Electronic Supplementary Information for

Polymeric heterometallic Pb-Ag iodometallate, iodoplumbate and iodoargentate with lanthanide complex cations as Templates

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

Pb(1)–I(1)	3.2979(19)	Pb(1)–I(2)	3.2480(18)
Pb(1)–I(3)	3.2059(17)	Pb(2)–I(8)	3.010(3)
Pb(2)–I(9)#2	3.294(2)	Pb(2)–I(10)#2	3.159(3)
Pb(2)–I(11)#2	3.233(4)		
Ag(1)–I(1)	2.849(3)	Ag(1)–I(2)	2.789(3)
Ag(1)–I(4)	2.870(3)	Ag(1)–I(5)	2.873(3)
Ag(2)–I(1)	2.937(3)	Ag(2)–I(3)	2.786(3)
Ag(2)–I(4)	3.010(3)	Ag(2)–I(6)	2.818(3)
Ag(3)–I(4)	2.956(4)	Ag(3)–I(6)	2.791(4)
Ag(3)–I(7)	2.873(4)	Ag(3)–I(8)	2.854(5)
Ag(4)–I(4)	2.844(4)	Ag(4)–I(5)	2.930(4)
Ag(4)–I(7)	2.795(4)	Ag(4)–I(9)	2.947(5)
Ag(5)–I(5)	2.777(4)	Ag(5)–I(11)	2.919(5)
Ag(5)–I(9)	2.944(4)	Ag(5)–I(10)	2.930(5)
Pb(2)-Ag(5)#2	3.247(4)		
Ce(1)–O(1)	2.464(18)	Ce(1)–O(2)	2.501(18)
Ce(1)–O(3)	2.467(19)	Ce(1)–O(4)	2.546(15)
Ce(1)–O(5)	2.432(19)	Ce(1)–O(6)	2.46(2)
Ce(1)–O(7)	2.38(2)	Ce(1)–O(8)	2.504(19)
I(1)–Pb(1)–I(1)#1	89.01(5)	I(1)–Pb(1)–I(2)	180.0
I(1)–Pb(1)–I(2)#1	90.99(5)	I(1)–Pb(1)–I(3)	87.36(5)
I(1)–Pb(1)–I(3)#1	92.64(5)	I(2)–Pb(1)–I(2)#1	180.0
I(2)–Pb(1)–I(3)#1	87.86(5)	I(2)–Pb(1)–I(3)	92.14(5)
I(3)–Pb(1)–I(3)#1	180.0		

I(8)–Pb(2)–I(9)#2	170.81(8)	I(8)–Pb(2)–I(10)#2	95.50(7)
I(8)–Pb(2)–I(11)#2	93.79(8)	I(9)#2–Pb(2)–I(10)#2	93.48(6)
I(9)#2–Pb(2)–I(11)#2	84.57(7)	I(10)#2–Pb(2)–I(11)#2	87.74(9)
I(1)–Ag(1)–I(2)	108.95(9)	I(1)–Ag(1)–I(4)	116.60(9)
I(1)–Ag(1)–I(5)	107.50(10)	I(2)–Ag(1)–I(4)	103.66(10)
I(2)–Ag(1)–I(5)	118.22(10)	I(4)–Ag(1)–I(5)	102.21(8)
I(1)–Ag(2)–I(3)	103.40(9)	I(1)–Ag(2)–I(4)	109.81(9)
I(1)–Ag(2)–I(6)	111.95(11)	I(3)–Ag(2)–I(4)	108.64(10)
I(3)–Ag(2)–I(6)	119.33(10)	I(4)–Ag(2)–I(6)	103.59(9)
I(4)–Ag(3)–I(6)	105.68(11)	I(4)–Ag(3)–I(7)	110.10(12)
I(4)–Ag(3)–I(8)	96.65(13)	I(6)–Ag(3)–I(7)	117.15(15)
I(6)–Ag(3)–I(8)	116.08(13)	I(7)–Ag(3)–I(8)	109.03(13)
I(4)–Ag(4)–I(5)	101.42(12)	I(4)–Ag(4)–I(7)	115.82(13)
I(4)–Ag(4)–I(9)	98.89(14)	I(5)–Ag(4)–I(7)	123.69(16)
I(5)–Ag(4)–I(9)	110.32(13)	I(7)–Ag(4)–I(9)	104.09(13)
I(5)–Ag(5)–I(9)	114.89(13)	I(5)–Ag(5)–I(10)	106.64(15)
I(5)–Ag(5)–I(11)	130.66(17)	I(9)–Ag(5)–I(10)	106.30(13)
I(9)–Ag(5)–I(11)	97.01(15)	I(10)–Ag(5)–I(11)	98.47(12)
O(1)–Ce(1)–O(2)	75.7(7)	O(1)–Ce(1)–O(3)	100.2(7)
O(1)–Ce(1)–O(4)	70.5(7)	O(1)–Ce(1)–O(5)	141.0(7)
O(1)–Ce(1)–O(6)	83.5(8)	O(1)–Ce(1)–O(7)	144.7(7)
O(1)–Ce(1)–O(8)	75.2(7)	O(2)–Ce(1)–O(3)	67.6(6)
O(2)–Ce(1)–O(4)	120.8(7)	O(2)–Ce(1)–O(5)	135.1(7)
O(2)–Ce(1)–O(6)	147.7(7)	O(2)–Ce(1)–O(7)	81.5(8)
O(2)–Ce(1)–O(8)	74.7(7)	O(3)–Ce(1)–O(4)	72.4(6)
O(3)–Ce(1)–O(5)	78.5(7)	O(3)–Ce(1)–O(6)	141.6(6)
O(3)–Ce(1)–O(7)	95.5(7)	O(3)–Ce(1)–O(8)	141.9(7)
O(4)–Ce(1)–O(5)	72.1(7)	O(4)–Ce(1)–O(6)	73.1(7)
O(4)–Ce(1)–O(7)	144.8(7)	O(4)–Ce(1)–O(8)	135.8(7)
O(5)–Ce(1)–O(6)	75.4(7)	O(5)–Ce(1)–O(7)	73.1(7)
O(5)–Ce(1)–O(8)	128.7(8)	O(6)–Ce(1)–O(7)	103.2(8)
O(6)–Ce(1)–O(8)	76.2(7)	O(7)–Ce(1)–O(8)	73.0(7)
Pb(1)–I(1)–Ag(1)	78.75(7)	Pb(1)–I(1)–Ag(2)	80.37(7)
Ag(1)–I(1)–Ag(2)	64.98(8)	Pb(1)–I(2)–Ag(1)	80.47(7)
Pb(1)–I(3)–Ag(2)	84.28(7)	Ag(1)–I(4)–Ag(2)	63.79(7)
Ag(1)–I(4)–Ag(3)	108.97(11)	Ag(1)–I(4)–Ag(4)	75.44(10)
Ag(2)–I(4)–Ag(3)	71.23(9)	Ag(2)–I(4)–Ag(4)	104.55(12)
Ag(3)–I(4)–Ag(4)	66.13(10)	Ag(1)–I(5)–Ag(5)	127.94(11)
Ag(1)–I(5)–Ag(4)	74.09(9)	Ag(2)–I(6)–Ag(3)	76.53(10)
Ag(4)–I(5)–Ag(5)	62.76(12)	Ag(4)–I(8)–Ag(5)	60.66(11)

Ag(3)–I(7)–Ag(4)	67.89(11)	Pb(2)#2–I(8)–Ag(5)	62.43(8)
Pb(2)–I(8)–Ag(3)	85.17(9)	Pb(2)#2–I(10)–Ag(5)	64.32(9)
Pb(2)#2–I(9)–Ag(4)	109.14(10)	Pb(2)#2–I(11)–Ag(5)	63.47(10)

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

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

Pb(1)–I(1)	3.311(3)	Pb(1)–I(2)	3.214(3)
Pb(1)–I(3)	3.247(3)	Pb(2)–I(8)	3.241(5)
Pb(2)–I(9)	3.156(5)	Pb(2)–I(10)	3.295(8)
Pb(2)–I(11)	2.878(6)		
Ag(1)–I(1)	2.940(4)	Ag(1)–I(2)	2.785(5)
Ag(1)–I(4)	3.009(5)	Ag(1)–I(5)	2.837(5)
Ag(2)–I(1)	2.860(4)	Ag(2)–I(3)	2.789(5)
Ag(2)–I(4)	2.865(4)	Ag(2)–I(6)	2.869(4)
Ag(3)–I(5)	2.793(6)	Ag(3)–I(4)	2.938(6)
Ag(3)–I(7)	2.884(6)	Ag(3)–I(11)#2	2.859(9)
Ag(4)–I(4)	2.860(7)	Ag(4)–I(6)	2.957(7)
Ag(4)–I(7)	2.804 (7)	Ag(4)–I(8)	2.911(8)
Ag(5)–I(6)	2.773(7)	Ag(5)–I(8)	2.941(8)
Ag(5)–I(9)	3.018(8)	Ag(5)–I(10)	2.879(7)
Pr(1)–O(1)	2.41(3)	Pr(1)–O(2)	2.42(3)
Pr(1)–O(3)	2.44(3)	Pr(1)–O(4)	2.52(3)
Pr(1)–O(5)	2.43(3)	Pr(1)–O(6)	2.50(3)
Pr(1)–O(7)	2.49(3)	Pr(1)–O(8)	2.38(3)
I(1)–Pb(1)–I(1)#1	180.0	I(1)–Pb(1)–I(2)	87.41(7)
I(1)–Pb(1)–I(2)#1	92.59(7)	I(1)–Pb(1)–I(3)	88.89(7)
I(1)–Pb(1)–I(3)#1	91.11(7)	I(2)–Pb(1)–I(2)#1	180.0
I(2)–Pb(1)–I(3)#1	88.14(7)	I(2)–Pb(1)–I(3)	91.86(7)
I(3)–Pb(1)–I(3)#1	180.0		
I(8)–Pb(2)–I(9)	95.56(12)	I(8)–Pb(2)–I(10)	86.58(14)
I(8)–Pb(2)–I(11)	164.56(17)	I(9)–Pb(2)–I(10)	90.11(15)
I(9)–Pb(2)–I(11)	98.40(13)	I(10)–Pb(2)–I(11)	99.93(16)
I(1)–Ag(1)–I(2)	103.89(15)	I(1)–Ag(1)–I(4)	109.81(13)
I(1)–Ag(1)–I(5)	110.58(14)	I(2)–Ag(1)–I(4)	109.69(14)
I(2)–Ag(1)–I(5)	119.25(15)	I(4)–Ag(1)–I(5)	103.56(15)
I(1)–Ag(2)–I(3)	108.77(15)	I(1)–Ag(2)–I(4)	116.49(14)
I(1)–Ag(2)–I(6)	106.71(14)	I(3)–Ag(2)–I(4)	104.41(14)
I(3)–Ag(2)–I(6)	118.41(15)	I(4)–Ag(2)–I(6)	102.41(14)
I(4)–Ag(3)–I(5)	106.5(2)	I(5)–Ag(3)–I(7)	116.4(2)
I(5)–Ag(3)–I(11)#2	114.4(2)	I(4)–Ag(3)–I(7)	111.2(2)

I(4)–Ag(3)–I(11)#2	96.2(2)	I(7)–Ag(3)–I(11)#2	110.2(3)
I(4)–Ag(4)–I(6)	100.4(2)	I(4)–Ag(4)–I(7)	116.0(2)
I(4)–Ag(4)–I(8)	101.3(2)	I(6)–Ag(4)–I(7)	118.9(2)
I(6)–Ag(4)–I(8)	110.3(2)	I(7)–Ag(4)–I(8)	108.5(3)
I(6)–Ag(5)–I(8)	114.8(2)	I(6)–Ag(5)–I(9)	103.1(2)
I(6)–Ag(5)–I(10)	128.8(3)	I(8)–Ag(5)–I(9)	105.3(2)
I(8)–Ag(5)–I(10)	100.7(3)	I(9)–Ag(5)–I(10)	101.5(2)
O(1)–Pr(1)–O(2)	75.3(11)	O(1)–Pr(1)–O(3)	127.5(9)
O(1)–Pr(1)–O(4)	135.7(12)	O(1)–Pr(1)–O(5)	75.8(9)
O(1)–Pr(1)–O(6)	141.7(13)	O(1)–Pr(1)–O(7)	75.5(12)
O(1)–Pr(1)–O(8)	72.5(12)	O(2)–Pr(1)–O(3)	77.6(10)
O(2)–Pr(1)–O(4)	72.9(10)	O(2)–Pr(1)–O(5)	82.3(10)
O(2)–Pr(1)–O(6)	143.0(11)	O(2)–Pr(1)–O(7)	147.1(10)
O(2)–Pr(1)–O(8)	106.1(12)	O(3)–Pr(1)–O(4)	73.9(11)
O(3)–Pr(1)–O(5)	142.5(10)	O(3)–Pr(1)–O(6)	75.6(10)
O(3)–Pr(1)–O(7)	133.4(10)	O(3)–Pr(1)–O(8)	73.1(11)
O(4)–Pr(1)–O(5)	70.1(10)	O(4)–Pr(1)–O(6)	75.4(11)
O(4)–Pr(1)–O(7)	120.6(10)	O(4)–Pr(1)–O(8)	146.2(12)
O(5)–Pr(1)–O(6)	104.4(9)	O(5)–Pr(1)–O(7)	76.1(10)
O(5)–Pr(1)–O(8)	143.7(11)	O(6)–Pr(1)–O(7)	67.7(11)
O(6)–Pr(1)–O(8)	90.0(12)	O(7)–Pr(1)–O(8)	79.1(11)
Pb(1)–I(1)–Ag(1)	79.99(10)	Pb(1)–I(1)–Ag(2)	78.71(10)
Ag(1)–I(1)–Ag(2)	64.59(11)	Pb(1)–I(2)–Ag(1)	84.02(10)
Pb(1)–I(3)–Ag(2)	80.83(10)	Ag(1)–I(4)–Ag(2)	63.64(11)
Ag(1)–I(4)–Ag(3)	70.81(16)	Ag(1)–I(4)–Ag(4)	105.92(17)
Ag(2)–I(4)–Ag(3)	107.32(19)	Ag(2)–I(4)–Ag(4)	76.32(17)
Ag(3)–I(4)–Ag(4)	65.45(17)	Ag(2)–I(6)–Ag(5)	128.42(19)
Ag(2)–I(6)–Ag(4)	74.75(16)	Ag(1)–I(5)–Ag(3)	75.48(17)
Ag(4)–I(6)–Ag(5)	63.3(2)	Ag(4)–I(8)–Ag(5)	61.92(17)
Ag(3)–I(7)–Ag(4)	66.88(18)	Pb(2)–I(8)–Ag(5)	60.40(16)
Pb(2)–I(8)–Ag(4)	108.04(15)	Pb(2)–I(10)–Ag(5)	60.27(18)
Pb(2)–I(9)–Ag(5)	60.65(16)	Pb(2)–I(11)–Ag(3)#2	90.72(19)

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

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

Pb(1)–I(1)	3.2352(15)	Pb(1)–I(2)	3.2063(14)
Pb(1)–I(3)	3.2933(19)	Pb(2)–I(1)	3.1602(16)
Pb(2)–I(2)	3.2271(19)	Pb(2)–I(3)	3.1723(13)
Pb(2)–I(4)	3.1994(19)	Pb(2)–I(5)	3.2060(14)
Pb(2)–I(8)	3.3072(13)	Pb(3)–I(3)	3.6455(18)
Pb(3)–I(4)	3.4627(15)	Pb(3)–I(5)	3.3899(18)
Pb(3)–I(6)	3.0339(16)	Pb(3)–I(7)	3.025(2)
Pb(3)–I(9)	3.1642(15)	Pb(4)–I(4)	3.2945(14)
Pb(4)–I(5)	3.2207(15)	Pb(4)–I(8)	3.2777(18)
Pb(4)–I(9)	3.3085(18)	Pb(4)–I(10)	3.1301(14)
Pb(4)–I(11)	3.1993(15)	Pb(5)–I(8)	3.2674(14)
Pb(5)–I(10)	3.3405(16)	Pb(5)–I(11)	3.319(2)
Pb(5)–I(12)	3.1776(19)	Pb(5)–I(13)	3.1384(15)
Pb(5)–I(14)	3.1731(14)	Pb(6)–I(12)	3.2665(15)
Pb(6)–I(13)	3.2880(15)	Pb(6)–I(15)	3.2896(15)
Pb(6)–I(16)	3.2057(14)	Pb(6)–I(17)	2.9745(18)
Pb(7)–I(14)	3.2896(13)	Pb(7)–I(15)	3.1748(15)
Pb(7)–I(16)	3.1683(18)	Pb(7)–I(18)	3.1757(13)
Pb(7)–I(19)	3.2573(15)	Pb(7)–I(20)	3.2713(19)
Pb(8)–I(18)	3.1459(19)	Pb(8)–I(19)	3.2101(15)
Pb(8)–I(20)	3.2018(15)	Pb(8)–I(21)	3.2498(15)
Pb(8)–I(22)	3.2961(15)	Pb(8)–I(23)	3.343(2)
Pb(9)–I(21)	3.2053(18)	Pb(9)–I(22)	3.2252(15)
Pb(9)–I(23)	3.1214(14)	Pb(9)–I(24)	3.195(2)
Pb(9)–I(25)	3.1979(15)	Pb(10)–I(23)	3.4724(18)
Pb(10)–I(24)	3.4956(18)	Pb(10)–I(25)	3.4679(18)
Pb(10)–I(26)	3.2157(16)	Pb(10)–I(27)	3.0096(19)
Pb(10)–I(28)	2.955(2)	Pb(11)–I(24)	3.1983(15)
Pb(11)–I(25)	3.2593(15)	Pb(11)–I(26)	3.2363(18)
Pb(11)–I(29)	3.1884(15)	Pb(11)–I(30)	3.1841(16)
Pb(11)–I(31)#2	3.252(2)	Pb(12)–I(29)	3.2085(16)
Pb(12)–I(30)	3.2102(15)	Pb(12)–I(31)	3.2784(17)
Pr(1)–O(1)	2.620(11)	Pr(1)–O(2)	2.422(12)
Pr(1)–O(3)	2.464(10)	Pr(1)–O(4)	2.484(9)
Pr(1)–O(5)	2.438(12)	Pr(1)–O(6)	2.617(11)
Pr(1)–O(7)	2.456(11)	Pr(1)–O(8)	2.467(11)
Pr(1)–O(9)	2.538(16)	Pr(2)–O(10)	2.464(10)
Pr(2)–O(11)	2.444(10)	Pr(2)–O(12)	2.458(10)
Pr(2)–O(13)	2.544(11)	Pr(2)–O(14)	2.633(15)

Pr(2)–O(15)	2.422(14)	Pr(2)–O(16)	2.635(13)
Pr(2)–O(17)	2.422(13)	Pr(2)–O(18)	2.464(13)
Pr(3)–O(19)	2.385(11)	Pr(3)–O(20)	2.527(11)
Pr(3)–O(21)	2.395(13)	Pr(3)–O(22)	2.485(10)
Pr(3)–O(23)	2.435(11)	Pr(3)–O(24)	2.482(14)
Pr(3)–O(25)	2.347(12)	Pr(3)–O(26)	2.430(10)
I(1)–Pb(1)–I(1)#1	180.00(3)	I(1)–Pb(1)–I(2)	90.22(4)
I(1)–Pb(1)–I(2)#1	89.78(4)	I(1)–Pb(1)–I(3)	85.90(4)
I(1)–Pb(1)–I3)#1	94.10(4)	I(2)–Pb(1)–I(2)#1	180.00(4)
I(2)–Pb(1)–I(3)	83.69(4)	I(2)–Pb(1)–I(3)#1	96.31(4)
I(3)–Pb(1)–I(3)#1	180.00(3)	I(1)–Pb(2)–I(2)	91.19(5)
I(1)–Pb(2)–I(3)	89.25(4)	I(1)–Pb(2)–I(4)	93.34(4)
I(1)–Pb(2)–I(5)	178.94(3)	I(1)–Pb(2)–I(8)	97.93(4)
I(2)–Pb(2)–I(3)	85.32(5)	I(2)–Pb(2)–I(4)	170.62(4)
I(2)–Pb(2)–I(5)	88.05(4)	I(2)–Pb(2)–I(8)	105.25(5)
I(3)–Pb(2)–I(4)	86.54(5)	I(3)–Pb(2)–I(5)	89.94(4)
I(3)–Pb(2)–I(8)	167.00(4)	I(4)–Pb(2)–I(5)	87.30(4)
I(4)–Pb(2)–I(8)	82.26(4)	I(5)–Pb(2)–I(8)	83.00(4)
I(3)–Pb(3)–I(4)	75.77(4)	I(3)–Pb(3)–I(5)	79.60(5)
I(3)–Pb(3)–I(6)	96.18(5)	I(3)–Pb(3)–I(7)	101.55(5)
I(3)–Pb(3)–I(9)	154.28(3)	I(4)–Pb(3)–I(5)	80.35(3)
I(4)–Pb(3)–I(6)	165.52(5)	I(4)–Pb(3)–I(7)	91.01(5)
I(4)–Pb(3)–I(9)	83.16(4)	I(5)–Pb(3)–I(6)	86.41(4)
I(5)–Pb(3)–I(7)	170.77(4)	I(5)–Pb(3)–I(9)	82.50(4)
I(6)–Pb(3)–I(7)	102.50(5)	I(6)–Pb(3)–I(9)	100.99(4)
I(7)–Pb(3)–I(9)	93.30(5)	I(4)–Pb(4)–I(5)	85.46(3)
I(4)–Pb(4)–I(8)	81.28(4)	I(4)–Pb(4)–I(9)	83.66(4)
I(4)–Pb(4)–I(10)	168.66(4)	I(4)–Pb(4)–I(11)	99.04(4)
I(5)–Pb(4)–I(8)	83.24(4)	I(5)–Pb(4)–I(9)	82.95(4)
I(5)–Pb(4)–I(10)	86.53(4)	I(5)–Pb(4)–I(11)	166.64(4)
I(8)–Pb(4)–I(9)	160.29(3)	I(8)–Pb(4)–I(10)	89.82(4)
I(8)–Pb(4)–I(11)	85.02(4)	I(9)–Pb(4)–I(10)	103.30(4)
I(9)–Pb(4)–I(11)	109.96(4)	I(10)–Pb(4)–I(11)	87.08(4)
I(8)–Pb(5)–I(10)	86.43(3)	I(8)–Pb(5)–I(11)	83.29(4)
I(8)–Pb(5)–I(12)	95.85(4)	I(8)–Pb(5)–I(13)	85.18(4)
I(8)–Pb(5)–I(14)	174.95(3)	I(10)–Pb(5)–I(11)	81.81(4)
I(10)–Pb(5)–I(12)	94.07(4)	I(10)–Pb(5)–I(13)	171.45(3)
I(10)–Pb(5)–I(14)	97.44(4)	I(11)–Pb(5)–I(12)	175.82(3)
I(11)–Pb(5)–I(13)	95.56(4)	I(11)–Pb(5)–I(14)	94.02(4)
I(12)–Pb(6)–I(13)	84.44(3)	I(12)–Pb(6)–I(15)	164.88(4)
I(12)–Pb(6)–I(16)	91.52(4)	I(12)–Pb(6)–I(17)	99.41(5)

I(13)–Pb(6)–I(15)	97.07(4)	I(13)–Pb(6)–I(16)	165.15(4)
I(13)–Pb(6)–I(17)	96.72(4)	I(15)–Pb(6)–I(16)	83.19(3)
I(15)–Pb(6)–I(17)	95.36(4)	I(16)–Pb(6)–I(17)	98.04(4)
I(14)–Pb(7)–I(15)	91.04(4)	I(14)–Pb(7)–I(16)	87.22(4)
I(14)–Pb(7)–I(18)	176.65(4)	I(14)–Pb(7)–I(19)	93.08(4)
I(14)–Pb(7)–I(20)	90.22(4)	I(15)–Pb(7)–I(16)	85.67(4)
I(15)–Pb(7)–I(18)	90.17(4)	I(15)–Pb(7)–I(19)	175.47(3)
I(15)–Pb(7)–I(20)	95.29(4)	I(16)–Pb(7)–I(18)	95.99(5)
I(16)–Pb(7)–I(19)	92.67(4)	I(16)–Pb(7)–I(20)	177.28(3)
I(18)–Pb(7)–I(19)	85.81(4)	I(18)–Pb(7)–I(20)	86.56(4)
I(19)–Pb(7)–I(20)	86.55(4)	I(18)–Pb(8)–I(19)	87.11(4)
I(18)–Pb(8)–I(20)	88.27(4)	I(18)–Pb(8)–I(21)	96.24(4)
I(18)–Pb(8)–I(22)	92.03(4)	I(18)–Pb(8)–I(23)	176.12(3)
I(19)–Pb(8)–I(20)	88.53(4)	I(19)–Pb(8)–I(21)	90.99(4)
I(19)–Pb(8)–I(22)	179.13(4)	I(19)–Pb(8)–I(23)	95.92(4)
I(20)–Pb(8)–I(21)	175.44(4)	I(20)–Pb(8)–I(22)	91.36(4)
I(20)–Pb(8)–I(23)	94.23(4)	I(21)–Pb(8)–I(22)	89.18(4)
I(21)–Pb(8)–I(23)	81.31(4)	I(22)–Pb(8)–I(23)	84.95(4)
I(21)–Pb(9)–I(22)	91.23(4)	I(21)–Pb(9)–I(23)	85.51(5)
I(21)–Pb(9)–I(24)	167.36(4)	I(21)–Pb(9)–I(25)	91.47(4)
I(22)–Pb(9)–I(23)	89.86(4)	I(22)–Pb(9)–I(24)	89.21(4)
I(22)–Pb(9)–I(25)	176.55(4)	I(23)–Pb(9)–I(24)	81.86(5)
I(23)–Pb(9)–I(25)	88.19(4)	I(24)–Pb(9)–I(25)	87.69(4)
I(23)–Pb(10)–I(24)	72.87(4)	I(23)–Pb(10)–I(25)	78.64(5)
I(23)–Pb(10)–I(26)	153.00(4)	I(23)–Pb(10)–I(27)	99.64(5)
I(23)–Pb(10)–I(28)	98.76(6)	I(24)–Pb(10)–I(25)	78.98(4)
I(24)–Pb(10)–I(26)	83.73(4)	I(24)–Pb(10)–I(27)	166.62(5)
I(24)–Pb(10)–I(28)	91.04(10)	I(25)–Pb(10)–I(26)	83.90(5)
I(25)–Pb(10)–I(27)	88.76(4)	I(25)–Pb(10)–I(28)	170.01(10)
I(26)–Pb(10)–I(27)	100.42(5)	I(26)–Pb(10)–I(28)	94.87(7)
I(27)–Pb(10)–I(28)	101.21(11)	I(24)–Pb(11)–I(25)	86.58(4)
I(24)–Pb(11)–I(26)	88.35(4)	I(24)–Pb(11)–I(29)	85.17(4)
I(24)–Pb(11)–I(30)	173.21(4)	I(24)–Pb(11)–I(31)#2	88.81(5)
I(25)–Pb(11)–I(26)	87.02(5)	I(25)–Pb(11)–I(29)	163.59(4)
I(25)–Pb(11)–I(30)	98.33(4)	I(25)–Pb(11)–I(31)#2	80.74(5)
I(26)–Pb(11)–I(29)	106.88(5)	I(26)–Pb(11)–I(30)	96.55(4)
I(26)–Pb(11)–I(31)#2	167.57(4)	I(29)–Pb(11)–I(30)	88.90(4)
I(29)–Pb(11)–I(31)#2	84.93(5)	I(30)–Pb(11)–I(31)#2	87.37(5)
I(29)–Pb(12)–I(29)#2	180.00(4)	I(29)–Pb(12)–I(30)	88.10(4)
I(29)–Pb(12)–I(30)#2	91.90(4)	I(29)–Pb(12)–I(31)	95.83(5)
I(29)–Pb(12)–I(31)#2	84.17(5)	I(30)–Pb(12)–I(30)#2	180.000(1)
I(30)–Pb(12)–I(31)	93.52(4)	I(30)–Pb(12)–I(31)#2	86.48(4)

I(31)–Pb(12)–I(31)#2	180.00(4)	Pb(1)–I(1)–Pb(2)	74.28(4)
Pb(1)–I(2)–Pb(2)	73.78(4)	Pb(1)–I(3)–Pb(2)	73.32(4)
Pb(1)–I(3)–Pb(3)	150.78(4)	Pb(2)–I(3)–Pb(3)	77.72(4)
Pb(2)–I(4)–Pb(3)	80.15(4)	Pb(2)–I(4)–Pb(4)	79.15(4)
Pb(3)–I(4)–Pb(4)	78.06(3)	Pb(2)–I(5)–Pb(3)	81.18(4)
Pb(2)–I(5)–Pb(4)	80.15(3)	Pb(3)–I(5)–Pb(4)	80.14(4)
Pb(2)–I(8)–Pb(4)	77.86(3)	Pb(2)–I(8)–Pb(5)	152.36(4)
Pb(4)–I(8)–Pb(5)	76.18(3)	Pb(3)–I(9)–Pb(4)	82.22(4)
Pb(4)–I(10)–Pb(5)	77.14(3)	Pb(4)–I(11)–Pb(5)	76.53(3)
Pb(5)–I(12)–Pb(6)	77.71(3)	Pb(5)–I(13)–Pb(6)	77.94(3)
Pb(5)–I(14)–Pb(7)	146.75(4)	Pb(6)–I(15)–Pb(7)	77.45(3)
Pb(6)–I(16)–Pb(7)	78.77(3)	Pb(7)–I(18)–Pb(8)	75.89(4)
Pb(7)–I(19)–Pb(8)	73.88(3)	Pb(7)–I(20)–Pb(8)	73.80(4)
Pb(8)–I(21)–Pb(9)	74.98(4)	Pb(8)–I(22)–Pb(9)	74.08(3)
Pb(8)–I(23)–Pb(9)	74.77(4)	Pb(8)–I(23)–Pb(10)	157.71(4)
Pb(9)–I(23)–Pb(10)	82.96(4)	Pb(9)–I(24)–Pb(10)	81.55(4)
Pb(9)–I(24)–Pb(11)	81.23(4)	Pb(10)–I(24)–Pb(11)	76.61(4)
Pb(9)–I(25)–Pb(10)	81.94(4)	Pb(9)–I(25)–Pb(11)	80.25(4)
Pb(10)–I(25)–Pb(11)	76.24(4)	Pb(10)–I(26)–Pb(11)	80.20(4)
Pb(11)–I(29)–Pb(12)	75.72(3)	Pb(11)–I(30)–Pb(12)	75.76(3)
Pb(11)#2–I(31)–Pb(12)	73.91(4)		
O(1)–Pr(1)–O(2)	69.0(4)	O(1)–Pr(1)–O(3)	69.2(4)
O(1)–Pr(1)–O(4)	69.6(3)	O(1)–Pr(1)–O(5)	66.9(4)
O(1)–Pr(1)–O(6)	119.2(4)	O(1)–Pr(1)–O(7)	138.0(3)
O(1)–Pr(1)–O(8)	135.1(4)	O(1)–Pr(1)–O(9)	120.8(5)
O(2)–Pr(1)–O(3)	90.7(4)	O(2)–Pr(1)–O(4)	138.6(4)
O(2)–Pr(1)–O(5)	79.3(4)	O(2)–Pr(1)–O(6)	133.8(4)
O(2)–Pr(1)–O(7)	139.0(4)	O(2)–Pr(1)–O(8)	77.0(4)
O(2)–Pr(1)–O(9)	70.2(5)	O(3)–Pr(1)–O(4)	77.0(3)
O(3)–Pr(1)–O(5)	135.7(4)	O(3)–Pr(1)–O(6)	135.4(3)
O(3)–Pr(1)–O(7)	78.5(4)	O(3)–Pr(1)–O(8)	140.9(4)
O(3)–Pr(1)–O(9)	70.4(5)	O(4)–Pr(1)–O(5)	82.6(4)
O(4)–Pr(1)–O(6)	67.8(3)	O(4)–Pr(1)–O(7)	77.6(3)
O(4)–Pr(1)–O(8)	134.9(4)	O(4)–Pr(1)–O(9)	136.9(5)
O(5)–Pr(1)–O(6)	66.4(4)	O(5)–Pr(1)–O(7)	134.4(4)
O(5)–Pr(1)–O(8)	78.8(4)	O(5)–Pr(1)–O(9)	140.5(5)
O(6)–Pr(1)–O(7)	68.1(4)	O(6)–Pr(1)–O(8)	67.1(4)
O(6)–Pr(1)–O(9)	119.9(5)	O(7)–Pr(1)–O(8)	86.8(4)
O(7)–Pr(1)–O(9)	69.0(5)	O(8)–Pr(1)–O(9)	70.5(5)
O(10)–Pr(2)–O(11)	137.0(4)	O(10)–Pr(2)–O(12)	136.8(4)
O(10)–Pr(2)–O(13)	136.9(4)	O(10)–Pr(2)–O(14)	69.4(4)

O(10)–Pr(2)–O(15)	85.7(4)	O(10)–Pr(2)–O(16)	69.2(4)
O(10)–Pr(2)–O(17)	79.2(4)	O(10)–Pr(2)–O(18)	76.4(4)
O(11)–Pr(2)–O(12)	77.2(4)	O(11)–Pr(2)–O(13)	70.5(4)
O(11)–Pr(2)–O(14)	134.0(4)	O(11)–Pr(2)–O(15)	75.3(5)
O(11)–Pr(2)–O(16)	67.9(4)	O(11)–Pr(2)–O(17)	86.2(4)
O(11)–Pr(2)–O(18)	141.2(4)	O(12)–Pr(2)–O(13)	69.4(4)
O(12)–Pr(2)–O(14)	67.4(4)	O(12)–Pr(2)–O(15)	79.0(4)
O(12)–Pr(2)–O(16)	136.1(4)	O(12)–Pr(2)–O(17)	138.5(4)
O(12)–Pr(2)–O(18)	88.0(4)	O(13)–Pr(2)–O(14)	119.3(5)
O(13)–Pr(2)–O(15)	137.4(4)	O(13)–Pr(2)–O(16)	119.1(4)
O(13)–Pr(2)–O(17)	69.2(4)	O(13)–Pr(2)–O(18)	70.8(4)
O(14)–Pr(2)–O(15)	70.0(6)	O(14)–Pr(2)–O(16)	121.5(5)
O(14)–Pr(2)–O(17)	139.7(5)	O(14)–Pr(2)–O(18)	67.2(6)
O(15)–Pr(2)–O(16)	67.4(5)	O(15)–Pr(2)–O(17)	133.1(5)
O(15)–Pr(2)–O(18)	137.0(5)	O(16)–Pr(2)–O(17)	65.7(5)
O(16)–Pr(2)–O(18)	135.9(4)	O(17)–Pr(2)–O(18)	81.7(6)
O(19)–Pr(3)–O(20)	71.4(4)	O(19)–Pr(3)–O(21)	90.8(5)
O(19)–Pr(3)–O(22)	143.4(4)	O(19)–Pr(3)–O(23)	143.1(4)
O(19)–Pr(3)–O(24)	74.6(4)	O(19)–Pr(3)–O(25)	99.2(5)
O(19)–Pr(3)–O(26)	77.7(4)	O(20)–Pr(3)–O(21)	73.6(5)
O(20)–Pr(3)–O(22)	73.9(4)	O(20)–Pr(3)–O(23)	143.9(4)
O(20)–Pr(3)–O(24)	127.0(5)	O(20)–Pr(3)–O(25)	73.4(5)
O(20)–Pr(3)–O(26)	133.7(4)	O(21)–Pr(3)–O(22)	68.5(4)
O(21)–Pr(3)–O(23)	107.5(5)	O(21)–Pr(3)–O(24)	146.1(5)
O(21)–Pr(3)–O(25)	140.2(5)	O(21)–Pr(3)–O(26)	73.2(4)
O(22)–Pr(3)–O(23)	73.4(3)	O(22)–Pr(3)–O(24)	138.1(4)
O(22)–Pr(3)–O(25)	81.5(4)	O(22)–Pr(3)–O(26)	120.8(4)
O(23)–Pr(3)–O(24)	72.5(4)	O(23)–Pr(3)–O(25)	87.0(5)
O(23)–Pr(3)–O(26)	77.5(4)	O(24)–Pr(3)–O(25)	73.3(5)
O(24)–Pr(3)–O(26)	73.9(5)	O(25)–Pr(3)–O(26)	146.6(5)

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

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

Ag(1)–I(1)	2.897(4)	Ag(1)–I(1)#2	2.917(4)
Ag(1)–I(2)#1	2.843(5)	Ag(1)–I(3)	2.828(4)
Ag(2)–I(1)	3.017(4)	Ag(2)–I(3)	2.830(4)
Ag(2)–I(4)	2.925(4)	Ag(2)–I(5)	2.788(4)
Ag(3)–I(2)	2.775(4)	Ag(3)–I(4)	2.848(4)
Ag(3)–I(4)#3	2.905(4)	Ag(3)–I(1)#3	2.981(4)
Ag(2)–Ag(3)#3	3.066(5)		
Ce(1)–O(1)	2.41(2)	Ce(1)–O(2)	2.39(3)
Ce(1)–O(3)	2.50(2)	Ce(1)–O(4)	2.39(2)
I(1)–Ag(1)–I(3)	109.24(14)	I(1)–Ag(1)–I(1)#1	103.19(13)
I(1)–Ag(1)–I(2)#2	111.41(15)	I(3)–Ag(1)–I(1)#1	106.49(14)
I(3)–Ag(1)–I(2)#2	119.17(15)	I(1)#1–Ag(1)–I(2)#2	105.96(14)
I(1)–Ag(2)–I(5)	96.32(11)	I(1)–Ag(2)–I(4)	116.42(13)
I(1)–Ag(2)–I(3)	105.92(13)	I(5)–Ag(2)–I(4)	114.27(13)
I(5)–Ag(2)–I(3)	125.69(14)	I(4)–Ag(2)–I(3)	99.08(12)
I(2)–Ag(3)–I(1)#3	106.00(13)	I(2)–Ag(3)–I(4)	123.37(14)
I(2)–Ag(3)–I(4)#3	114.10(14)	I(1)#3–Ag(3)–I(4)	99.39(12)
I(1)#3–Ag(3)–I(4)#3	118.20(13)	I(4)–Ag(3)–I(4)#3	95.65(12)
Ag(1)–I(1)–Ag(2)	70.30(11)	Ag(1)–I(1)–Ag(3)#3	104.47(13)
Ag(1)–I(1)–Ag(1)#2	76.81(13)	Ag(1)#2–I(1)–Ag(3)#3	71.52(11)
Ag(2)–I(1)–Ag(1)#2	111.21(12)	Ag(2)–I(1)–Ag(3)#3	61.47(10)
Ag(1)#4–I(2)–Ag(3)	75.70(12)	Ag(2)–I(3)–Ag(1)	74.02(12)
Ag(2)–I(4)–Ag(3)	103.62(12)	Ag(3)#3–I(4)–Ag(2)	63.45(10)
Ag(3)#3–I(4)–Ag(3)	83.40(12)	Ag(2)#3–I(5)–Ag(2)	94.65(17)
O(1)–Ce(1)–O(2)	75.3(10)	O(1)–Ce(1)–O(3)	133.3(8)
O(1)–Ce(1)–O(4)	144.8(10)	O(1)–Ce(1)–O(1)#5	126.4(13)
O(1)–Ce(1)–O(2)#5	70.5(10)	O(1)–Ce(1)–O(3)#5	73.4(8)
O(1)–Ce(1)–O(4)#5	77.6(10)	O(2)–Ce(1)–O(3)	143.5(10)
O(2)–Ce(1)–O(4)	93.0(11)	O(2)–Ce(1)–O(2)#5	98.8(17)
O(2)–Ce(1)–O(3)#5	76.9(10)	O(2)–Ce(1)–O(4)#5	144.7(11)
O(3)–Ce(1)–O(4)	73.9(10)	O(3)–Ce(1)–O(4)#5	71.6(10)
O(3)–Ce(1)–O(3)#5	127.4(12)	O(4)–Ce(1)–O(4)#5	96.2(15)

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

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

Ag(1)–I(1)	2.935(4)	Ag(1)–I(1)#1	2.900(4)
Ag(1)–I(2)	2.840(4)	Ag(1)–I(3)	2.827(4)
Ag(2)–I(1)	2.976(3)	Ag(2)–I(2)	2.794(3)
Ag(2)–I(4)	2.900(3)	Ag(2)–I(4)#2	2.855(4)
Ag(3)–I(1)	3.011(3)	Ag(3)–I(3)#1	2.838(3)
Ag(3)–I(4)	2.916(3)	Ag(3)–I(5)	2.799(3)
Ag(1)–Ag(3)#1	3.378(4)		
Pr(1)–O(1)	2.44(2)	Pr(1)–O(2)	2.40(2)
Pr(1)–O(3)	2.52(2)	Pr(1)–O(4)	2.43(2)
I(1)–Ag(1)–I(2)	106.55(11)	I(1)–Ag(1)–I(3)	105.91(12)
I(1)–Ag(1)–I(1)#1	101.84(11)	I(2)–Ag(1)–I(3)	119.30(13)
I(2)–Ag(1)–I(1)#1	111.63(13)	I(3)–Ag(1)–I(1)#1	109.92(11)
I(1)–Ag(2)–I(2)	106.67(11)	I(1)–Ag(2)–I(4)	118.13(10)
I(1)–Ag(2)–I(4)#2	99.40(10)	I(2)–Ag(2)–I(4)	114.41(12)
I(2)–Ag(2)–I(4)#2	122.34(12)	I(4)–Ag(2)–I(4)#2	95.55(10)
I(1)–Ag(3)–I(3)#1	106.55(10)	I(1)–Ag(3)–I(4)	116.49(10)
I(1)–Ag(3)–I(5)	96.16(9)	I(3)#1–Ag(3)–I(4)	98.76(10)
I(3)#1–Ag(3)–I(5)	125.57(11)	I(4)–Ag(3)–I(5)	114.26(11)
Ag(1)–I(1)–Ag(2)	70.91(9)	Ag(1)–I(1)–Ag(3)	111.18(10)
Ag(1)–I(1)–Ag(1)#1	78.16(11)	Ag(2)–I(1)–Ag(3)	61.47(8)
Ag(2)–I(1)–Ag(1)#1	104.41(11)	Ag(3)–I(1)–Ag(1)#1	69.68(9)
Ag(1)–I(2)–Ag(2)	74.98(10)	Ag(3)#2–I(3)–Ag(1)	73.22(10)
Ag(2)#2–I(4)–Ag(2)	83.49(10)	Ag(2)#2–I(4)–Ag(3)	103.76(10)
Ag(2)–I(4)–Ag(3)	63.48(9)	Ag(3)#2–I(5)–Ag(3)	94.50(14)
O(1)–Pr(1)–O(2)	77.9(9)	O(1)–Pr(1)–O(3)	133.9(7)
O(1)–Pr(1)–O(4)	75.3(8)	O(1)–Pr(1)–O(1)#3	125.4(13)
O(1)–Pr(1)–O(2)#3	145.1(8)	O(1)–Pr(1)–O(3)#3	72.9(7)
O(1)–Pr(1)–O(4)#3	70.1(8)	O(2)–Pr(1)–O(3)	72.5(8)
O(2)–Pr(1)–O(4)	144.8(8)	O(2)–Pr(1)–O(2)#3	96.5(12)
O(2)–Pr(1)–O(3)#3	73.8(8)	O(2)–Pr(1)–O(4)#3	92.6(9)
O(3)–Pr(1)–O(4)	142.5(8)	O(3)–Pr(1)–O(4)#3	76.8(8)
O(3)–Pr(1)–O(3)#3	128.4(11)	O(4)–Pr(1)–O(4)#3	99.2(12)

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

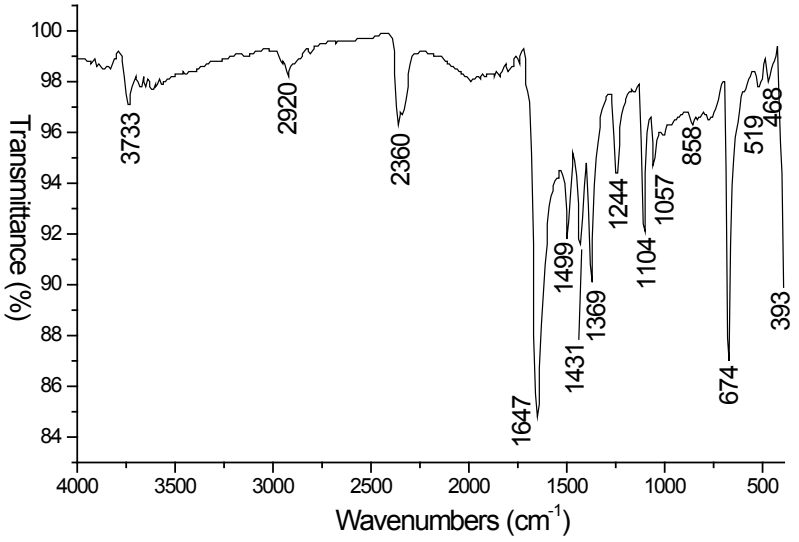


Figure S1. IR spectrum of complex **1**.

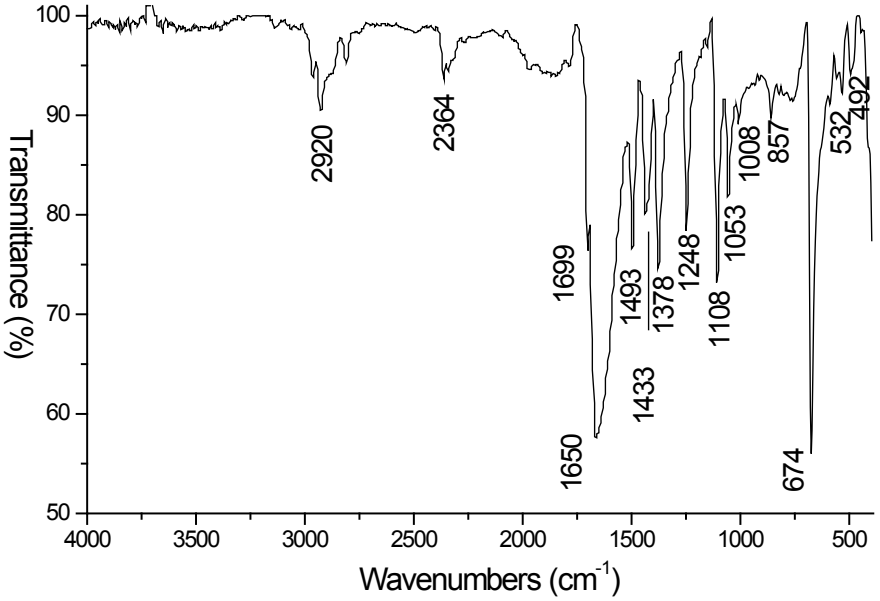


Figure S2. IR spectrum of complex **2**.

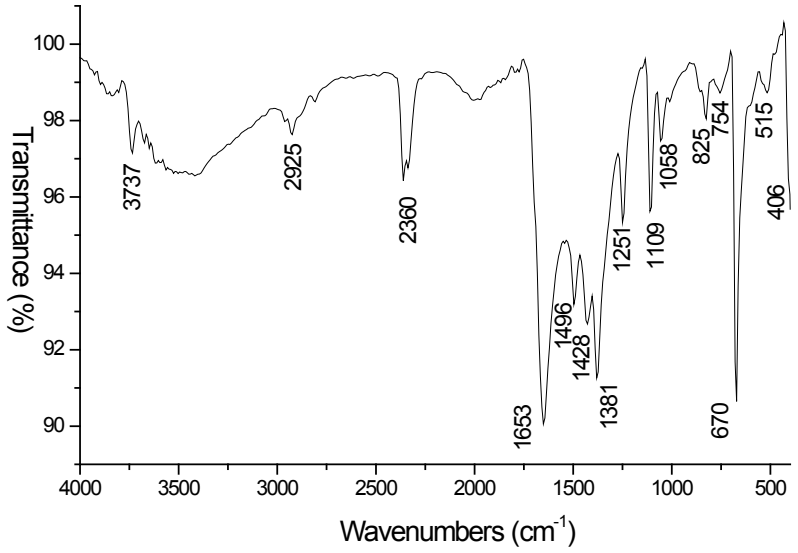


Figure S3. IR spectrum of complex **3**.

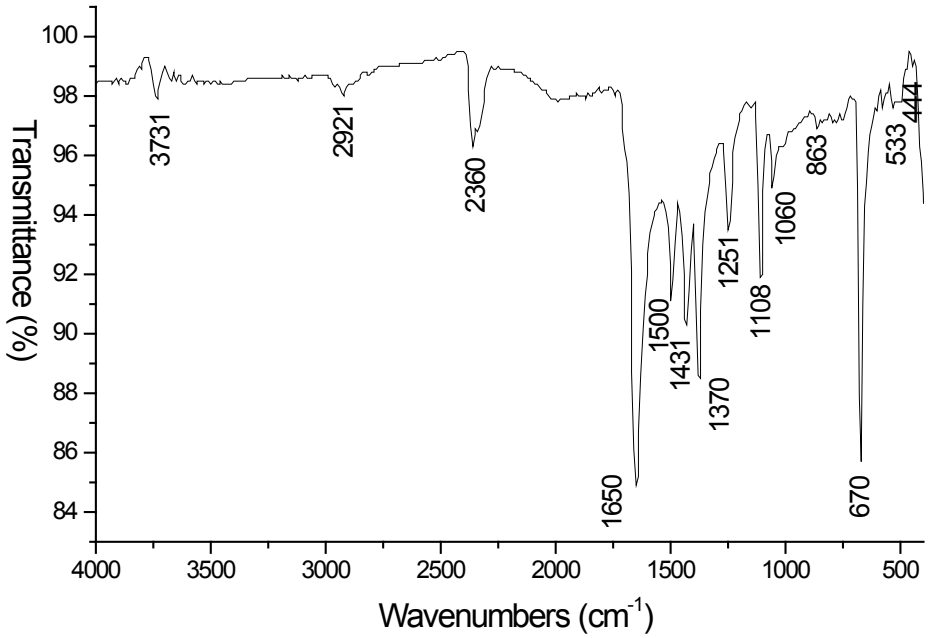


Figure S4. IR spectrum of complex **4**.

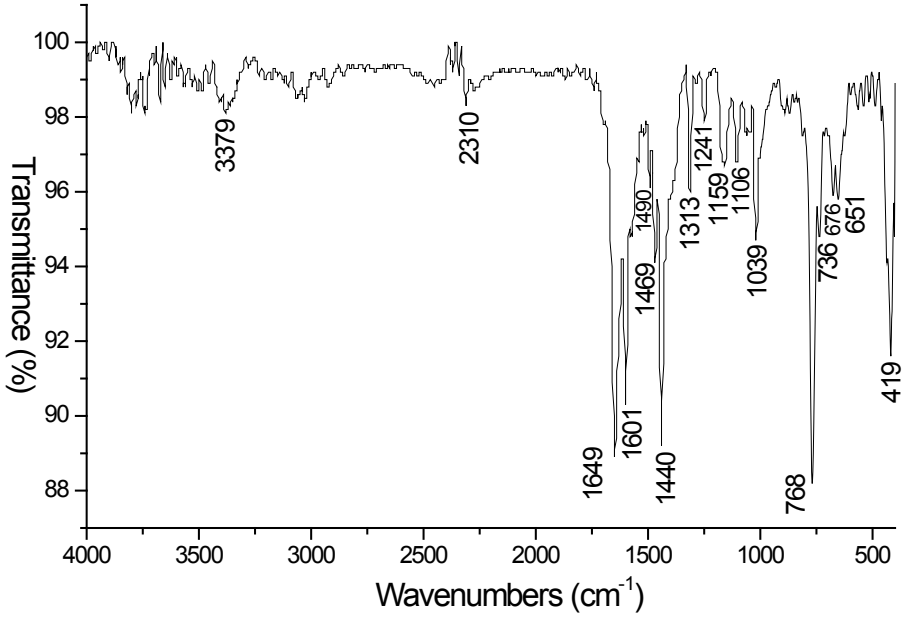


Figure S5. IR spectrum of complex **5**.

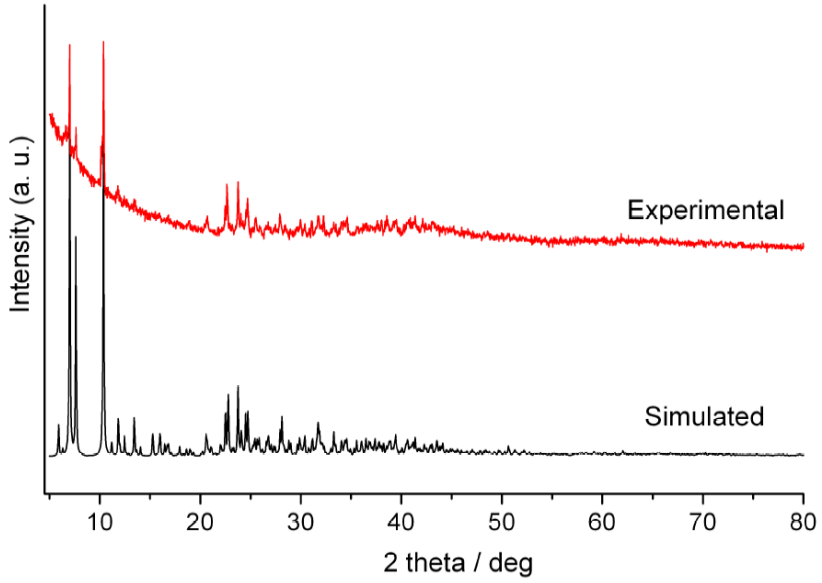


Figure S6. Powder X-Ray diffraction pattern (red) of the polycrystalline sample of complex **1** and the simulated pattern (black) base on the single crystal data.

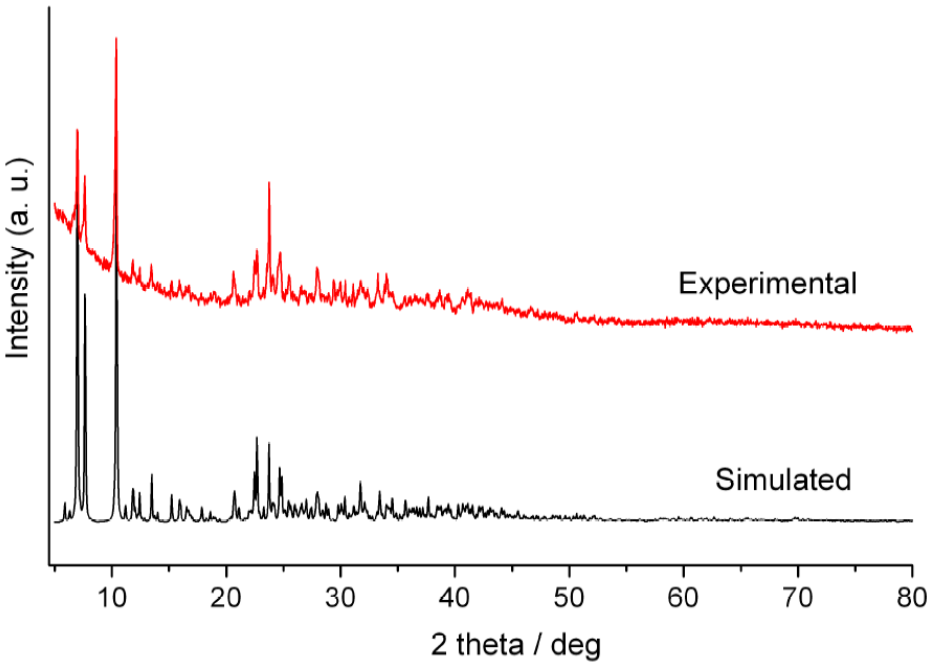


Figure S7. Powder X-Ray diffraction pattern (red) of the polycrystalline sample of complex **2** and the simulated pattern (black) base on the single crystal data.

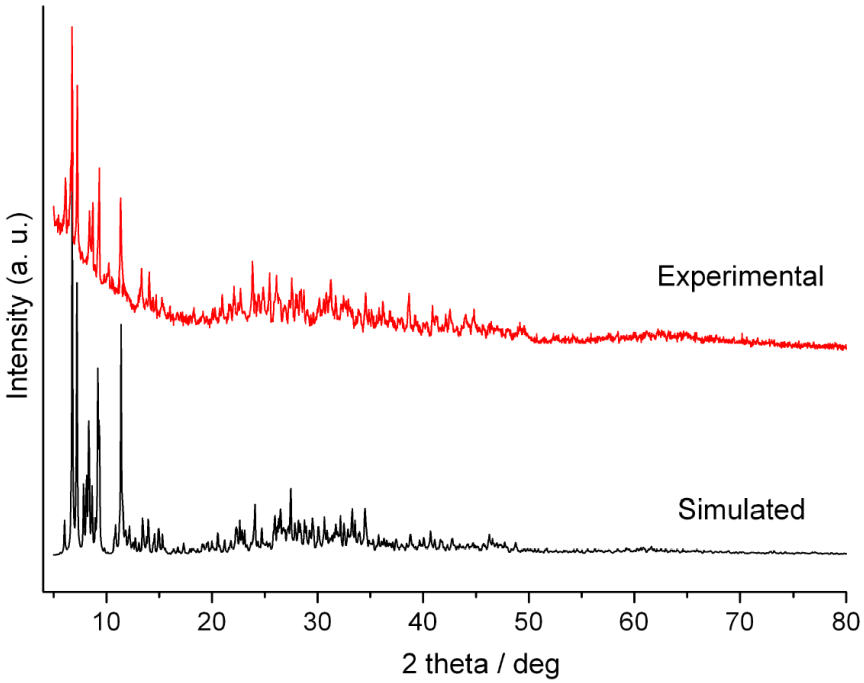


Figure S8. Powder X-Ray diffraction pattern (red) of the polycrystalline sample of complex **3** and the simulated pattern (black) base on the single crystal data.

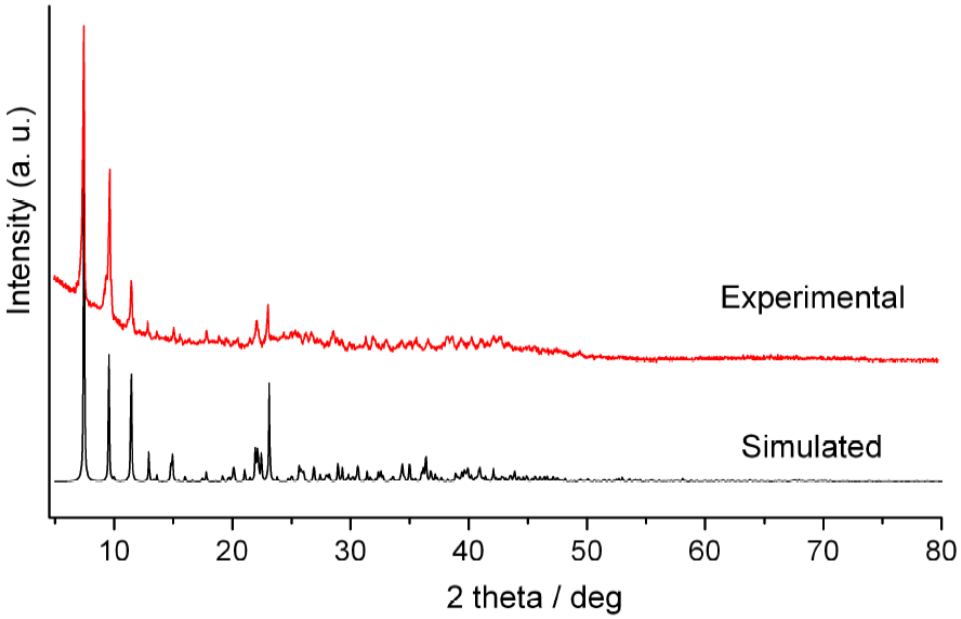


Figure S9. Powder X-Ray diffraction pattern (red) of the polycrystalline sample of complex **4** and the simulated pattern (black) base on the single crystal data.

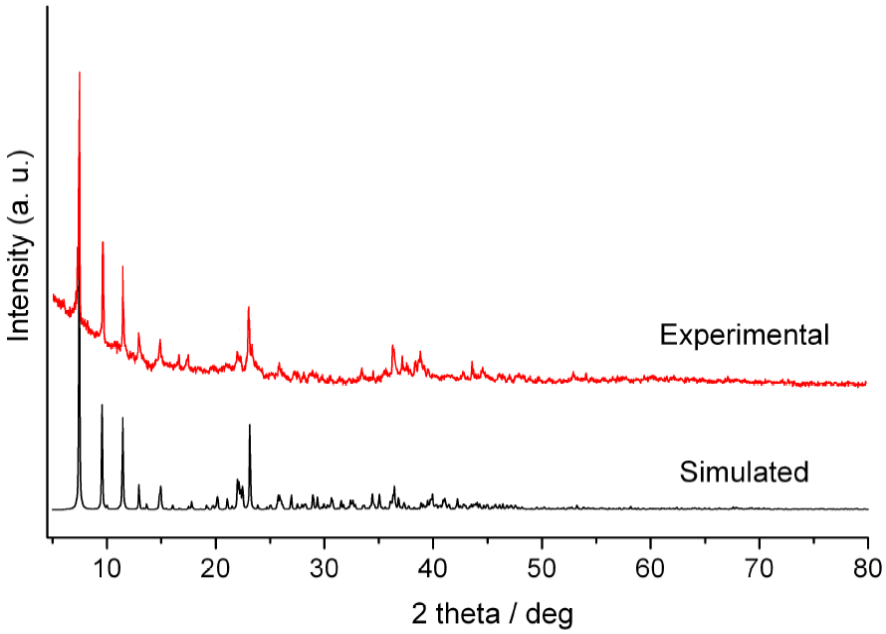


Figure S10. Powder X-Ray diffraction pattern (red) of the polycrystalline sample of complex **5** and the simulated pattern (black) base on the single crystal data.

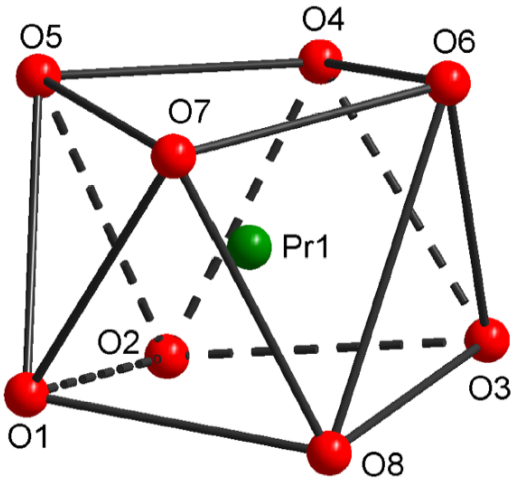


Figure S11. The distorted square antiprism of PrO_8 in **2**.

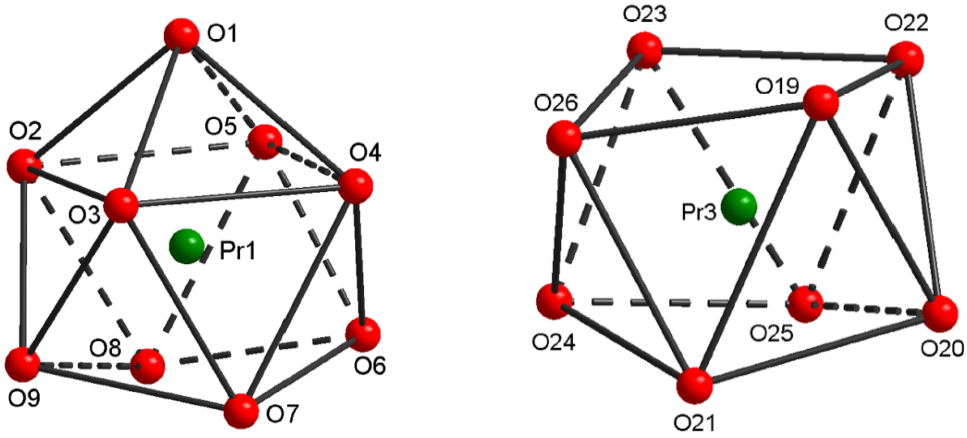
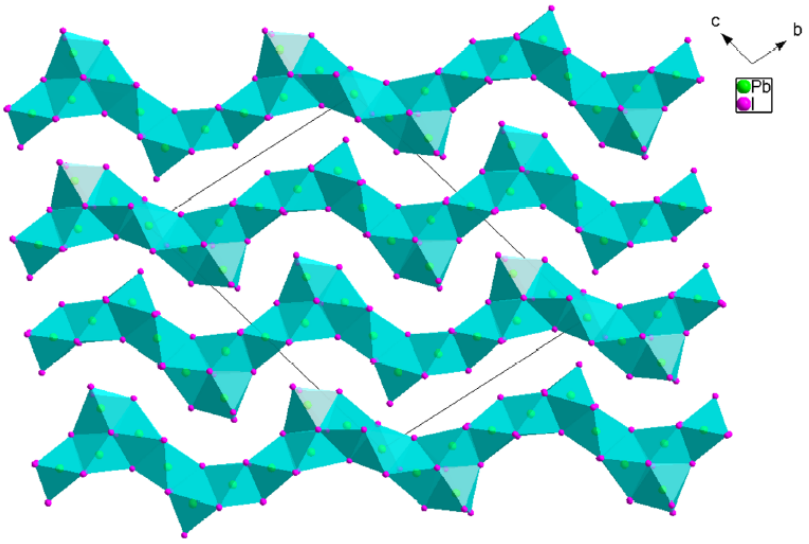


Figure S12. The distorted monocapped square antiprism PrO_9 (right) in $[Pr(1)(DMF)_9]^{3+}$ and square antiprism PrO_8 (left) in $[Pr(3)(DMF)_8]^{3+}$ of **3**.



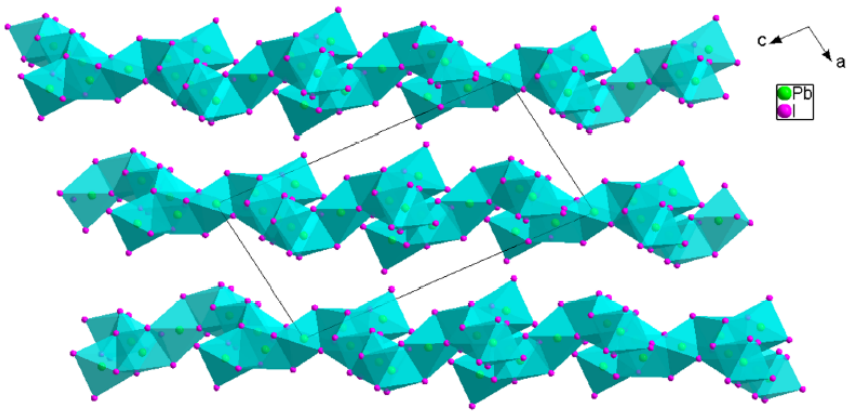


Figure S13. View of **3** along the *a* (top) and *b* axis (bottom). The $[Pr(DMF)_9]^{3+}$ and $[Pr(DMF)_8]^{3+}$ cations are omitted for clarity.

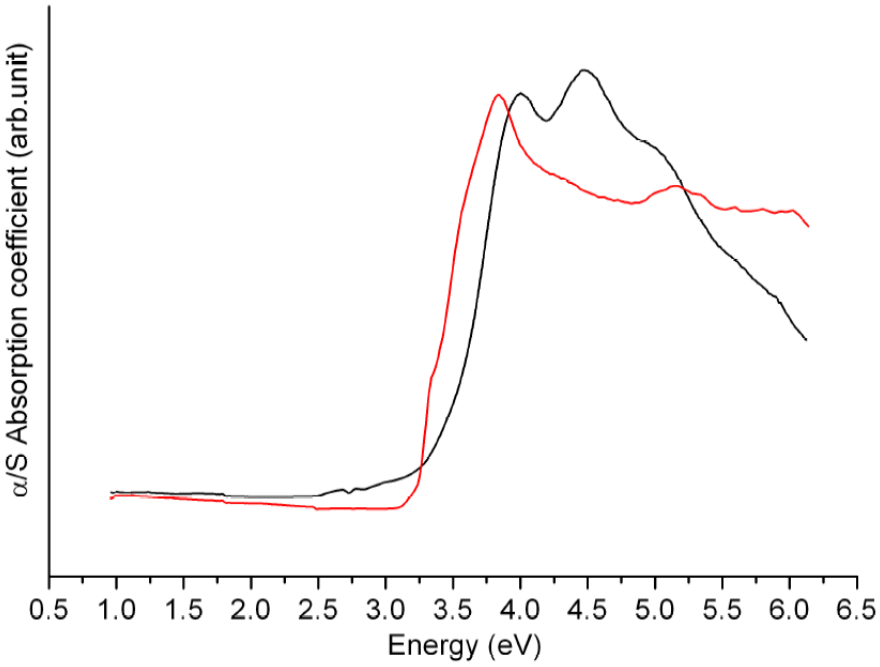
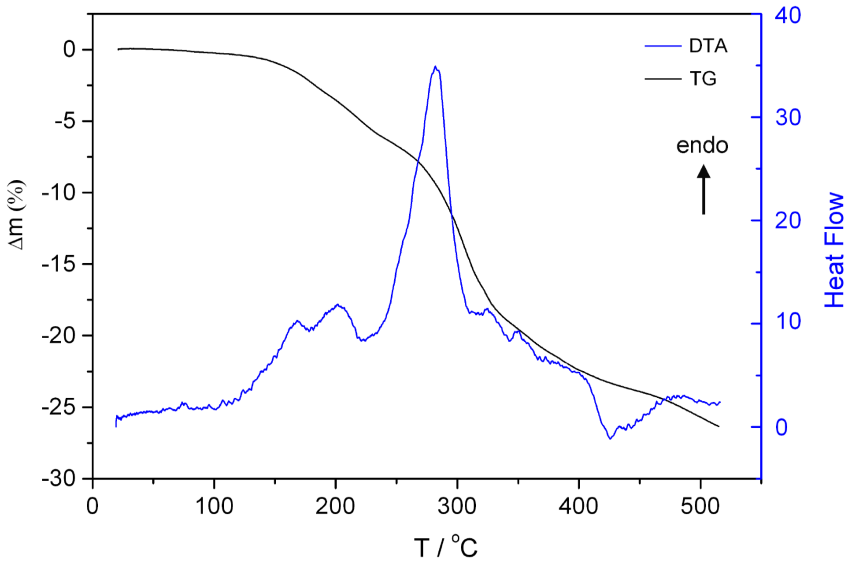
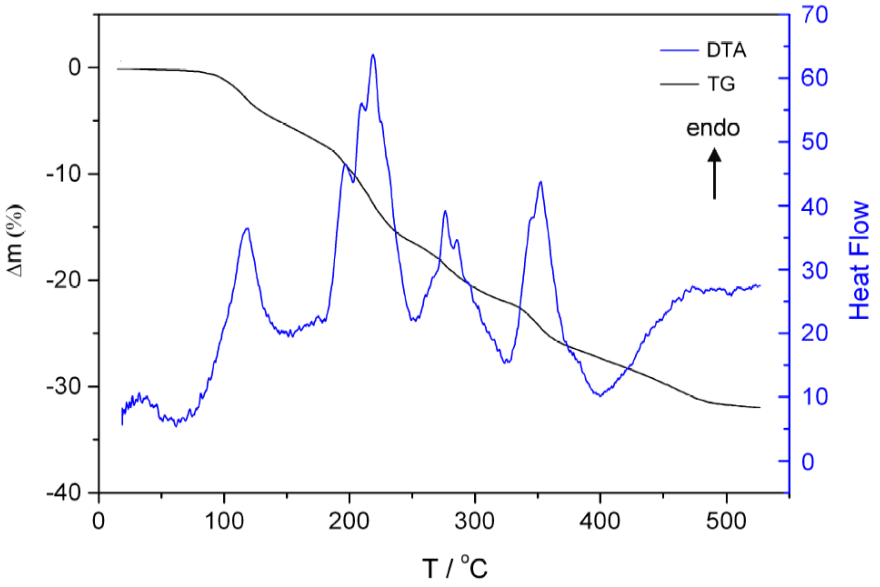


Figure S14. Solid state optical absorption spectra of **4** (black) and **5** (red).





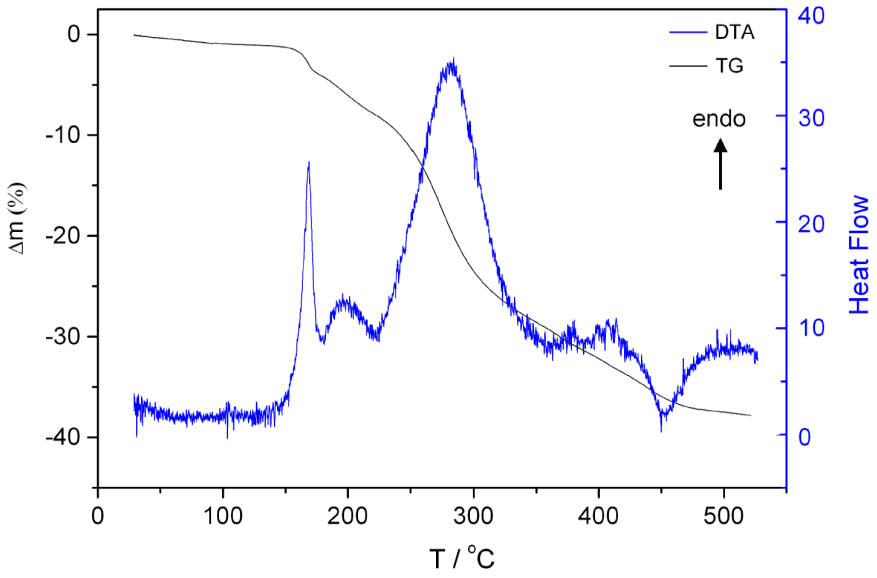


Figure S15. TG-DTA curves of compounds **2** (top), **3** (middle), and **5** (bottom).