Electronic Supplementary Information for

Syntheses and characterizations of polymeric silver iodoplumbates, and iodoplumbates with lanthanide complexes

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Table S1. Selected Bond Lengths (Å) and angles (°) for **1**

Pb(1)–I(1)	3.3747(11)	Pb(1)–I(2)	3.2181(13)
Pb(1)–I(3)	2.9798(13)	Pb(1)–I(4)	3.3023(14)
Pb(1)–I(1)#1	3.5876(13)	Pb(1)–I(5)	3.1193(6)
Pb(1)–Ag(1)#1	3.4767(17)		
Ag(1)–I(1)	3.083(2)	Ag(1)–I(1)#1	2.971(2)
Ag(1)–I(2)	2.7313(19)	Ag(1)–I(4)#1	2.7305(19)
La(1)–O(1)	2.458(18)	La(1)–O(2)	2.449(17)
La(1)–O(3)	2.459(19)	La(1)–O(4)	2.439(14)
I(1)–Pb(1)–I(2)	87.97(3)	I(1)–Pb(1)–I(3)	86.84(3)
I(1)–Pb(1)–I(4)	91.34(3)	I(1)–Pb(1)–I(5)	177.73(3)
I(2)–Pb(1)–I(3)	98.21(4)	I(2)–Pb(1)–I(4)	164.67(4)
I(2)–Pb(1)–I(5)	90.81(2)	I(3)–Pb(1)–I(4)	97.05(4)
I(3)–Pb(1)–I(5)	95.22(3)	I(4)–Pb(1)–I(5)	89.33(2)
I(1)#1–Pb(1)–I(2)	83.53(3)	I(1)#1–Pb(1)–I(3)	161.13(3)
I(1)#1–Pb(1)–I(4)	81.54(3)	I(1)#1–Pb(1)–I(5)	103.56(3)
I(1)#1–Pb(1)–I(1)	74.41(3)	I(1)–Ag(1)–I(1)#1	88.19(5)
I(1)–Ag(1)–I(2)	103.78(7)	I(1)#1–Ag(1)–I(2)	105.50(6)
I(1)–Ag(1)–I(4)#1	101.39(7)	I(1)#1–Ag(1)–I(4)#1	113.76(7)
I(2)–Ag(1)–I(4)#1	133.53(8)		
Ag(1)–I(1)–Pb(1)	66.95(4)	Ag(1)#1–I(1)–Pb(1)	66.09(4)
Ag(1)–I(2)–Pb(1)	73.24(5)	Ag(1)#1–I(4)–Pb(1)	69.64(4)
Pb(1)#3–I(5)–Pb(1)	180.0	Ag(1)–I(1)–Ag(1)#1	91.81(5)
O(1)–La(1)–O(2)	74.3(6)	O(1)–La(1)–O(1)#2	81.4(11)

O(1)–La(1)–O(3)	132.7(9)	O(1)–La(1)–O(2)#2	75.2(6)
O(1)–La(1)–O(4)	66.4(9)	O(1)–La(1)–O(3)#2	120.9(6)
O(2)–La(1)–O(2)#2	139.4(9)	O(1)–La(1)–O(4)#2	147.4(10)
O(2)–La(1)–O(3)#2	72.8(7)	O(2)–La(1)–O(3)	147.3(7)
O(2)–La(1)–O(4)#2	92.0(8)	O(2)–La(1)–O(4)	99.6(7)
O(3)–La(1)–O(4)	80.9(9)	O(3)–La(1)–O(3)#2	76.3(10)
O(4)–La(1)–O(4)#2	146.1(15)	O(3)–La(1)–O(4)#2	72.5(10)

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

Table S2. Selected Bond Lengths (Å) and angles (°) for **2**

Pb(1)–I(1)	3.3905(17)	Pb(1)–I(2)	3.2538(14)
Pb(1)–I(3)	2.9879(18)	Pb(1)–I(4)	3.0928(8)
Pb(1)–I(1)#1	3.5831(8)	Pb(1)–Ag#1	3.5492(8)
Ag(1)–I(1)	3.036(2)	Ag(1)–I(2)	2.7184(16)
Gd(1)–O(1)	2.383(12)	Gd(1)–O(2)	2.331(13)
I(1)–Pb(1)–I(4)	168.46(4)	I(2)–Pb(1)–I(2)#1	169.09(6)
I(2)–Pb(1)–I(3)	95.10(3)	I(2)–Pb(1)–I(4)	91.47(3)
I(3)–Pb(1)–I(4)	95.19(4)	I(1)#1–Pb(1)–I(3)	170.20(4)
I(1)#1–Pb(1)–I(4)	94.61(4)	I(1)#1–Pb(1)–I(2)	84.65(4)
I(1)#1–Pb(1)–I(1)	73.85(4)		
I(1)–Ag(1)–I(2)	105.88(5)	I(1)–Ag(1)–I(1)#3	87.34(8)
I(2)–Ag(1)–I(2)#2	134.87(11)	I(1)–Ag(1)–I(2)#2	106.35(5)
Ag(1)–I(1)–Ag(1)#3	92.66(8)	Ag(1)–I(1)–Pb(1)	66.78(3)
Pb(1)–I(4)–Pb(1)#4	180.0	Ag(1)–I(2)–Pb(1)	72.29(6)
O(1)–Gd(1)–O(1)#6	137.2(6)	O(1)–Gd(1)–O(1)#5	121.2(7)
O(1)–Gd(1)–O(2)	71.2(5)	O(1)–Gd(1)–O(1)#7	75.4(7)
O(1)–Gd(1)–O(2)#6	77.2(6)	O(1)–Gd(1)–O(2)#5	74.9(5)
O(2)–Gd(1)–O(2)#5	107.1(10)	O(1)–Gd(1)–O(2)#7	143.5(5)
O(2)–Gd(1)–O(2)#7	144.5(8)	O(2)–Gd(1)–O(2)#6	83.8(9)

Symmetry transformations used to generate equivalent atoms: #1 x, y, –z+1; #2 –x+3/2, –y+1/2, z; #3 –x+3/2, –y+1/2, –z+1; #4 –x+1/2, –y+1/2, –z+1; #5 –x, –y+1, z; #6 x, –y+1, –z+3/2; #7 –x, y, –z+3/2.

Table S3. Selected Bond Lengths (Å) and angles (°) for **3**

Pb(1)–I(1)	3.2555(12)	Pb(1)–I(2)	3.3889(14)
Pb(1)–I(3)	2.9909(15)	Pb(1)–I(4)	3.1122(8)
Pb(1)–I(1)#3	3.5943(12)	Pb(1)–Ag#1	3.5612(8)
Ag(1)–I(1)	2.7107(13)	Ag(1)–I(2)	3.0436(17)
Tm(1)–O(1)	2.235(9)	Tm(1)–O(2)	2.301(10)
I(1)–Pb(1)–I(1)#1	168.60(4)	I(1)–Pb(1)–I(2)	87.48(2)
I(1)–Pb(1)–I(3)	95.35(2)	I(1)–Pb(1)–I(4)	91.44(2)
I(2)–Pb(1)–I(3)	95.99(4)	I(2)–Pb(1)–I(4)	168.29(3)
I(3)–Pb(1)–I(4)	95.72(3)	I(2)–Pb(1)–I(2)#3	73.71(2)
I(1)–Pb(1)–I(2)#3	84.38(2)	I(3)–Pb(1)–I(2)#3	169.71(2)
I(4)–Pb(1)–I(2)#3	94.57(2)	I(1)–Ag(1)–I(1)#2	135.22(9)
I(1)–Ag(1)–I(2)	105.83(4)	I(1)–Ag(1)–I(2)#3	106.24(4)
I(2)–Ag(1)–I(2)#3	87.04(6)	Ag(1)–I(1)–Pb(1)	72.64(5)
Ag(1)–I(2)–Ag(1)#3	92.96(6)	Ag(1)–I(2)–Pb(1)	66.97(2)
Pb(1)–I(4)–Pb(1)#4	180.00(2)	O(1)–Tm(1)–O(1)#5	83.8(7)
O(1)–Tm(1)–O(1)#6	106.6(7)	O(1)–Tm(1)–O(1)#7	145.2(8)
O(1)–Tm(1)–O(2)	78.3(5)	O(1)–Tm(1)–O(2)#5	71.7(6)
O(1)–Tm(1)–O(2)#6	142.3(6)	O(1)–Tm(1)–O(2)#7	74.1(5)
O(2)–Tm(1)–O(2)#5	139.4(8)	O(2)–Tm(1)–O(2)#6	120.9(7)
O(2)–Tm(1)–O(2)#7	74.2(8)		

Symmetry transformations used to generate equivalent atoms: #1 x, y, –z; #2 –x+1/2, –y+1/2, z; #3 –x+1/2, –y+1/2, –z; #4 –x–1/2, –y+1/2, –z; #5 x, –y+1, –z+1/2; #6 –x, –y+1, z; #7 –x, y, –z+1/2.

Table S4. Selected Bond Lengths (Å) and angles (°) for **4**

Pb(1)–I(1)	3.162(3)	Pb(1)–I(2)	3.194(3)
Pb(1)–I(3)	3.326(3)	Pb(1)–I(4)	3.351(3)
Pb(1)–I(5)	2.982(3)	Pb(1)–I(6)	3.639(3)
Pb(2)–I(1)	3.197(3)	Pb(2)–I(6)	3.226(2)
Pb(2)–I(2)	3.183(3)	Pb(2)–I(8)	3.242(3)
Pb(2)–I(7)	3.292(3)	Pb(2)–I(11)#1	3.273(2)
Pb(3)–I(7)	3.096(3)	Pb(3)–I(9)	2.997(3)
Pb(3)–I(8)	3.237(3)	Pb(3)–I(11) #1	3.505(3)
Pb(3)–I(10)#1	3.281(3)	Pb(3)–O(9)	2.694(19)
Pb(4)–I(3)	3.230(3)	Pb(4)–I(4)	3.046(3)
Pb(4)–I(6)	3.288(2)	Pb(4)–I(10)	3.176(3)
Pb(4)–I(11)	3.233(2)	Pb(4)–O(9)#2	2.748(19)
La(1)–O(1)	2.40(2)	La(1)–O(2)	2.520(19)
La(1)–O(3)	2.465(16)	La(1)–O(4)	2.413(19)
La(1)–O(5)	2.476(17)	La(1)–O(6)	2.433(19)
La(1)–O(7)	2.60(2)	La(1)–O(8)	2.46(2)
I(1)–Pb(1)–I(2)	86.42(7)	I(1)–Pb(1)–I(3)	95.31(7)
I(1)–Pb(1)–I(4)	164.73(8)	I(1)–Pb(1)–I(5)	93.23(8)
I(2)–Pb(1)–I(3)	160.75(8)	I(2)–Pb(1)–I(4)	88.85(7)
I(2)–Pb(1)–I(5)	99.01(9)	I(3)–Pb(1)–I(4)	84.49(7)
I(1)–Pb(1)–I(6)	81.79(8)	I(2)–Pb(1)–I(6)	82.14(8)
I(3)–Pb(1)–I(6)	79.15(8)	I(4)–Pb(1)–I(6)	83.19(8)
I(5)–Pb(1)–I(6)	174.81(8)		
I(3)–Pb(1)–I(5)	100.02(9)	I(4)–Pb(1)–I(5)	101.85(9)
I(1)–Pb(2)–I(2)	86.03(7)	I(1)–Pb(2)–I(6)	88.12(7)
I(1)–Pb(2)–I(7)	85.68(7)	I(1)–Pb(2)–I(8)	169.84(8)
I(1)–Pb(2)–I(11)#1	98.07(7)	I(2)–Pb(2)–I(6)	89.25(7)
I(2)–Pb(2)–I(7)	168.02(8)	I(2)–Pb(2)–I(8)	103.75(8)
I(2)–Pb(2)–I(11)#1	85.72(6)	I(6)–Pb(2)–I(7)	99.10(7)
I(6)–Pb(2)–I(8)	89.25(7)	I(6)–Pb(2)–I(11)#1	171.72(8)
I(7)–Pb(2)–I(8)	85.05(7)	I(7)–Pb(2)–I(11)#1	86.90(6)
I(8)–Pb(2)–I(11)#1	85.57(7)	I(7)–Pb(3)–I(8)	88.42(7)
I(7)–Pb(3)–I(9)	97.14(8)	I(7)–Pb(3)–I(10)#1	91.84(7)
I(8)–Pb(3)–I(9)	96.09(8)	I(8)–Pb(3)–I(10)#1	165.20(8)
I(9)–Pb(3)–I(10)#1	98.56(8)	O(9)–Pb(3)–I(7)	164.4(4)
O(9)–Pb(3)–I(8)	97.2(4)	O(9)–Pb(3)–I(9)	96.7(5)
I(7)–Pb(3)–I(11)#1	86.07(8)	I(8)–Pb(3)–I(11)#1	81.94(8)

I(9)–Pb(3)–I(11)#1	176.19(8)	I(10)#1–Pb(3)–I(11)#1	91.84(8)
O(9)–Pb(3)–I(11)#1	80.34(8)		
O(9)–Pb(3)–I(10)#1	79.0(4)	I(3)–Pb(4)–I(4)	91.29(8)
I(3)–Pb(4)–I(6)	85.98(7)	I(3)–Pb(4)–I(10)	173.08(8)
I(3)–Pb(4)–I(11)	91.08(7)	I(4)–Pb(4)–I(6)	94.29(7)
I(4)–Pb(4)–I(10)	95.58(8)	I(4)–Pb(4)–I(11)	91.72(7)
I(6)–Pb(4)–I(10)	92.68(7)	I(6)–Pb(4)–I(11)	173.36(7)
I(10)–Pb(4)–I(11)	89.53(6)	O(9)#2–Pb(4)–I(3)	93.0(4)
O(9)#2–Pb(4)–I(4)	174.5(4)	O(9)#2–Pb(4)–I(6)	89.5(5)
O(9)#2–Pb(4)–I(10)	80.2(4)	O(9)#2–Pb(4)–I(11)	84.7(5)
Pb(1)–I(1)–Pb(2)	79.00(6)	Pb(1)–I(2)–Pb(2)	78.74(6)
Pb(1)–I(3)–Pb(4)	76.20(6)	Pb(1)–I(4)–Pb(4)	78.31(6)
Pb(2)–I(6)–Pb(4)	142.20(8)	Pb(2)–I(7)–Pb(3)	78.69(6)
Pb(2)–I(8)–Pb(3)	77.45(6)	Pb(3)#2–I(10)–Pb(4)	75.75(6)
Pb(2)#2–I(11)–Pb(4)	145.33(8)	O(1)–La(1)–O(2)	76.1(8)
O(1)–La(1)–O(3)	72.4(10)	O(1)–La(1)–O(4)	76.6(10)
O(1)–La(1)–O(5)	73.2(8)	O(1)–La(1)–O(6)	142.1(9)
O(1)–La(1)–O(7)	120.7(10)	O(1)–La(1)–O(8)	135.7(9)
O(2)–La(1)–O(3)	86.1(8)	O(2)–La(1)–O(4)	74.6(7)
O(2)–La(1)–O(5)	142.8(7)	O(2)–La(1)–O(6)	111.0(9)
O(2)–La(1)–O(7)	144.6(8)	O(2)–La(1)–O(8)	72.5(8)
O(3)–La(1)–O(4)	146.5(9)	O(3)–La(1)–O(5)	103.8(9)
O(3)–La(1)–O(6)	143.2(9)	O(3)–La(1)–O(7)	72.1(9)
O(3)–La(1)–O(8)	75.0(9)	O(4)–La(1)–O(5)	78.4(8)
O(4)–La(1)–O(6)	70.2(10)	O(4)–La(1)–O(7)	136.8(9)
O(4)–La(1)–O(8)	122.4(9)	O(5)–La(1)–O(6)	82.5(8)
O(5)–La(1)–O(7)	71.2(8)	O(5)–La(1)–O(8)	144.6(8)
O(6)–La(1)–O(7)	76.0(10)	O(6)–La(1)–O(8)	79.4(9)
O(7)–La(1)–O(8)	75.0(9)	Pb(3)–O(9)–Pb(4)#1	93.5(5)

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

Table S5. Selected Bond Lengths (Å) and angles (°) for **5**

Pb(1)–I(1)	3.153(2)	Pb(1)–I(2)	3.194(2)
Pb(1)–I(3)	3.648(3)	Pb(1)–I(4)	3.315(2)
Pb(1)–I(5)	3.345(2)	Pb(1)–I(6)	2.976(3)
Pb(2)–I(1)	3.192(2)	Pb(2)–I(2)	3.188(2)
Pb(2)–I(3)	3.225(2)	Pb(2)–I(7)	3.278(3)
Pb(2)–I(8)	3.240(2)	Pb(2)–I(9)	3.258(2)
Pb(3)–I(7)	3.083(2)	Pb(3)–I(8)	3.234(2)
Pb(3)–I(9)	3.509(2)	Pb(3)–I(10)	3.275(2)
Pb(3)–I(11)	2.988(3)	Pb(3)–O(9)	2.696(19)
Pb(4)–I(3)#1	3.272(2)	Pb(4)–I(4)#1	3.233(2)
Pb(4)–I(5)#1	3.042(2)	Pb(4)–I(9)	3.231(2)
Pb(4)–I(10)	3.180(2)	Pb(4)–O(9)	2.72(2)
Pr(1)–O(1)	2.46(2)	Pr(1)–O(2)	2.437(18)
Pr(1)–O(3)	2.45(2)	Pr(1)–O(4)	2.39(2)
Pr(1)–O(5)	2.41(2)	Pr(1)–O(6)	2.444(19)
Pr(1)–O(7)	2.46(3)	Pr(1)–O(8)	2.37(2)
I(1)–Pb(1)–I(2)	86.29(6)	I(1)–Pb(1)–I(3)	81.68(6)
I(1)–Pb(1)–I(4)	95.18(6)	I(1)–Pb(1)–I(5)	164.21(7)
I(1)–Pb(1)–I(6)	93.30(8)	I(2)–Pb(1)–I(3)	82.13(6)
I(2)–Pb(1)–I(4)	160.68(7)	I(2)–Pb(1)–I(5)	88.54(6)
I(2)–Pb(1)–I(6)	99.07(8)	I(3)–Pb(1)–I(4)	79.04(6)
I(3)–Pb(1)–I(5)	82.84(6)	I(3)–Pb(1)–I(6)	174.77(8)
I(4)–Pb(1)–I(5)	84.89(6)	I(4)–Pb(1)–I(6)	100.07(8)
I(5)–Pb(1)–I(6)	102.25(8)	I(1)–Pb(2)–I(2)	85.75(6)
I(1)–Pb(2)–I(3)	88.15(6)	I(1)–Pb(2)–I(7)	85.81(6)
I(1)–Pb(2)–I(8)	169.98(7)	I(1)–Pb(2)–I(9)	97.92(6)
I(2)–Pb(2)–I(3)	89.33(6)	I(2)–Pb(2)–I(7)	168.12(7)
I(2)–Pb(2)–I(8)	103.87(7)	I(2)–Pb(2)–I(9)	85.49(6)
I(3)–Pb(2)–I(7)	98.75(7)	I(3)–Pb(2)–I(8)	89.18(6)
I(3)–Pb(2)–I(9)	171.68(6)	I(7)–Pb(2)–I(8)	85.05(7)
I(7)–Pb(2)–I(9)	87.40(6)	I(8)–Pb(2)–I(9)	85.77(6)
I(7)–Pb(3)–I(8)	88.42(7)	I(7)–Pb(3)–I(9)	86.21(6)
I(7)–Pb(3)–I(10)	91.87(7)	I(7)–Pb(3)–I(11)	96.98(8)
I(8)–Pb(3)–I(9)	81.85(6)	I(8)–Pb(3)–I(10)	165.24(7)
I(8)–Pb(3)–I(11)	96.12(8)	I(9)–Pb(3)–I(10)	83.44(6)
I(9)–Pb(3)–I(11)	176.19(7)	I(10)–Pb(3)–I(11)	98.49(8)
O(9)–Pb(3)–I(7)	164.1(5)	O(9)–Pb(3)–I(8)	97.0(4)

O(9)–Pb(3)–I(9)	79.8(5)	O(9)–Pb(3)–I(10)	79.1(4)
O(9)–Pb(3)–I(11)	97.3(5)	I(3)#1–Pb(4)–I(4)#1	86.05(6)
I(3)#1–Pb(4)–I(5)#1	94.31(7)	I(3)#1–Pb(4)–I(9)	173.12(6)
I(3)#1–Pb(4)–I(10)	93.00(6)	I(4)#1–Pb(4)–I(5)#1	91.46(7)
I(4)#1–Pb(4)–I(9)	90.60(6)	I(4)#1–Pb(4)–I(10)	173.21(7)
I(5)#1–Pb(4)–I(9)	91.77(7)	I(5)#1–Pb(4)–I(10)	95.32(7)
I(9)–Pb(4)–I(10)	89.62(6)	O(9)–Pb(4)–I(3)#1	89.3(4)
O(9)–Pb(4)–I(4)#1	92.7(5)	O(9)–Pb(4)–I(5)#1	174.7(4)
O(9)–Pb(4)–I(9)	84.8(4)	O(9)–Pb(4)–I(10)	80.6(5)
Pb(1)–I(1)–Pb(2)	79.31(5)	Pb(1)–I(2)–Pb(2)	78.76(6)
Pb(1)–I(3)–Pb(2)	71.89(5)	Pb(1)–I(3)–Pb(4)#2	71.17(5)
Pb(2)–I(3)–Pb(4)#2	142.08(7)	Pb(1)–I(4)–Pb(4)#2	76.15(5)
Pb(1)–I(5)–Pb(4)#2	78.29(6)	Pb(2)–I(7)–Pb(3)	78.72(6)
Pb(2)–I(8)–Pb(3)	77.14(5)	Pb(2)–I(9)–Pb(3)	73.12(5)
Pb(2)–I(9)–Pb(4)	144.81(7)	Pb(3)–I(9)–Pb(4)	71.69(5)
Pb(3)–I(10)–Pb(4)	75.53(5)	O(1)–Pr(1)–O(2)	71.0(7)
O(1)–Pr(1)–O(3)	146.8(9)	O(1)–Pr(1)–O(4)	135.0(8)
O(1)–Pr(1)–O(5)	122.5(8)	O(1)–Pr(1)–O(6)	76.7(8)
O(1)–Pr(1)–O(7)	75.2(9)	O(1)–Pr(1)–O(8)	78.8(9)
O(2)–Pr(1)–O(3)	142.1(8)	O(2)–Pr(1)–O(4)	76.5(7)
O(2)–Pr(1)–O(5)	73.2(7)	O(2)–Pr(1)–O(6)	88.5(9)
O(2)–Pr(1)–O(7)	144.3(10)	O(2)–Pr(1)–O(8)	109.7(8)
O(3)–Pr(1)–O(4)	72.0(8)	O(3)–Pr(1)–O(5)	78.3(9)
O(3)–Pr(1)–O(6)	101.1(10)	O(3)–Pr(1)–O(7)	72.7(11)
O(3)–Pr(1)–O(8)	84.6(9)	O(4)–Pr(1)–O(5)	74.2(9)
O(4)–Pr(1)–O(6)	72.2(8)	O(4)–Pr(1)–O(7)	123.4(10)
O(4)–Pr(1)–O(8)	142.6(9)	O(5)–Pr(1)–O(6)	144.7(10)
O(5)–Pr(1)–O(7)	137.1(12)	O(5)–Pr(1)–O(8)	72.8(11)
O(6)–Pr(1)–O(7)	73.0(12)	O(6)–Pr(1)–O(8)	142.5(10)
O(7)–Pr(1)–O(8)	73.6(12)		

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

Table S6. Selected Bond Lengths (Å) and angles (°) for **6**

Pb(1)–I(1)	3.1945(15)	Pb(1)–I(2)	3.1696(14)
Pb(1)–I(3)	2.9792(16)	Pb(1)–I(4)	3.3103(15)
Pb(1)–I(5)	3.3294(15)	Pb(1)–I(8)	3.6625 (16)
Pb(2)–I(1)	3.1964(15)	Pb(2)–I(2)	3.1804(14)
Pb(2)–I(7)	3.2441(15)	Pb(2)–I(6)	3.2943(16)
Pb(2)–I(10)#1	3.2644(13)	Pb(2)–I(8)	3.2074(13)
Pb(3)–I(6)	3.096(3)	Pb(3)–I(7)	3.2141(15)
Pb(3)–I(9)	3.0073(15)	Pb(3)–I(11)#1	3.3076(15)
Pb(3)–I(10)#1	3.5064(15)	Pb(3)–O(9)#1	2.69(2)
Pb(4)–I(4)	3.2492(15)	Pb(4)–I(5)	3.0494(15)
Pb(4)–I(8)	3.2659(13)	Pb(4)–I(10)	3.2211(13)
Pb(4)–I(11)	3.1518(15)	Pb(4)–O(9)	2.712(19)
Nd(1)–O(1)	2.443(12)	Nd(1)–O(2)	2.429(13)
Nd(1)–O(3)	2.426(15)	Nd(1)–O(4)	2.431(14)
Nd(1)–O(5)	2.451(16)	Nd(1)–O(6)	2.412(15)
Nd(1)–O(7)	2.415(12)	Nd(1)–O(8)	2.401(12)
I(1)–Pb(1)–I(2)	86.58(4)	I(1)–Pb(1)–I(3)	97.68(4)
I(1)–Pb(1)–I(4)	161.63(4)	I(1)–Pb(1)–I(5)	89.22(4)
I(2)–Pb(1)–I(3)	93.79(4)	I(2)–Pb(1)–I(4)	94.12(4)
I(2)–Pb(1)–I(5)	164.69(4)	I(3)–Pb(1)–I(4)	100.58(5)
I(3)–Pb(1)–I(5)	101.36(4)	I(4)–Pb(1)–I(5)	85.31(4)
I(1)–Pb(1)–I(8)	82.38(4)	I(2)–Pb(1)–I(8)	81.16(4)
I(3)–Pb(1)–I(8)	174.95(4)	I(4)–Pb(1)–I(8)	79.60(4)
I(5)–Pb(1)–I(8)	83.69(4)		
I(1)–Pb(2)–I(2)	86.36(4)	I(1)–Pb(2)–I(6)	167.34(4)
I(1)–Pb(2)–I(7)	103.36(4)	I(1)–Pb(2)–I(8)	90.01(4)
I(1)–Pb(2)–I(10)#1	84.27(4)	I(2)–Pb(2)–I(6)	85.68(4)
I(2)–Pb(2)–I(7)	169.85(4)	I(2)–Pb(2)–I(8)	88.56(4)
I(2)–Pb(2)–I(10)#1	98.94(4)	I(6)–Pb(2)–I(7)	85.21(4)
I(6)–Pb(2)–I(8)	99.61(4)	I(6)–Pb(2)–I(10)#1	87.25(4)
I(7)–Pb(2)–I(8)	88.54(4)	I(7)–Pb(2)–I(10)#1	85.11(4)
I(8)–Pb(2)–I(10)#1	170.24(4)	I(6)–Pb(3)–I(7)	89.21(4)
I(6)–Pb(3)–I(9)	96.05(4)	I(6)–Pb(3)–I(11)#1	91.71(4)
I(7)–Pb(3)–I(9)	94.89(4)	I(7)–Pb(3)–I(11)#1	165.11(4)
I(9)–Pb(3)–I(11)#1	99.79(4)	O(9)#1–Pb(3)–I(6)	163.3(4)
O(9)#1–Pb(3)–I(7)	97.8(4)	O(9)#1–Pb(3)–I(9)	98.4(5)
O(9)#1–Pb(3)–I(11)#1	77.7(4)	I(6)–Pb(3)–I(10)#1	86.42(4)

I(7)–Pb(3)–I(10)#1	81.71(4)	I(9)–Pb(3)–I(10)#1	175.79(4)
I(11)#1–Pb(3)–I(10)#1	83.51(4)	O(9)#1–Pb(3)–I(10)#1	79.64(4)
I(4)–Pb(4)–I(5)	91.11(4)		
I(4)–Pb(4)–I(8)	86.67(4)	I(4)–Pb(4)–I(10)	89.99(4)
I(4)–Pb(4)–I(11)	173.78(5)	I(5)–Pb(4)–I(8)	95.33(4)
I(5)–Pb(4)–I(10)	91.70(4)	I(5)–Pb(4)–I(11)	95.02(4)
I(8)–Pb(4)–I(10)	172.27(4)	I(8)–Pb(4)–I(11)	91.74(4)
I(10)–Pb(4)–I(11)	90.84(4)	O(9)–Pb(4)–I(4)	93.7(4)
O(9)–Pb(4)–I(5)	174.0(5)	O(9)–Pb(4)–I(8)	88.5(5)
O(9)–Pb(4)–I(10)	84.7(5)	O(9)–Pb(4)–I(11)	80.2(4)
Pb(1)–I(1)–Pb(2)	78.28(3)	Pb(1)–I(2)–Pb(2)	78.88(3)
Pb(1)–I(4)–Pb(4)	75.34(3)	Pb(1)–I(5)–Pb(4)	77.74(4)
Pb(2)–I(6)–Pb(3)	78.36(4)	Pb(2)–I(7)–Pb(3)	77.34(3)
Pb(2)–I(8)–Pb(4)	141.17(5)	Pb(2)#2–I(10)–Pb(4)	144.97(4)
Pb(3)#2–I(11)–Pb(4)	75.53(3)	O(1)–Nd(1)–O(2)	76.2(4)
O(1)–Nd(1)–O(3)	84.0(5)	O(1)–Nd(1)–O(4)	144.2(4)
O(1)–Nd(1)–O(5)	143.0(4)	O(1)–Nd(1)–O(6)	114.7(5)
O(1)–Nd(1)–O(7)	75.2(4)	O(1)–Nd(1)–O(8)	71.8(4)
O(2)–Nd(1)–O(3)	72.9(6)	O(2)–Nd(1)–O(4)	72.7(5)
O(2)–Nd(1)–O(5)	121.3(5)	O(2)–Nd(1)–O(6)	139.9(5)
O(2)–Nd(1)–O(7)	76.0(5)	O(2)–Nd(1)–O(8)	137.9(4)
O(3)–Nd(1)–O(4)	103.1(6)	O(3)–Nd(1)–O(5)	72.7(6)
O(3)–Nd(1)–O(6)	143.5(6)	O(3)–Nd(1)–O(7)	145.8(5)
O(3)–Nd(1)–O(8)	77.2(5)	O(4)–Nd(1)–O(5)	70.8(5)
O(4)–Nd(1)–O(6)	80.3(5)	O(4)–Nd(1)–O(7)	80.3(5)
O(4)–Nd(1)–O(8)	144.0(5)	O(5)–Nd(1)–O(6)	74.4(6)
O(5)–Nd(1)–O(7)	137.7(5)	O(5)–Nd(1)–O(8)	75.2(5)
O(6)–Nd(1)–O(7)	70.7(5)	O(6)–Nd(1)–O(8)	79.5(5)
O(7)–Nd(1)–O(8)	119.8(5)		

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

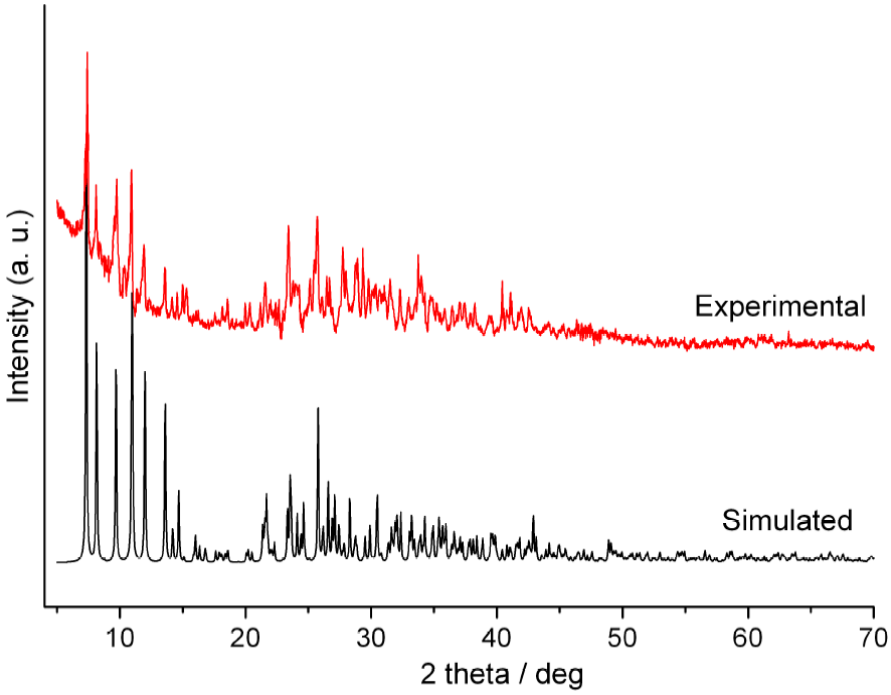

Fig. S1. Powder X-Ray diffraction pattern (red) of the polycrystalline sample of complex **1** and the simulated pattern (black) base on the single crystal data.

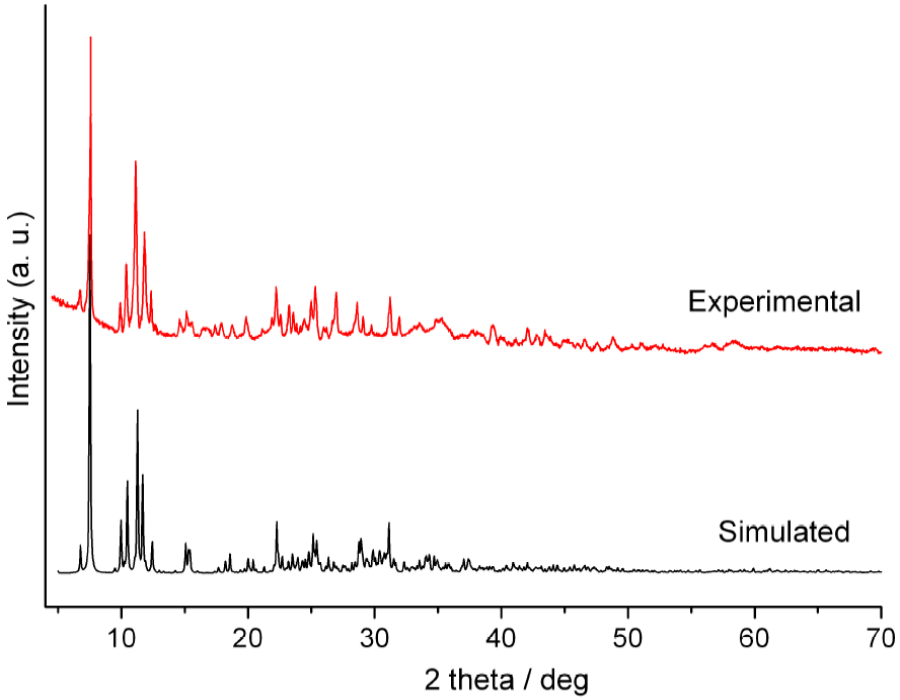

Fig. S2. Powder X-Ray diffraction pattern (red) of the polycrystalline sample of complex **4** and the simulated pattern (black) base on the single crystal data.

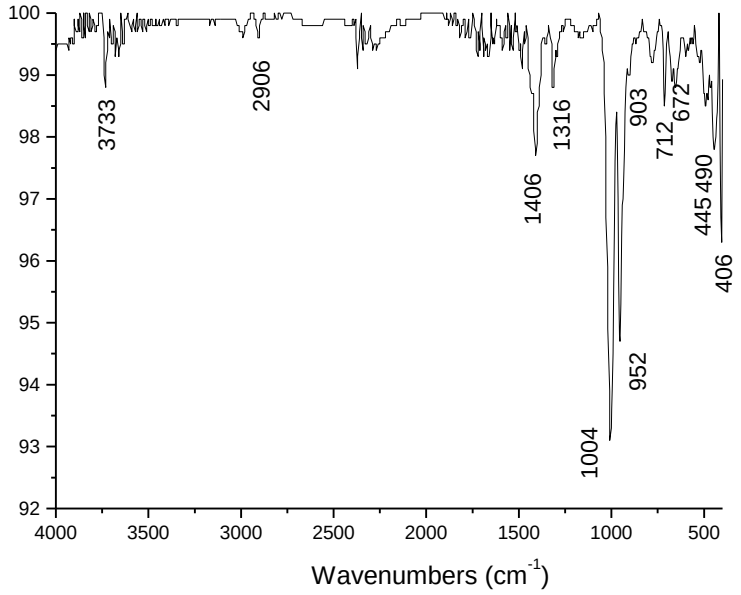

Fig. S3. IR spectrum of complex **1**.

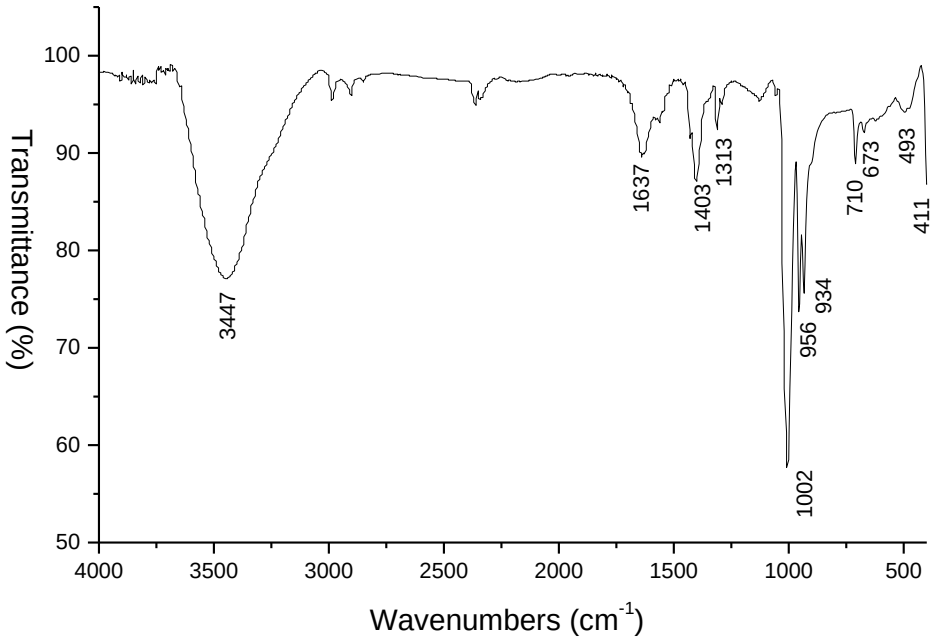

Fig. S4. IR spectrum of complex **2**.

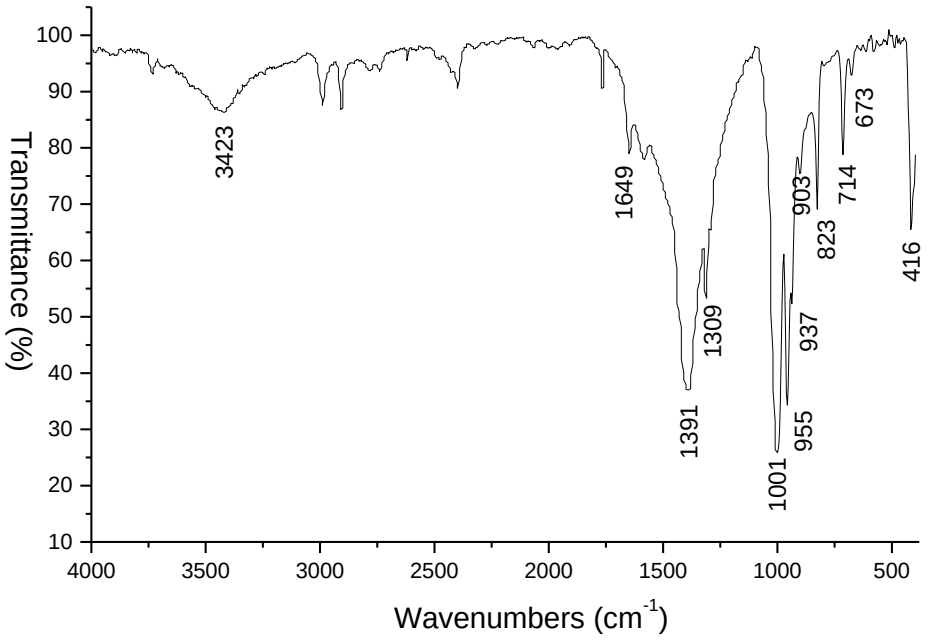

Fig. S5. IR spectrum of complex **3**.

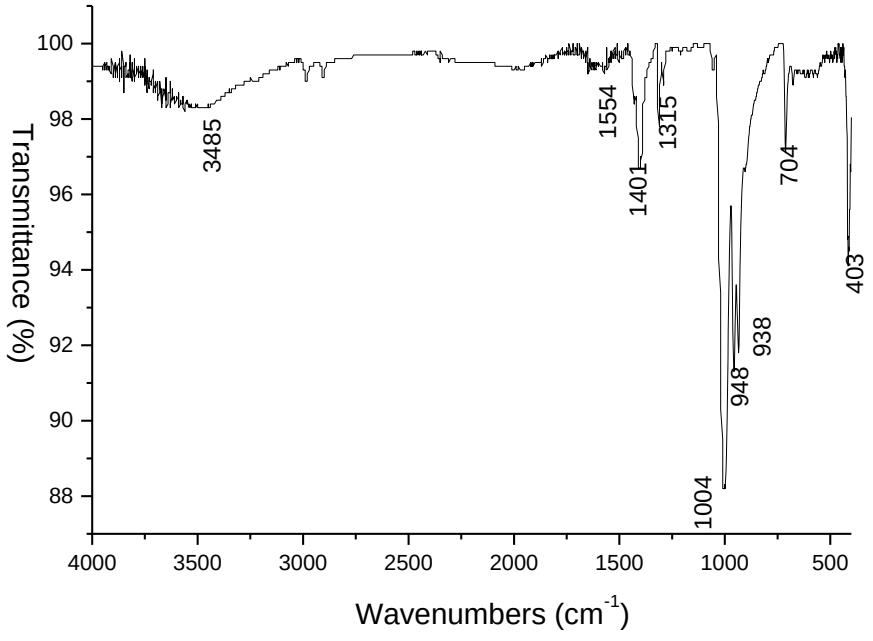

Fig. S6. IR spectrum of complex **4**.

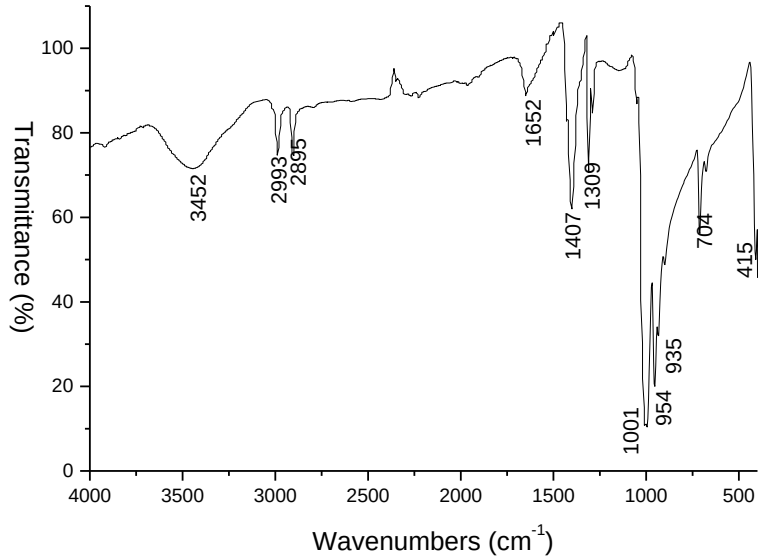

Fig. S7. IR spectrum of complex **5**.

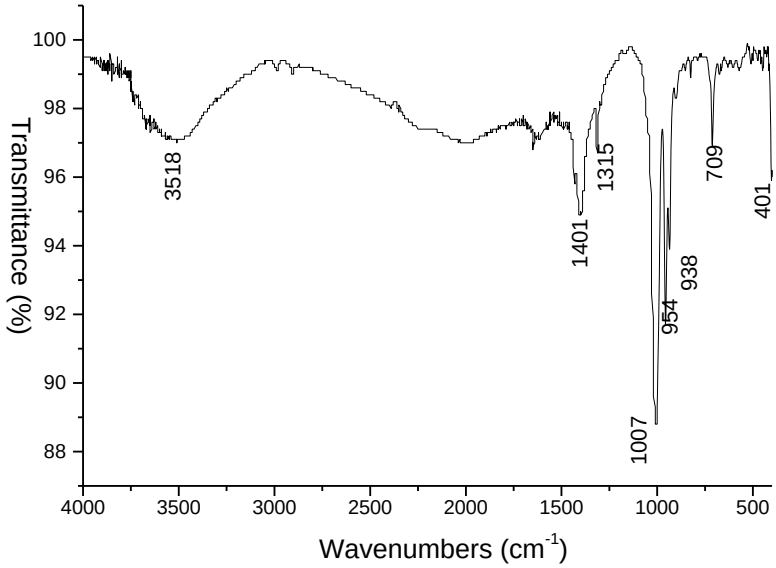

Fig. S8. IR spectrum of complex **6**.

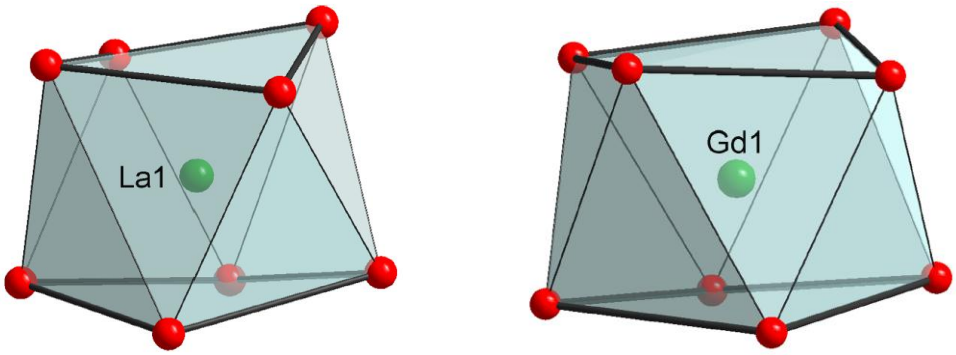

Fig. S9. Structures of square antiprismatic distorted towards bicapped trigonal prismatic for $[La(DMSO)_8]^{3+}$ in **1** (left), and slightly distorted square antiprismatic for $[Gd(DMSO)_8]^{3+}$ in **2** (right).

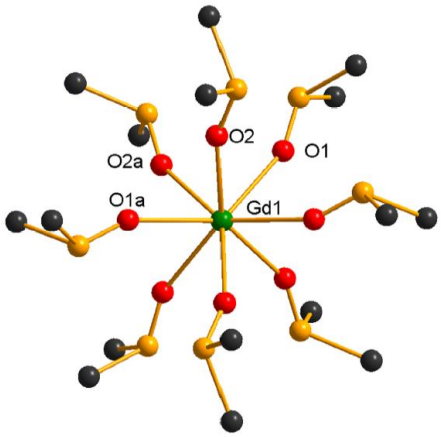

Fig. S10. Crystal structure of the $[Gd(DMSO)_8]^{3+}$ complex in **2** with the labeling scheme. The hydrogen atoms are omitted for clarity.

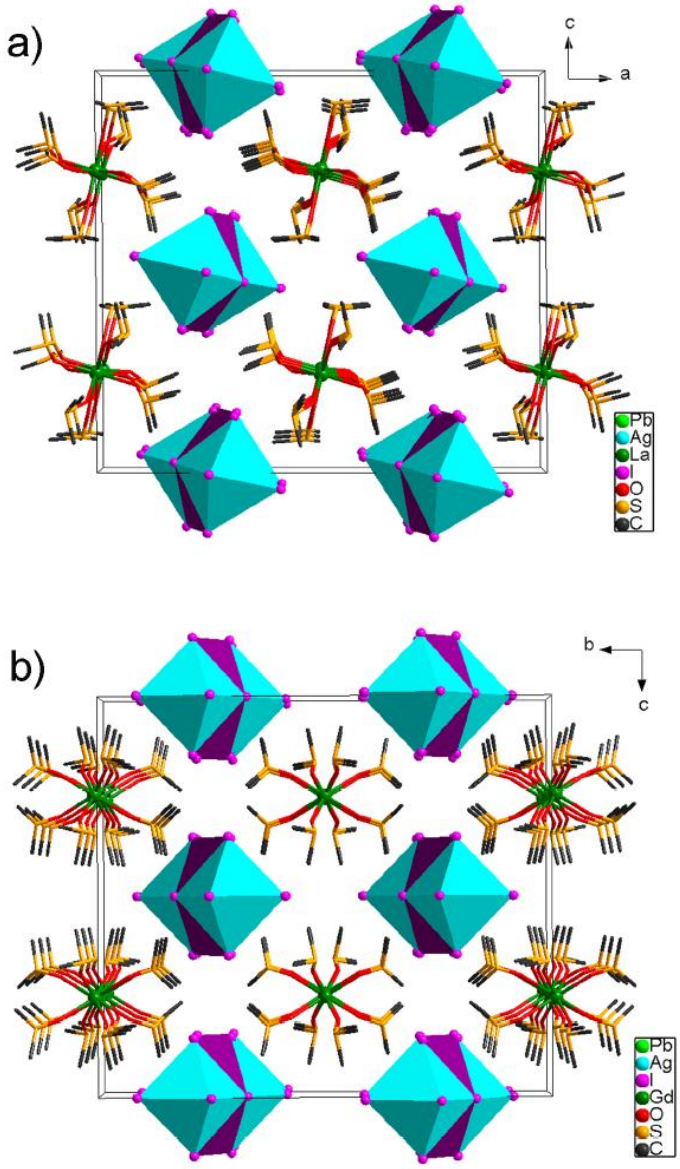

Fig. S11 Views of crystal packing of (a) along the *b* axis of **1**, and (b) along the *a* axis of **2**. The PbI_6 units are shown in green octahedra, and AgI_4 in purple tetrahedra. The hydrogen atoms are omitted for clarity

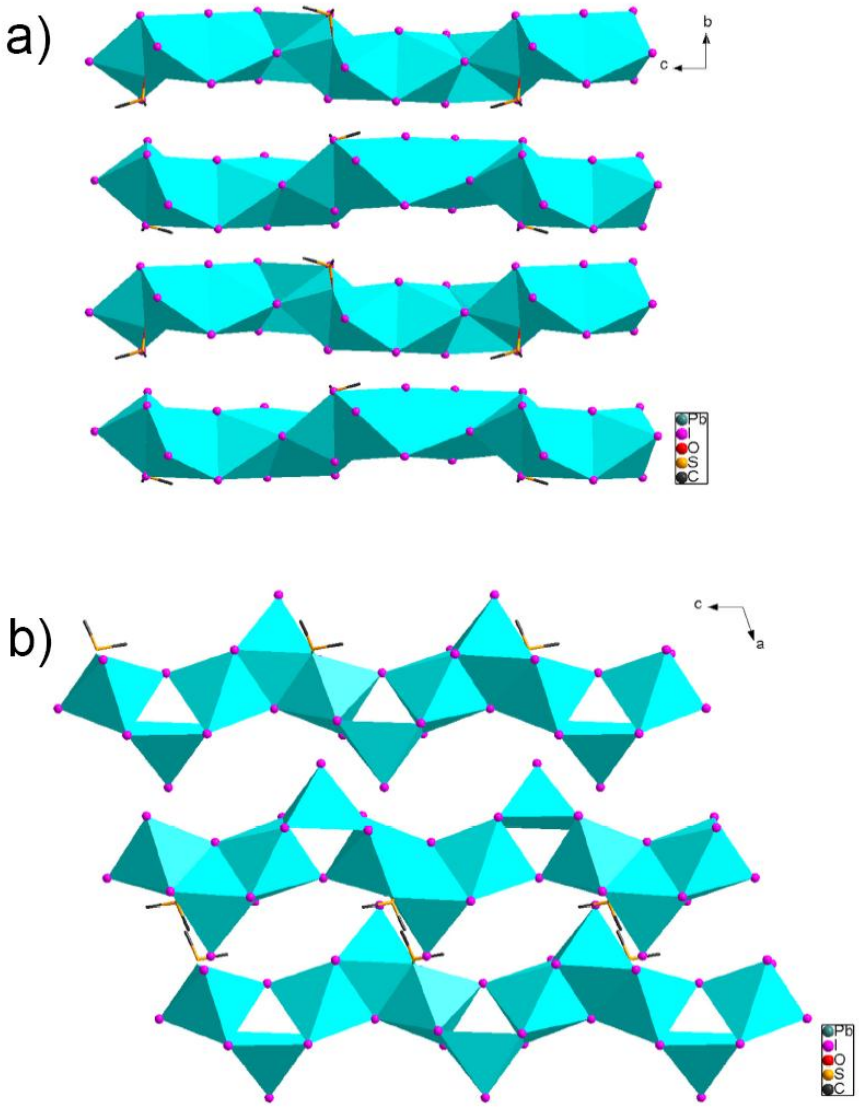

Fig. S12 Views of crystal packing of **4** (a) along the *a* axis and (b) along the *b* axis. The PbI_6 units are shown in green octahedron. The $[Ln(DMSO)_8]^{3+}$ complex cations are omitted for clarity

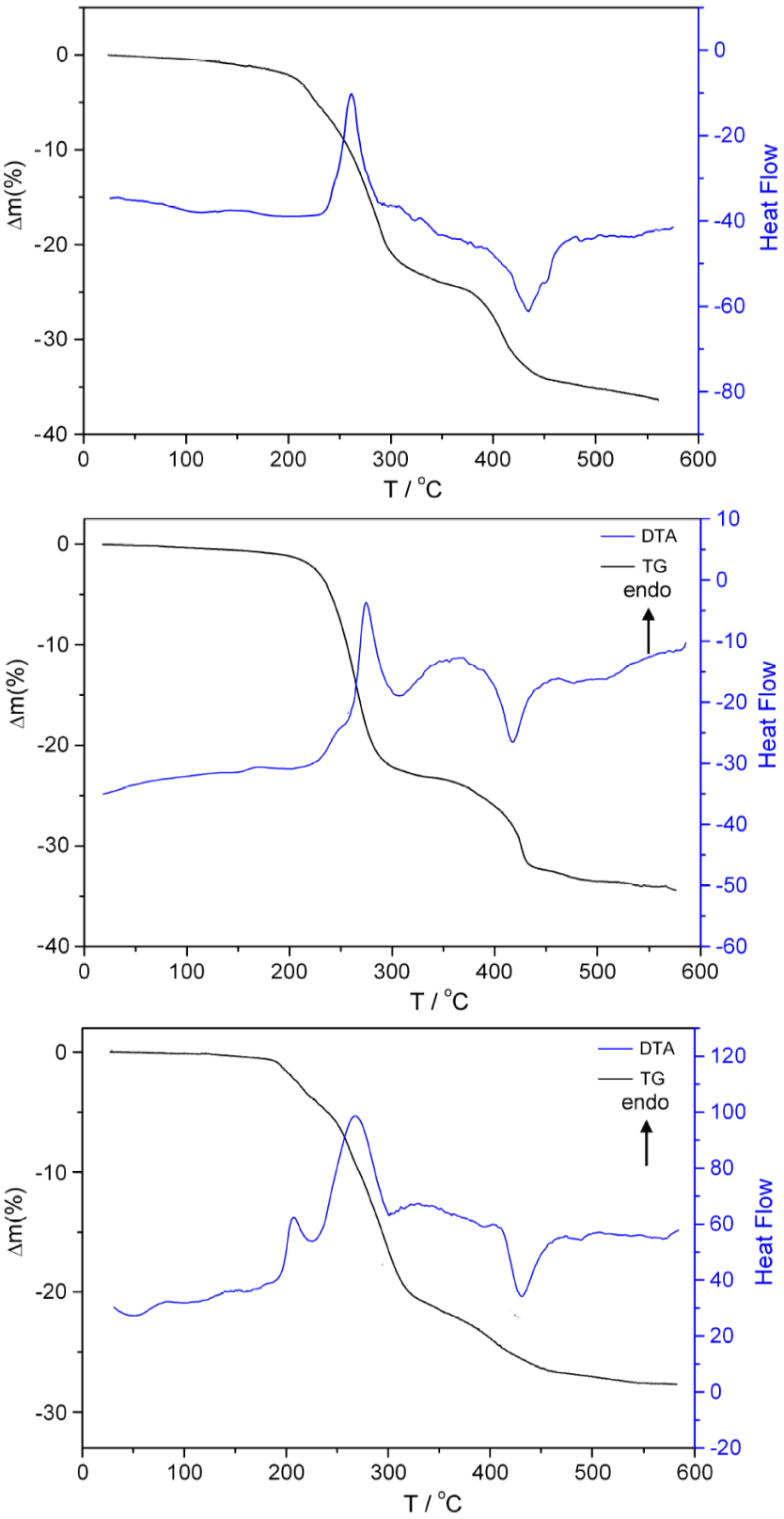

Fig. S13 TG-DTA curves of compounds **1** (top), **2** (middle), and **4** (bottom).