(11)$^{\#3}$	54.2(5)
N(3)-Co(1)-N(2)	118.1(4)	O(1)-Sm(1)-O(1')	13.4(8)	O(11')$^{\#3}$-Sm(2)-O(11)$^{\#3}$	21.7(5)
O(4')-Co(1)-N(2)	122.8(9)	O(16)$^{\#1}$-Sm(1)-O(1')	82.7(7)	O(8)$^{\#2}$-Sm(2)-O(14)	154.8(4)
N(1)-Co(1)-N(2)	109.4(3)	O(7)$^{\#2}$-Sm(1)-O(1')	72.6(6)	O(15)$^{\#2}$-Sm(2)-O(14)	121.8(3)
O(3)-Co(1)-N(4)	164.5(6)	O(10)-Sm(1)-O(1')	77.5(6)	O(2')-Sm(2)-O(14)	71.9(6)
N(3)-Co(1)-N(4)	76.4(4)	OW1-Sm(1)-O(1')	151.2(6)	O(5)-Sm(2)-O(14)	77.7(3)
O(4')-Co(1)-N(4)	160.1(9)	O(6)-Sm(1)-O(1')	119.7(6)	O(13)-Sm(2)-O(14)	53.4(3)
N(1)-Co(1)-N(4)	76.8(4)	O(9)-Sm(1)-O(1')	129.0(6)	O(2)-Sm(2)-O(14)	84.5(6)
N(2)-Co(1)-N(4)	76.7(4)	O(5)-Sm(1)-O(1')	98.1(6)	O(12)$^{\#3}$-Sm(2)-O(14)	75.8(3)
O(1)-Sm(1)-O(16)$^{\#1}$	93.4(6)	O(2')-Sm(1)-O(1')	45.4(7)	O(11')$^{\#3}$-Sm(2)-O(14)	123.5(5)
O(1)-Sm(1)-O(7)$^{\#2}$	82.6(5)	O(8)$^{\#2}$-Sm(2)-O(15)$^{\#2}$	77.9(4)	O(11)$^{\#3}$-Sm(2)-O(14)	113.6(4)

O(16)$^{\#1}$-Sm(1)-O(7)$^{\#2}$	79.5(4)	O(8)$^{\#2}$-Sm(2)-O(2')	83.2(6)		

Compound 6^f

Ni(1)-O(1)	2.00(4)	N(10)-Ni(2)-O(20)	97.6(16)	O(13)-Y(1)-O(5)	136.1(12)
Ni(1)-N(1)	2.01(4)	N(10)-Ni(2)-N(12)	93.2(17)	O(15)$^{\#1}$-Y(2)-O(16)	105.7(13)
Ni(1)-N(3)	2.02(4)	O(20)-Ni(2)-N(12)	101.7(17)	O(15)$^{\#1}$-Y(2)-O(18)	154.7(13)
Ni(1)-N(5)	2.02(4)	N(10)-Ni(2)-N(8)	98.3(17)	O(16)-Y(2)-O(18)	77.2(13)
Ni(1)-N(7)	2.27(4)	O(20)-Ni(2)-N(8)	101.0(17)	O(15)$^{\#1}$-Y(2)-O(8)$^{\#2}$	102.3(14)
Ni(2)-N(10)	2.00(4)	N(12)-Ni(2)-N(8)	152.8(18)	O(16)-Y(2)-O(8)$^{\#2}$	151.1(14)
Ni(2)-O(20)	2.01(4)	N(10)-Ni(2)-N(14)	80.8(16)	O(18)-Y(2)-O(8)$^{\#2}$	80.6(14)
Ni(2)-N(12)	2.03(4)	O(20)-Ni(2)-N(14)	177.6(16)	O(15)$^{\#1}$-Y(2)-OW10	77.2(14)
Ni(2)-N(8)	2.05(4)	N(12)-Ni(2)-N(14)	80.2(17)	O(16)-Y(2)-OW10	68.0(15)
Ni(2)-N(14)	2.25(4)	N(8)-Ni(2)-N(14)	77.5(16)	O(18)-Y(2)-OW10	125.5(14)
Y(1)-O(3)	2.23(4)	O(3)-Y(1)-O(9)	158.8(12)	O(8)$^{\#2}$-Y(2)-OW10	112.4(15)
Y(1)-O(9)	2.26(3)	O(3)-Y(1)-OW9	98.6(14)	O(15)$^{\#1}$-Y(2)-O(17)	151.0(13)
Y(1)-OW9	2.32(4)	O(9)-Y(1)-OW9	85.8(14)	O(16)-Y(2)-O(17)	79.6(13)
Y(1)-OW8	2.34(3)	O(3)-Y(1)-OW8	89.5(13)	O(18)-Y(2)-O(17)	54.1(12)
Y(1)-O(6)	2.38(3)	O(9)-Y(1)-OW8	95.0(12)	O(8)$^{\#2}$-Y(2)-O(17)	72.5(14)
Y(1)-O(14)	2.43(3)	OW9-Y(1)-OW8	155.5(12)	OW10-Y(2)-O(17)	78.7(14)
Y(1)-O(13)	2.43(3)	O(3)-Y(1)-O(6)	75.8(13)	O(15)$^{\#1}$-Y(2)-O(11)$^{\#1}$	81.6(12)
Y(1)-O(5)	2.54(3)	O(9)-Y(1)-O(6)	125.3(12)	O(16)-Y(2)-O(11)$^{\#1}$	121.0(14)
Y(2)-O(15)$^{\#1}$	2.25(3)	OW9-Y(1)-O(6)	77.6(13)	O(18)-Y(2)-O(11)$^{\#1}$	75.8(12)
Y(2)-O(16)	2.35(4)	OW8-Y(1)-O(6)	82.1(13)	O(8)$^{\#2}$-Y(2)-O(11)$^{\#1}$	69.9(13)
Y(2)-O(18)	2.39(3)	O(3)-Y(1)-O(14)	78.1(13)	OW10-Y(2)-O(11)$^{\#1}$	158.6(14)
Y(2)-O(8)$^{\#2}$	2.42(4)	O(9)-Y(1)-O(14)	83.0(12)	O(17)-Y(2)-O(11)$^{\#1}$	120.8(12)
Y(2)-OW10	2.44(5)	OW9-Y(1)-O(14)	76.1(12)	O(15)$^{\#1}$-Y(2)-O(12)$^{\#1}$	74.9(13)
Y(2)-O(17)	2.45(3)	OW8-Y(1)-O(14)	128.3(12)	O(16)-Y(2)-O(12)$^{\#1}$	72.6(13)
Y(2)-O(11)$^{\#1}$	2.47(3)	O(6)-Y(1)-O(14)	139.3(13)	O(18)-Y(2)-O(12)$^{\#1}$	82.3(12)
Y(2)-O(12)$^{\#1}$	2.47(4)	O(3)-Y(1)-O(13)	83.2(13)	O(8)$^{\#2}$-Y(2)-O(12)$^{\#1}$	122.4(13)
Y(2)-O(7)$^{\#2}$	2.56(4)	O(9)-Y(1)-O(13)	78.0(12)	OW10-Y(2)-O(12)$^{\#1}$	122.2(14)
O(1)-Ni(1)-N(1)	100.0(16)	OW9-Y(1)-O(13)	128.5(12)	O(17)-Y(2)-O(12)$^{\#1}$	132.6(12)

O(1)-Ni(1)-N(3)	100.5(16)	OW8-Y(1)-O(13)	75.2(11)	O(11)$^{\#1}$-Y(2)-O(12)$^{\#1}$	52.6(12)
N(1)-Ni(1)-N(3)	93.4(17)	O(6)-Y(1)-O(13)	149.1(12)	O(15)$^{\#1}$-Y(2)-O(7)$^{\#2}$	79.7(12)
O(1)-Ni(1)-N(5)	101.9(17)	O(14)-Y(1)-O(13)	53.7(11)	O(16)-Y(2)-O(7)$^{\#2}$	127.6(15)
N(1)-Ni(1)-N(5)	154.9(18)	O(3)-Y(1)-O(5)	127.3(12)	O(18)-Y(2)-O(7)#^{2}	119.1(13)
N(3)-Ni(1)-N(5)	94.7(17)	O(9)-Y(1)-O(5)	73.7(11)	O(8)$^{\#2}$-Y(2)-O(7)$^{\#2}$	51.4(14)
O(1)-Ni(1)-N(7)	178.4(15)	OW9-Y(1)-O(5)	82.3(12)	OW10-Y(2)-O(7)$^{\#2}$	62.6(15)
N(1)-Ni(1)-N(7)	79.1(16)	OW8-Y(1)-O(5)	74.5(11)	O(17)-Y(2)-O(7)$^{\#2}$	75.0(14)
N(3)-Ni(1)-N(7)	80.9(16)	O(6)-Y(1)-O(5)	52.7(12)	O(11)$^{\#1}$-Y(2)-O(7)$^{\#2}$	111.4(14)
N(5)-Ni(1)-N(7)	78.7(16)	O(14)-Y(1)-O(5)	149.3(12)	O(12)$^{\#1}$-Y(2)-O(7)$^{\#2}$	151.5(14)

^{a}Symmetry code: $^{\#1}$ x, y − 1, z; $^{\#2}$ − x + 3, y − 1/2, −z + 1/2; $^{\#3}$ x, −y + 3/2, z − 1/2. ^{b}Symmetry code: $^{\#1}$ x, y − 1, z; $^{\#2}$ − x + 3, y − 1/2, −z + 1/2; $^{\#3}$ x, −y + 3/2, z − 1/2. ^{c}Symmetry code: $^{\#1}$ x, y − 1, z; $^{\#2}$ − x + 3, y − 1/2, −z + 1/2; $^{\#3}$ x, −y + 3/2, z − 1/2. ^{d}Symmetry code: $^{\#1}$ x, y − 1, z; $^{\#2}$ − x + 3, y − 1/2, −z + 1/2; $^{\#3}$ x, −y + 3/2, z − 1/2. ^{e}Symmetry code: $^{\#1}$ x, y − 1, z; $^{\#2}$ − x + 3, y − 1/2, −z + 1/2; $^{\#3}$ x, −y + 3/2, z − 1/2. ^{f}Symmetry code: $^{\#1}$ − x + 1, −y, −z + 1; $^{\#2}$ x, y, z + 1.
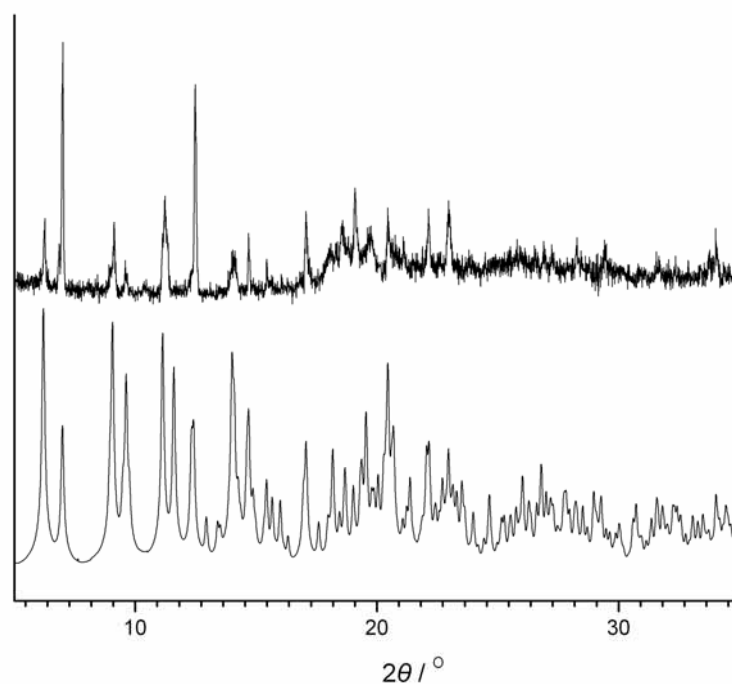
Fig. S1 Experimental (top) and simulated (bottom) XRD patterns for compound **1**.
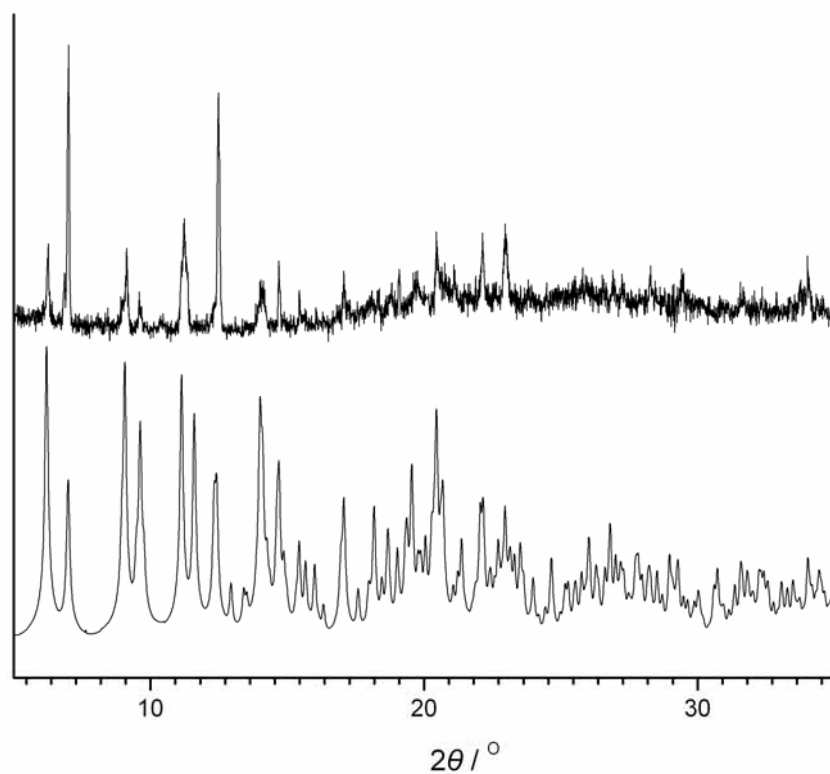
Fig. S2 Experimental (top) and simulated (bottom) XRD patterns for compound **2**.
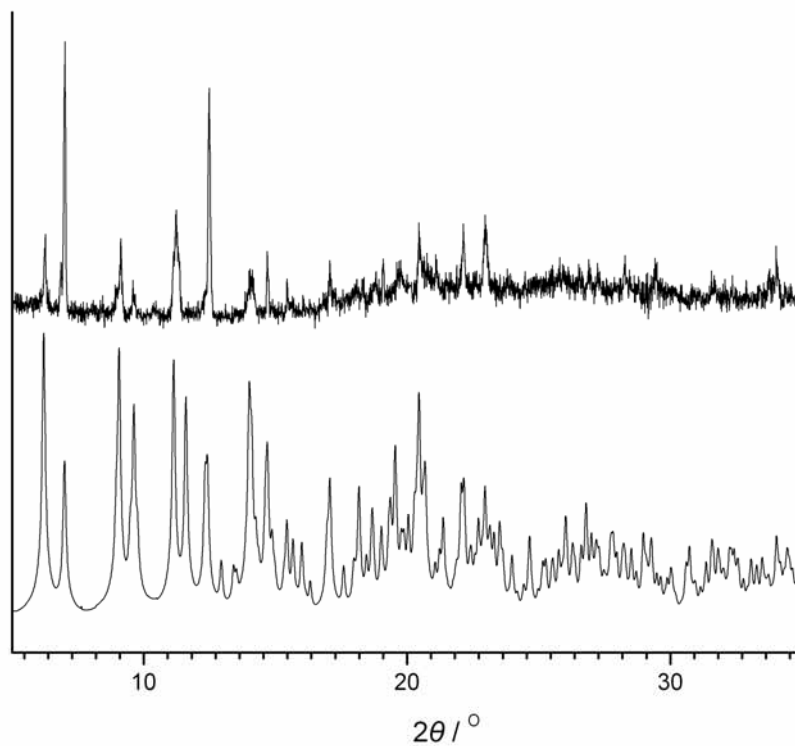
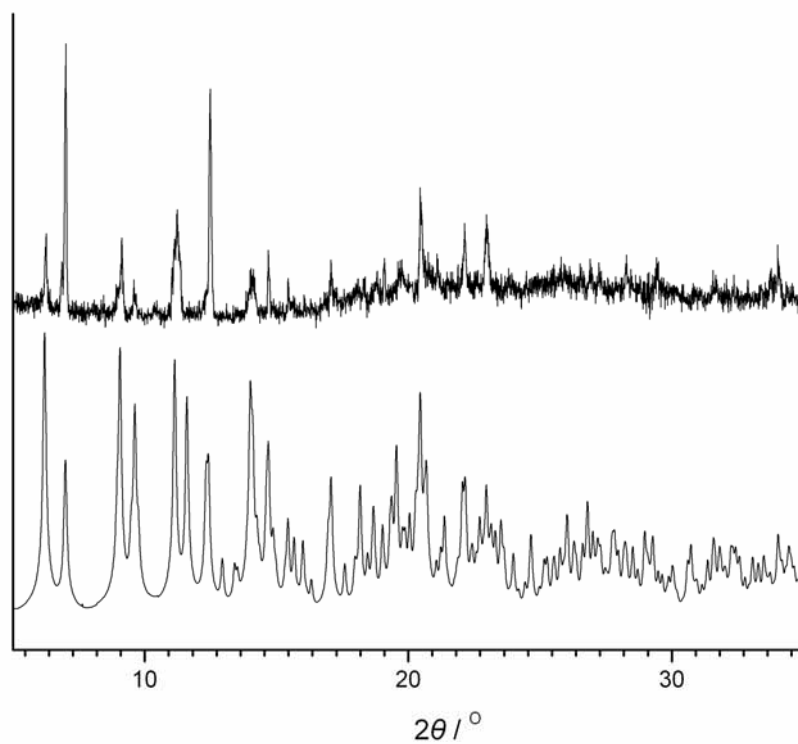**Fig. S3** Experimental (top) and simulated (bottom) XRD patterns for compound **3**.

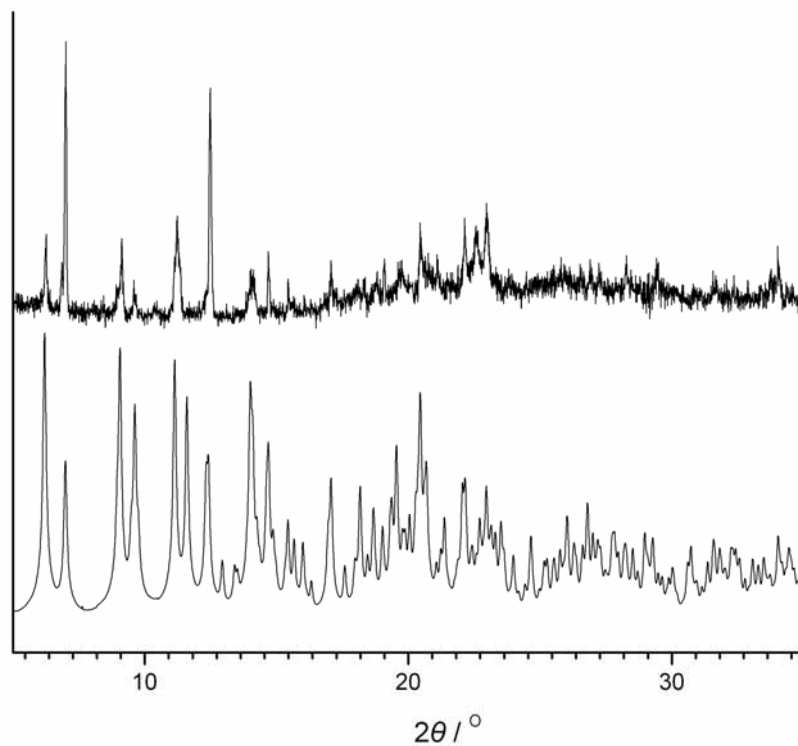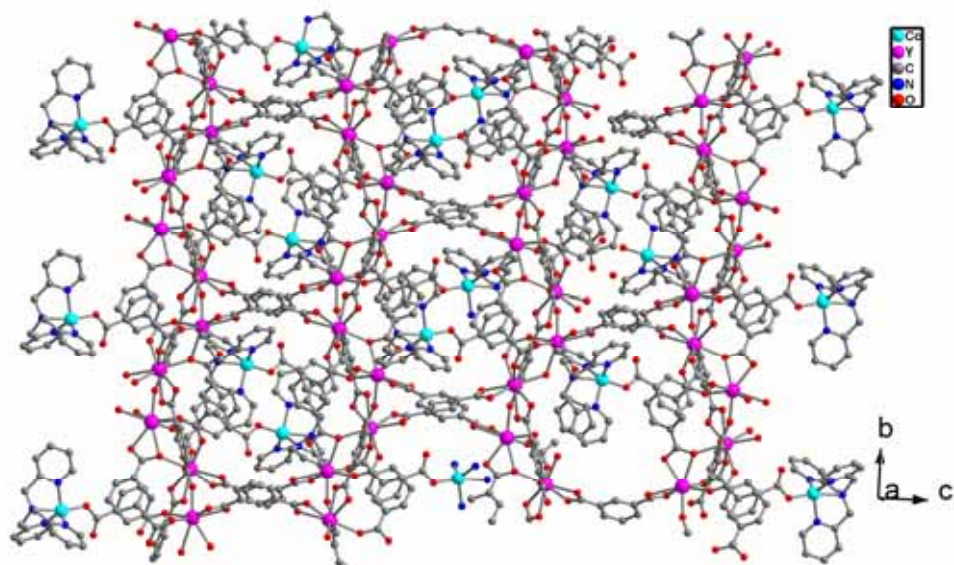**Fig. S4** Experimental (top) and simulated (bottom) XRD patterns for compound **4**.

Fig. S5 Experimental (top) and simulated (bottom) XRD patterns for compound **5**.

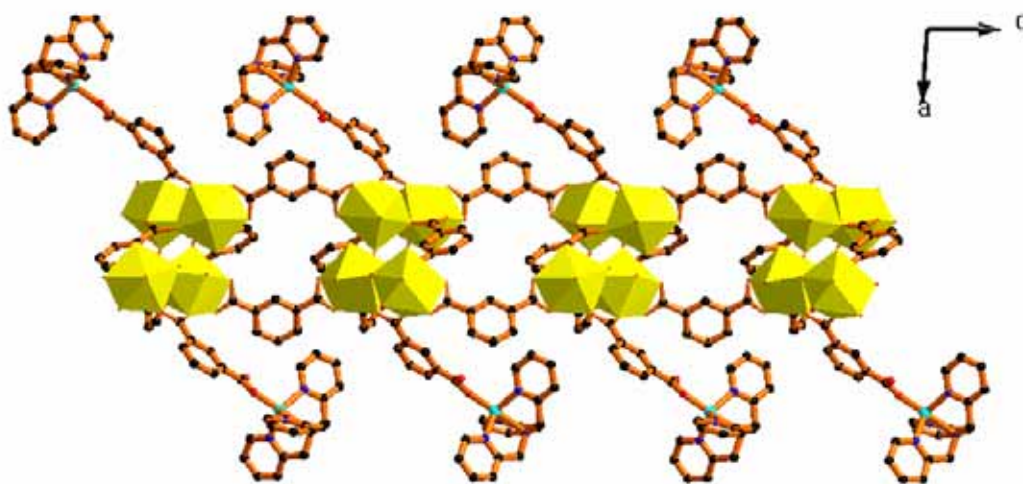**Fig. S6** The 2D structure of **1** viewed in the *bc* plane.
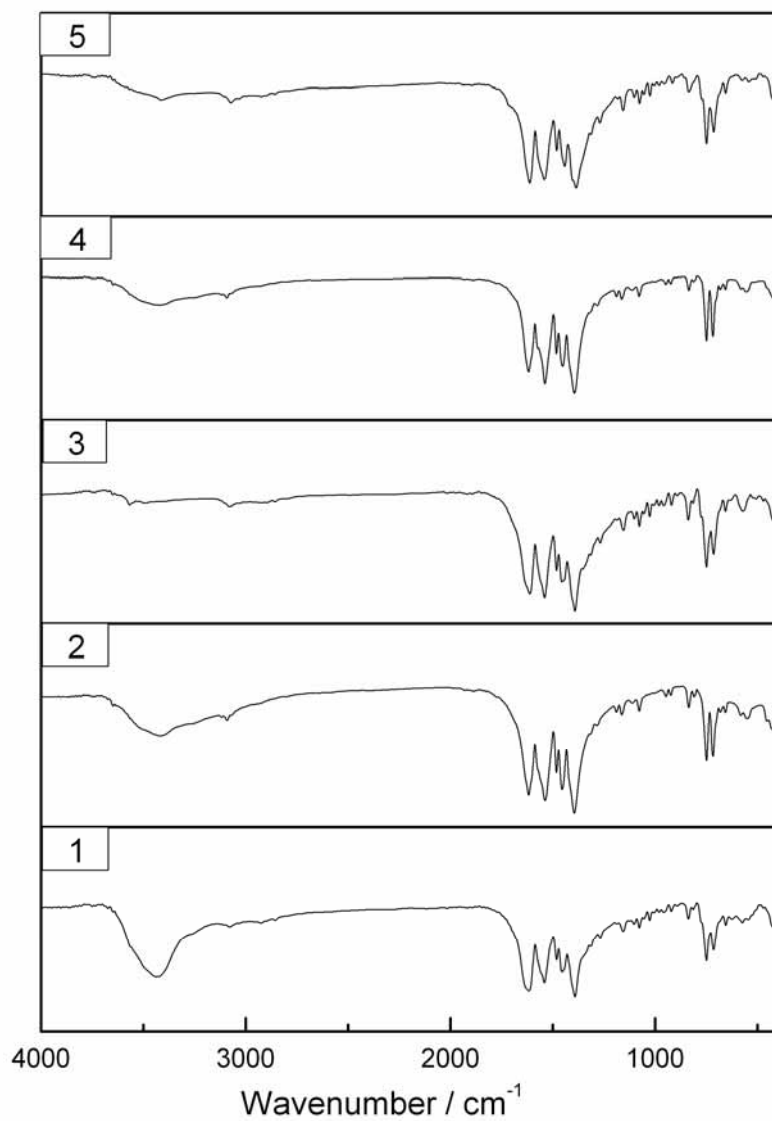

Fig. S7 The 1D structure of **1** viewed along the *c* axis.

Fig. S8 The IR spectra of **1.**
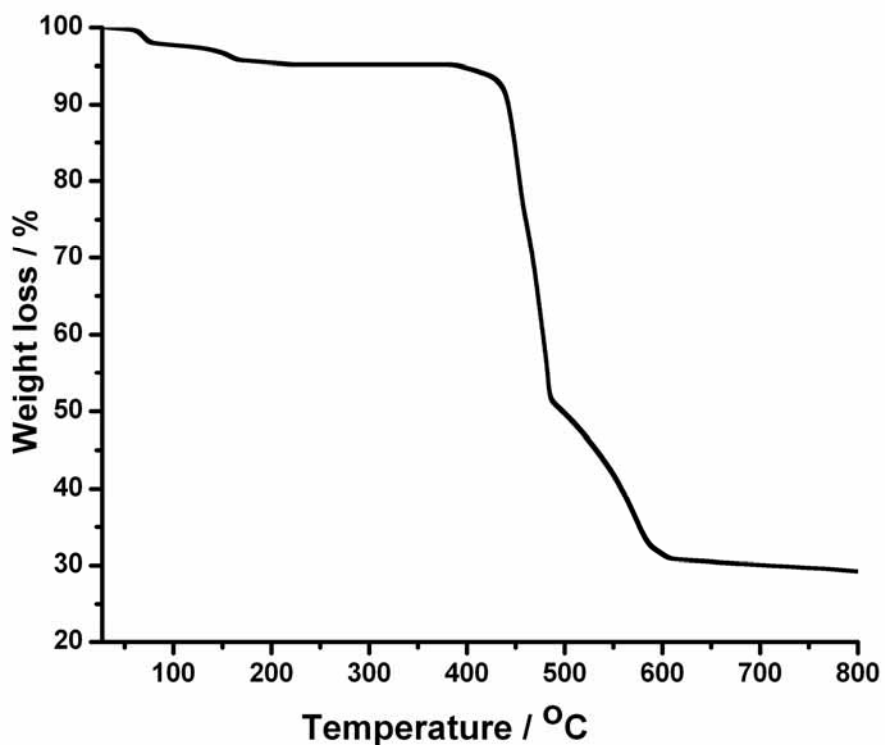
Fig. S9 TGA curve of **1**.
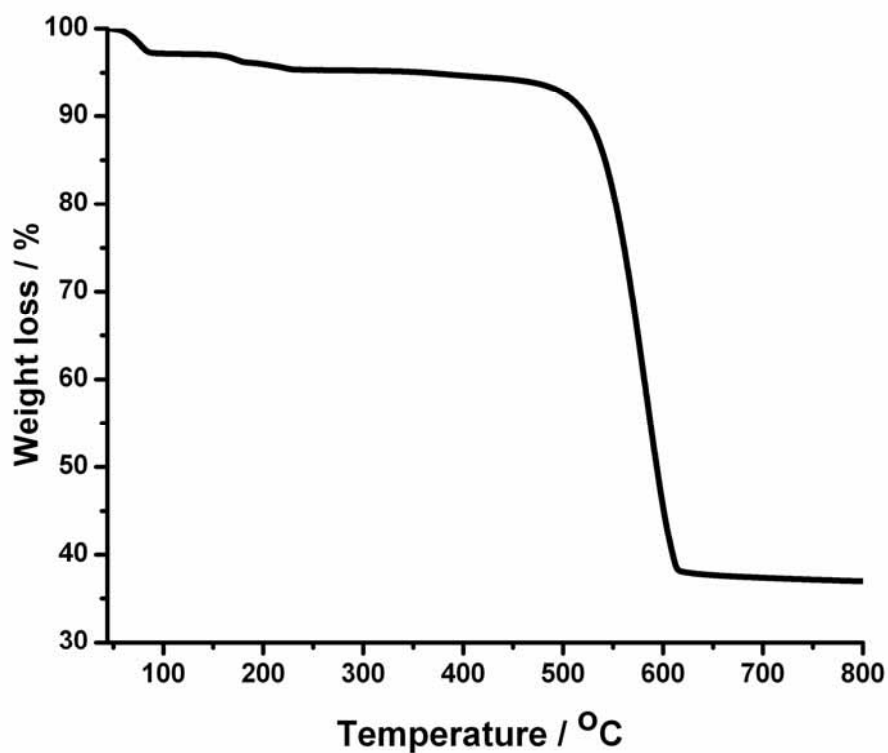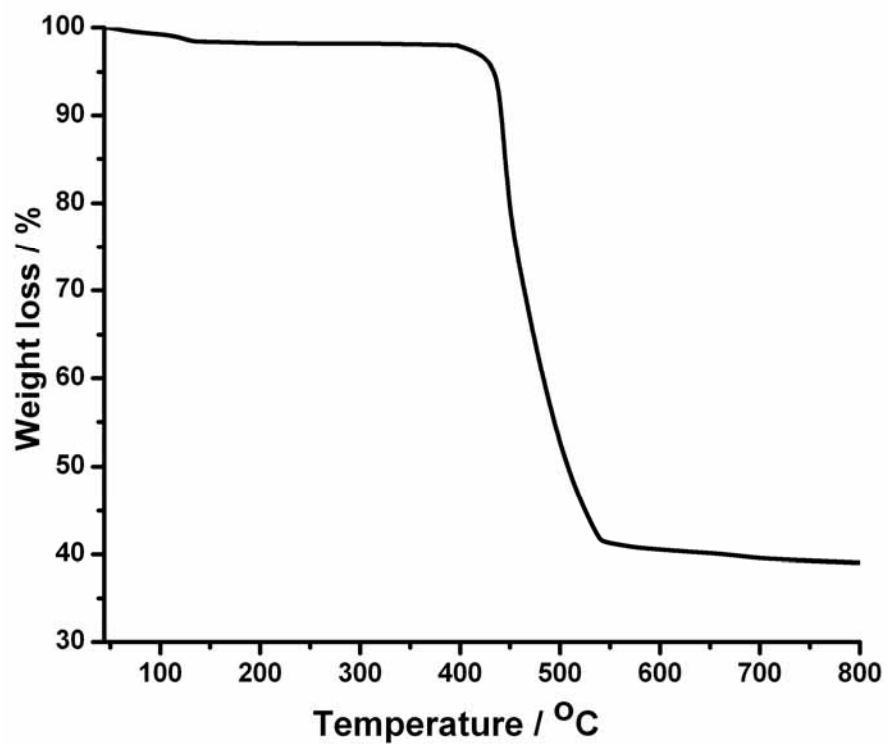

Fig. S10 TGA curve of **2**.
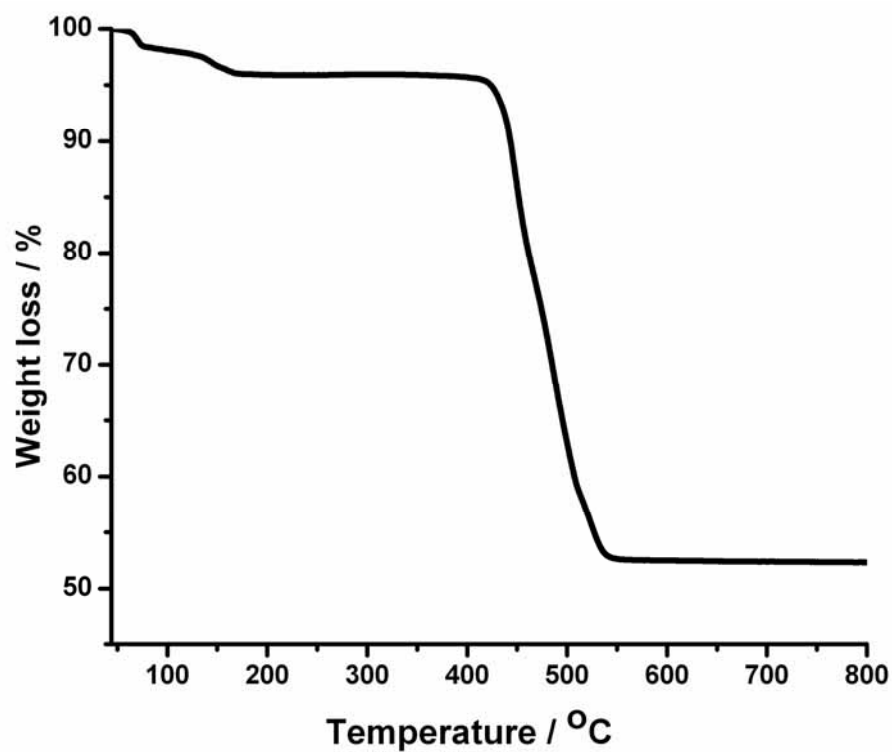
Fig. S11 TGA curve of **3**.
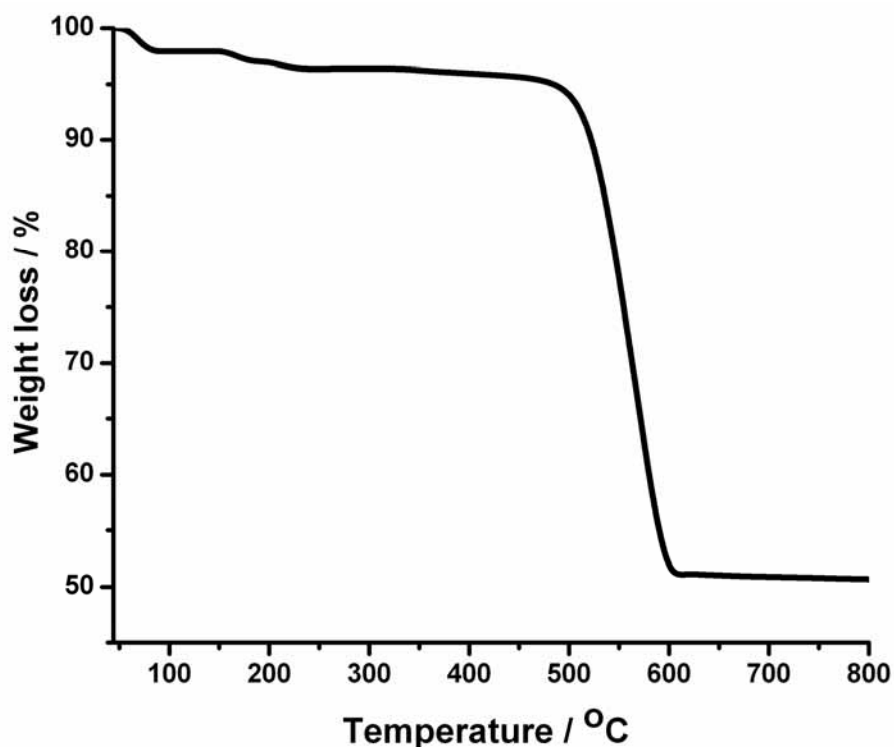
Fig. S12 TGA curve of **4**.

Fig. S13 TGA curve of **5**.