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Syntheses, structures, luminescence and magnetic properties of seven isomorphous metal-organic frameworks based on 2,7-bis(4-benzoic acid)-N-(4-benzoic acid) carbazole

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Table S1. Selected bond lengths (Å) and angles (deg) for **TCZ-M** (**M** = Nd, Sm, Eu, Gd, Tb, Dy, Ho).

TCZ-Nd			
Nd(1)-O(6)#1	2.371(6)	Nd(1)-O(1)	2.479(5)
Nd(1)-O(7A)	2.373(6)	Nd(1)-O(2)	2.528(6)
Nd(1)-O(7)	2.373(6)	Nd(1)-O(4)#3	2.545(5)
Nd(1)-O(5)#2	2.430(5)	Nd(1)-O(2)	2.528(6)
Nd(1)-O(8)	2.460(6)	Nd(1)-O(4)#3	2.545(5)
Nd(1)-O(3)#3	2.469(6)		
O(6)#1-Nd(1)-O(7A)	157.5(2)	O(8)-Nd(1)-O(1)	135.0(2)
O(6)#1-Nd(1)-O(7)	157.5(2)	O(3)#3-Nd(1)-O(1)	87.41(19)
O(6)#1-Nd(1)-O(5)#2	112.9(2)	O(6)#1-Nd(1)-O(2)	122.35(19)
O(7)-Nd(1)-O(5)#2	75.6(2)	O(7A)-Nd(1)-O(2)	79.3(2)
O(6)#1-Nd(1)-O(8)	78.6(2)	O(7)-Nd(1)-O(2)	79.3(2)
O(7A)-Nd(1)-O(8)	83.2(2)	O(5)#2-Nd(1)-O(2)	77.0(2)
O(7)-Nd(1)-O(8)	83.2(2)	O(8)-Nd(1)-O(2)	152.45(19)
O(5)#2-Nd(1)-O(8)	78.1(2)	O(3)#3-Nd(1)-O(2)	73.46(19)
O(6)#1-Nd(1)-O(3)#3	91.7(2)	O(1)-Nd(1)-O(2)	52.0(2)
O(7)-Nd(1)-O(3)#3	89.0(2)	O(6)#1-Nd(1)-O(4)#3	83.6(2)
O(5)#2-Nd(1)-O(3)#3	148.8(2)	O(7)-Nd(1)-O(4)#3	79.2(2)
O(8)-Nd(1)-O(3)#3	127.58(19)	O(5)#2-Nd(1)-O(4)#3	145.33(19)
O(6)#1-Nd(1)-O(1)	72.47(19)	O(8)-Nd(1)-O(4)#3	75.62(19)
O(7A)-Nd(1)-O(1)	130.0(2)	O(3)#3-Nd(1)-O(4)#3	52.04(18)
O(7)-Nd(1)-O(1)	130.0(2)	O(1)-Nd(1)-O(4)#3	132.34(17)
O(5)#2-Nd(1)-O(1)	82.3(2)	O(2)-Nd(1)-O(4)#3	121.1(2)
Symmetry transformations used to generate equivalent atoms:			

#1 x,-y-1/2,z+1/2; #2 -x+1,y+1/2,-z+3/2;
#3 -x,-y,-z+2; #4 -x+1,y-1/2,-z+3/2;
#5 x,-y-1/2,z-1/2

TCZ-Sm			
Sm(1)-O(4)#1	2.332(5)	Sm(1)-O(2)	2.441(5)
Sm(1)-O(7A)	2.338(6)	Sm(1)-O(5)#3	2.452(5)
Sm(1)-O(7)	2.338(6)	Sm(1)-O(1)	2.509(5)
Sm(1)-O(3)#2	2.397(5)	Sm(1)-O(6)#3	2.513(5)
Sm(1)-O(8)	2.428(5)		
O(4)#1-Sm(1)-O(7A)	156.8(2)	O(8)-Sm(1)-O(5)#3	128.25(17)
O(4)#1-Sm(1)-O(7)	156.8(2)	O(2)-Sm(1)-O(5)#3	87.38(18)
O(4)#1-Sm(1)-O(3)#2	111.27(19)	O(4)#1-Sm(1)-O(1)	122.71(18)
O(7)-Sm(1)-O(3)#2	76.9(2)	O(7A)-Sm(1)-O(1)	79.78(19)
O(4)#1-Sm(1)-O(8)	77.94(18)	O(7)-Sm(1)-O(1)	79.78(19)
O(7A)-Sm(1)-O(8)	83.20(19)	O(3)#2-Sm(1)-O(1)	77.91(19)
O(7)-Sm(1)-O(8)	83.20(19)	O(8)-Sm(1)-O(1)	152.07(18)
O(3)#2-Sm(1)-O(8)	76.76(19)	O(2)-Sm(1)-O(1)	52.40(16)
O(4)#1-Sm(1)-O(2)	72.53(17)	O(5)#3-Sm(1)-O(1)	74.16(18)
O(7A)-Sm(1)-O(2)	130.70(19)	O(4)#1-Sm(1)-O(6)#3	83.24(18)
O(7)-Sm(1)-O(2)	130.70(19)	O(7)-Sm(1)-O(6)#3	79.1(2)
O(3)#2-Sm(1)-O(2)	81.55(19)	O(3)#2-Sm(1)-O(6)#3	145.34(18)
O(8)-Sm(1)-O(2)	133.57(17)	O(8)-Sm(1)-O(6)#3	75.91(17)
O(4)#1-Sm(1)-O(5)#3	90.42(19)	O(2)-Sm(1)-O(6)#3	133.06(17)
O(7)-Sm(1)-O(5)#3	90.7(2)	O(5)#3-Sm(1)-O(6)#3	52.56(16)
O(3)#2-Sm(1)-O(5)#3	151.06(18)	O(1)-Sm(1)-O(6)#3	121.69(17)

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

TCZ-Eu			
Eu(1)-O(4)#1	2.314(4)	Eu(1)-O(2)	2.429(4)
Eu(1)-O(7)	2.325(4)	Eu(1)-O(5)#3	2.436(4)
Eu(1)-O(7A)	2.325(4)	Eu(1)-O(1)	2.500(4)
Eu(1)-O(3)#2	2.386(3)	Eu(1)-O(6)#3	2.506(4)
Eu(1)-O(8)	2.418(3)		
O(4)#1-Eu(1)-O(7)	156.60(14)	O(8)-Eu(1)-O(5)#3	128.15(13)
O(4)#1-Eu(1)-O(7A)	156.60(14)	O(2)-Eu(1)-O(5)#3	87.63(13)
O(4)#1-Eu(1)-O(3)#2	110.45(14)	O(4)#1-Eu(1)-O(1)	122.86(13)
O(7A)-Eu(1)-O(3)#2	77.79(15)	O(7)-Eu(1)-O(1)	79.79(14)

O(4)#1-Eu(1)-O(8)	77.63(13)	O(7A)-Eu(1)-O(1)	79.79(14)
O(7)-Eu(1)-O(8)	83.30(14)	O(3)#2-Eu(1)-O(1)	78.13(13)
O(7A)-Eu(1)-O(8)	83.30(14)	O(8)-Eu(1)-O(1)	152.38(13)
O(3)#2-Eu(1)-O(8)	77.05(14)	O(2)-Eu(1)-O(1)	52.76(12)
O(4)#1-Eu(1)-O(2)	72.45(12)	O(5)#3-Eu(1)-O(1)	74.02(13)
O(7)-Eu(1)-O(2)	130.95(14)	O(4)#1-Eu(1)-O(6)#3	83.31(13)
O(7A)-Eu(1)-O(2)	130.95(14)	O(7A)-Eu(1)-O(6)#3	78.93(14)
O(3)#2-Eu(1)-O(2)	80.64(14)	O(3)#2-Eu(1)-O(6)#3	145.87(13)
O(8)-Eu(1)-O(2)	133.15(13)	O(8)-Eu(1)-O(6)#3	75.74(12)
O(4)#1-Eu(1)-O(5)#3	90.38(13)	O(2)-Eu(1)-O(6)#3	133.40(12)
O(7A)-Eu(1)-O(5)#3	90.85(14)	O(5)#3-Eu(1)-O(6)#3	52.66(12)
O(3)#2-Eu(1)-O(5)#3	151.38(13)	O(1)-Eu(1)-O(6)#3	121.52(13)

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

TCZ-Gd			
Gd(1)-O(3)#1	2.279(3)	Gd(1)-O(5)	2.409(4)
Gd(1)-O(7A)	2.298(4)	Gd(1)-O(2)#3	2.409(4)
Gd(1)-O(7)	2.298(4)	Gd(1)-O(1)#3	2.482(4)
Gd(1)-O(4)#2	2.348(3)	Gd(1)-O(6)	2.485(3)
Gd(1)-O(8)	2.385(4)		
O(3)#1-Gd(1)-O(7A)	156.89(14)	O(8)-Gd(1)-O(2)#3	132.86(12)
O(3)#1-Gd(1)-O(7)	156.89(14)	O(5)-Gd(1)-O(2)#3	87.52(13)
O(3)#1-Gd(1)-O(4)#2	110.25(13)	O(3)#1-Gd(1)-O(1)#3	123.40(13)
O(7)-Gd(1)-O(4)#2	78.20(14)	O(7)-Gd(1)-O(1)#3	78.87(13)
O(3)#1-Gd(1)-O(8)	77.56(13)	O(4)#2-Gd(1)-O(1)#3	78.22(13)
O(7A)-Gd(1)-O(8)	83.81(14)	O(8)-Gd(1)-O(1)#3	152.19(13)
O(7)-Gd(1)-O(8)	83.81(14)	O(5)-Gd(1)-O(1)#3	74.20(12)
O(4)#2-Gd(1)-O(8)	77.04(14)	O(2)#3-Gd(1)-O(1)#3	53.42(12)
O(3)#1-Gd(1)-O(5)	89.63(13)	O(3)#1-Gd(1)-O(6)	82.97(13)
O(7A)-Gd(1)-O(5)	91.24(13)	O(7A)-Gd(1)-O(6)	79.15(14)
O(7)-Gd(1)-O(5)	91.24(13)	O(7)-Gd(1)-O(6)	79.15(14)
O(4)#2-Gd(1)-O(5)	151.91(13)	O(4)#2-Gd(1)-O(6)	145.79(13)
O(8)-Gd(1)-O(5)	128.12(12)	O(8)-Gd(1)-O(6)	75.32(12)
O(3)#1-Gd(1)-O(2)#3	72.45(12)	O(5)-Gd(1)-O(6)	53.13(11)
O(7)-Gd(1)-O(2)#3	130.66(13)	O(2)#3-Gd(1)-O(6)	133.79(12)
O(4)#2-Gd(1)-O(2)#3	80.26(14)	O(1)#3-Gd(1)-O(6)	121.71(12)

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

TCZ-Tb			
Tb(1)-O(4)#1	2.283(4)	Tb(1)-O(2)#3	2.408(4)
Tb(1)-O(7A)	2.298(4)	Tb(1)-O(5)	2.409(4)
Tb(1)-O(7)	2.298(4)	Tb(1)-O(1)#3	2.474(4)
Tb(1)-O(3)#2	2.351(4)	Tb(1)-O(6)	2.489(4)
Tb(1)-O(8)	2.391(4)		
O(4)#1-Tb(1)-O(7A)	156.67(17)	O(8)-Tb(1)-O(5)	128.30(15)
O(4)#1-Tb(1)-O(7)	156.67(17)	O(2)#3-Tb(1)-O(5)	87.34(15)
O(4)#1-Tb(1)-O(3)#2	110.15(16)	O(4)#1-Tb(1)-O(1)#3	123.44(15)
O(7)-Tb(1)-O(3)#2	78.24(17)	O(7)-Tb(1)-O(1)#3	79.13(16)
O(4)#1-Tb(1)-O(8)	77.62(15)	O(3)#2-Tb(1)-O(1)#3	77.98(16)
O(7A)-Tb(1)-O(8)	83.51(16)	O(8)-Tb(1)-O(1)#3	151.81(15)
O(7)-Tb(1)-O(8)	83.51(16)	O(2)#3-Tb(1)-O(1)#3	53.07(14)
O(3)#2-Tb(1)-O(8)	76.85(16)	O(5)-Tb(1)-O(1)#3	74.39(14)
O(4)#1-Tb(1)-O(2)#3	72.64(14)	O(4)#1-Tb(1)-O(6)	83.03(15)
O(7)-Tb(1)-O(2)#3	130.69(16)	O(7A)-Tb(1)-O(6)	79.02(16)
O(3)#2-Tb(1)-O(2)#3	80.43(16)	O(7)-Tb(1)-O(6)	79.02(16)
O(8)-Tb(1)-O(2)#3	133.16(15)	O(3)#2-Tb(1)-O(6)	145.79(16)
O(4)#1-Tb(1)-O(5)	89.91(15)	O(8)-Tb(1)-O(6)	75.48(14)
O(7A)-Tb(1)-O(5)	91.12(16)	O(2)#3-Tb(1)-O(6)	133.64(14)
O(7)-Tb(1)-O(5)	91.12(16)	O(5)-Tb(1)-O(6)	53.12(14)
O(3)#2-Tb(1)-O(5)	151.81(15)	O(1)#3-Tb(1)-O(6)	121.96(15)

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

TCZ-Dy			
Dy(1)-O(4)#1	2.266(4)	Dy(1)-O(6)#3	2.393(4)
Dy(1)-O(7A)	2.299(4)	Dy(1)-O(2)	2.401(4)
Dy(1)-O(7)	2.299(4)	Dy(1)-O(1)	2.474(4)
Dy(1)-O(3)#2	2.335(4)	Dy(1)-O(5)#3	2.476(4)
Dy(1)-O(8)	2.378(4)		
O(4)#1-Dy(1)-O(7A)	156.89(16)	O(8)-Dy(1)-O(2)	132.79(13)
O(4)#1-Dy(1)-O(7)	156.89(16)	O(6)#3-Dy(1)-O(2)	87.23(14)
O(4)#1-Dy(1)-O(3)#2	109.89(15)	O(4)#1-Dy(1)-O(1)	123.30(14)
O(7)-Dy(1)-O(3)#2	78.62(16)	O(7A)-Dy(1)-O(1)	78.95(15)
O(4)#1-Dy(1)-O(8)	77.60(14)	O(7)-Dy(1)-O(1)	78.95(15)
O(7A)-Dy(1)-O(8)	83.87(16)	O(3)#2-Dy(1)-O(1)	78.46(15)
O(7)-Dy(1)-O(8)	83.87(16)	O(8)-Dy(1)-O(1)	152.14(15)
O(3)#2-Dy(1)-O(8)	76.75(16)	O(6)#3-Dy(1)-O(1)	74.16(14)

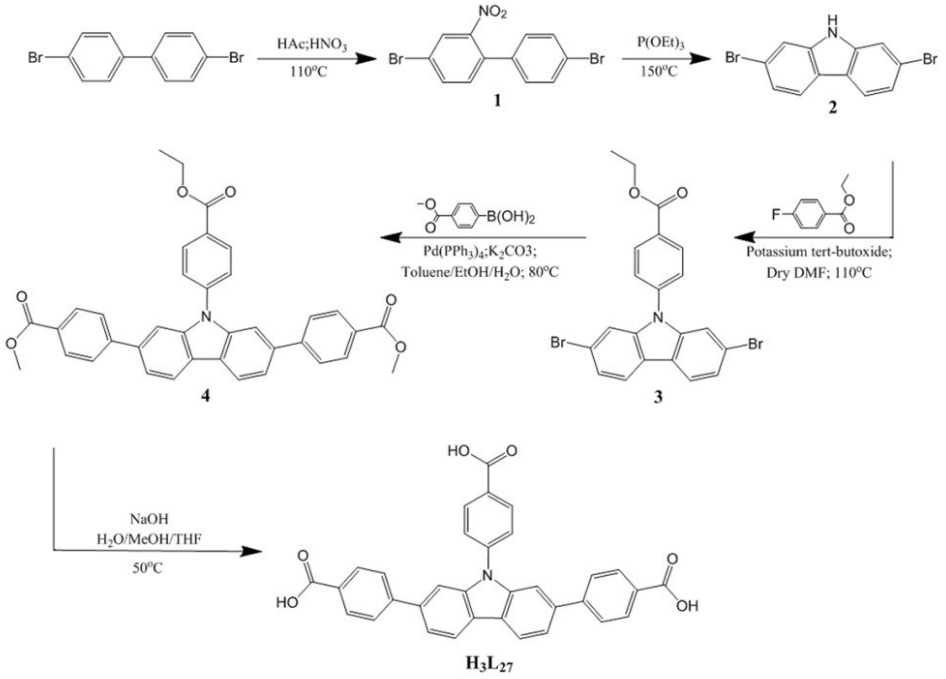
O(4)#1-Dy(1)-O(6)#3	89.33(14)	O(2)-Dy(1)-O(1)	53.27(13)
O(7)-Dy(1)-O(6)#3	91.49(15)	O(4)#1-Dy(1)-O(5)#3	82.71(14)
O(3)#2-Dy(1)-O(6)#3	152.22(14)	O(7)-Dy(1)-O(5)#3	79.31(16)
O(8)-Dy(1)-O(6)#3	128.42(14)	O(3)#2-Dy(1)-O(5)#3	145.93(15)
O(4)#1-Dy(1)-O(2)	72.51(13)	O(8)-Dy(1)-O(5)#3	75.36(14)
O(7A)-Dy(1)-O(2)	130.60(15)	O(6)#3-Dy(1)-O(5)#3	53.41(12)
O(7)-Dy(1)-O(2)	130.60(15)	O(2)-Dy(1)-O(5)#3	133.75(13)
O(3)#2-Dy(1)-O(2)	80.11(16)	O(1)-Dy(1)-O(5)#3	121.93(14)

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

TCZ-Ho

Ho(1)-O(4)#1	2.267(6)	Ho(1)-O(5)#3	2.379(6)
Ho(1)-O(7A)	2.271(6)	Ho(1)-O(2)	2.390(7)
Ho(1)-O(7)	2.271(6)	Ho(1)-O(1)	2.454(6)
Ho(1)-O(3)#2	2.328(6)	Ho(1)-O(6)#3	2.465(6)
Ho(1)-O(8)	2.367(6)		
O(4)#1-Ho(1)-O(7A)	156.5(2)	O(8)-Ho(1)-O(2)	132.1(2)
O(4)#1-Ho(1)-O(7)	156.5(2)	O(5)#3-Ho(1)-O(2)	87.1(2)
O(4)#1-Ho(1)-O(3)#2	109.4(2)	O(4)#1-Ho(1)-O(1)	123.5(2)
O(7)-Ho(1)-O(3)#2	78.9(2)	O(7A)-Ho(1)-O(1)	79.2(2)
O(4)#1-Ho(1)-O(8)	77.1(2)	O(7)-Ho(1)-O(1)	79.2(2)
O(7A)-Ho(1)-O(8)	83.9(2)	O(3)#2-Ho(1)-O(1)	78.3(2)
O(7)-Ho(1)-O(8)	83.9(2)	O(8)-Ho(1)-O(1)	152.1(2)
O(3)#2-Ho(1)-O(8)	76.9(2)	O(5)#3-Ho(1)-O(1)	74.2(2)
O(4)#1-Ho(1)-O(5)#3	89.3(2)	O(2)-Ho(1)-O(1)	53.7(2)
O(7)-Ho(1)-O(5)#3	92.0(2)	O(4)#1-Ho(1)-O(6)#3	82.9(2)
O(3)#2-Ho(1)-O(5)#3	152.2(2)	O(7)-Ho(1)-O(6)#3	79.1(2)
O(8)-Ho(1)-O(5)#3	128.7(2)	O(3)#2-Ho(1)-O(6)#3	146.1(2)
O(4)#1-Ho(1)-O(2)	72.3(2)	O(8)-Ho(1)-O(6)#3	75.4(2)
O(7A)-Ho(1)-O(2)	131.2(2)	O(5)#3-Ho(1)-O(6)#3	53.7(2)
O(7)-Ho(1)-O(2)	131.2(2)	O(2)-Ho(1)-O(6)#3	133.9(2)
O(3)#2-Ho(1)-O(2)	79.7(2)	O(1)-Ho(1)-O(6)#3	122.0(2)

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



Scheme S1. Synthesis of 2, 7-bis(4-benzoic acid)-N-(4-benzoic acid) carbazole **(H_3L_{27})**

4,4'-Dibromo-2-nitrobiphenyl(1): ^{1}H NMR (400 MHz, $CDCl_3$): δ (ppm) = 8.05 (d, *J* = 1.96 Hz, 1 H), 7.78 (dd, *J* = 6.24, 2.00 Hz, 1 H), 7.78 (d, *J* = 8.44 Hz, 2 H), 7.31 (d, *J* = 8.28 Hz, 1H), 7.18 (d, *J* = 8.40 Hz, 2 H). ^{13}C NMR (400 MHz, $CDCl_3$): δ (ppm) = 149.23, 135.60, 135.30, 134.14, 133.04, 132.05, 129.42, 127.29, 123.09, 121.85. MS (EI): calculated for $C_{12}H_7Br_2NO_2$ m/z: 357.00, found m/z: 356.90.

2,7-Dibromocarbazole(2): ^{1}H NMR (400 MHz, acetone- d_6): δ (ppm) = 10.63 (s, 1 H), 8.06 (d, *J* = 8.36 Hz, 2 H), 7.74 (d, *J* = 1.52 Hz, 2 H), 7.36 (dd, *J* = 1.56, 6.76 Hz, 2 H). ^{13}C NMR (400 MHz, acetone- d_6): δ (ppm) = 141.12, 122.43, 121.75, 121.61, 119.10, 114.04. MS (EI): calculated for $C_{12}H_7Br_2N$ m/z: 325.00, found m/z: 325.10.

2,7-Dibromo-N-(4-ethyl benzoate) carbazole (3): ^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) = 8.35 (d, *J* = 8.5 Hz, 2H), 7.97 (d, *J*= 8.3 Hz, 2H), 7.64 (d, *J* = 8.5 Hz, 2H), 7.56 (d, *J* = 1.56 Hz, 2H), 7.45 (dd, *J* = 1.6, 6.7 Hz, 2H), 4.49 (q, *J* = 7.1 Hz, 2H), 1.48 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (400 MHz, $CDCl_3$) δ (ppm) = 165.64, 141.30, 140.50, 131.67, 130.08, 126.52, 124.16, 122.02, 121.60, 113.03, 61.43, 14.30. MS (EI): calculated for $C_{21}H_{15}Br_2NO_2$ m/z: 473.16, found m/z: 473.06.

2,7-bis(4-methyl benzoate)-N-(4-ethyl benzoate) carbazole (4): ^{1}H NMR (400 MHz, DMSO-d_6) δ (ppm) = 8.41 (d, *J* = 8.2 Hz, 2 H), 8.29 (d， *J* = 8.5 Hz,2 H),8.04 (d, *J* = 8.4 Hz,4 H), 7.98 (d, *J* = 8.5 Hz, 2 H), 7.90(d, *J* = 8.3 Hz, 4 H), 7.72 (d, *J* = 9.3 Hz, 2 H), 7.60 (dd, *J* = 2.8, 5.6 Hz, 2 H), 4.34 (d, *J* = 7.1 Hz,2 H), 2.81 (s, 2 H) 1.34 (d, *J* = 7.1 Hz,3 H). ^{13}C NMR (400 MHz, DMSO-d_6) δ (ppm) = 166.06, 162.78, 145.69, 141.16, 140.01, 137.89, 131.83, 130.32, 129.36, 128.31, 127.76, 127.26, 126.21, 123.53, 121.86, 108.62, 61.21, 36.25, 31.23, 14.67. MS (EI): calculated for $C_{37}H_29NO_6$ m/z: 583.64, found m/z: 583.63.

2,7-bis(4-benzoic acid)-N-(4-benzoic acid) carbazole (H_3L_{27}): ^{1}H NMR (400 MHz, DMSO-d_6) δ

(ppm) = 8.45 (d, *J* = 8.1 Hz, 2 H), 8.28 (d，*J* = 8.5 Hz, 2 H),8.03 (d, *J* = 8.4 Hz, 4 H), 7.95 (d, *J* = 8.5 Hz, 2 H), 7.89 (d, *J* = 8.4 Hz, 4 H), 7.74 (d, *J* = 8.9 Hz, 2 H), 7.62 (dd, *J* = 7.0, 12.1 Hz, 2 H). ^{13}C NMR (400 MHz, DMSO-d_6) δ (ppm) = 167.64, 167.21, 145.28, 141.41, 140.89, 138.31, 132.00, 130.45, 129.97, 129.30, 127.75, 127.23, 123.18, 122.07, 120.71, 108.66. MS (EI): calculated for $C_{33}H_{21}NO_6$ m/z: 526.14, found m/z: 526.13.

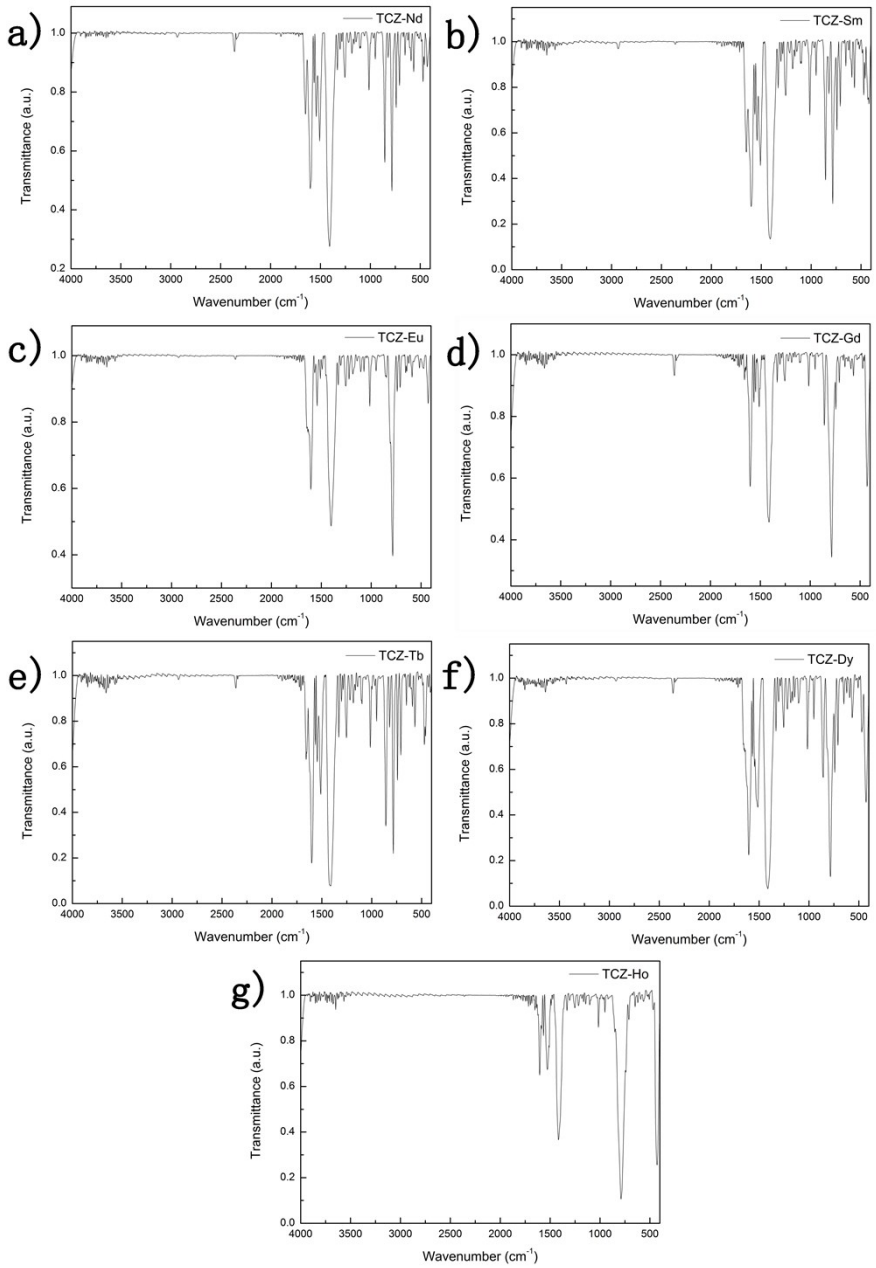


Fig. S1. Infrared spectra after baseline normalization for (a) **TCZ-Nd**, (b) **TCZ-Sm**, (c) **TCZ-Eu**, (d) **TCZ-Gd**, (e) **TCZ-Tb,** (f)**TCZ-Dy,** (g)**TCZ-Ho**. (KBr, cm^{-1})

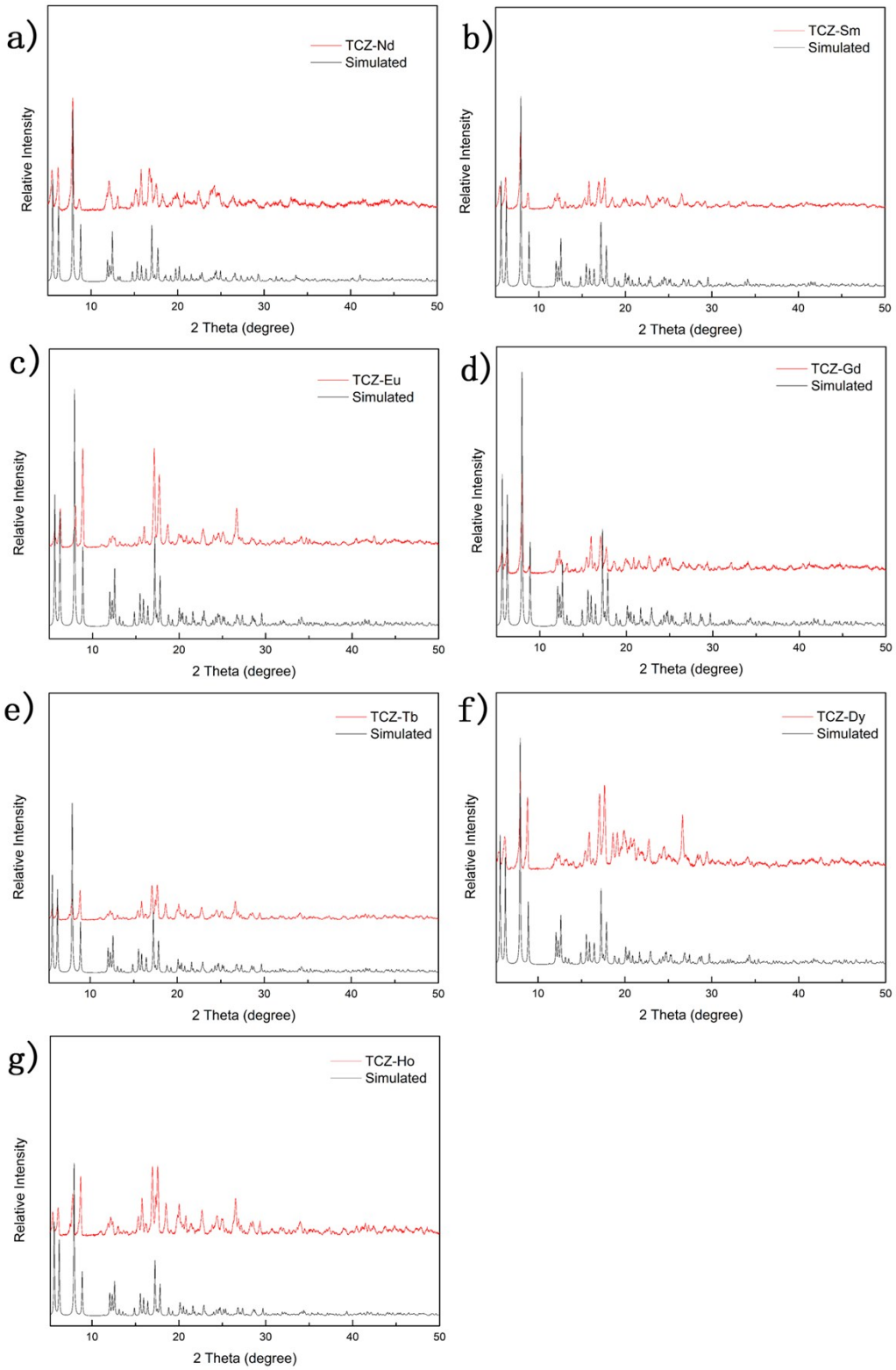


Fig. S2. Simulated (black), experimental (red) powder X-ray diffraction (PXRD) patterns for **TCZ-M**（**M** = Nd, Sm, Eu, Gd, Tb, Dy, Ho）.

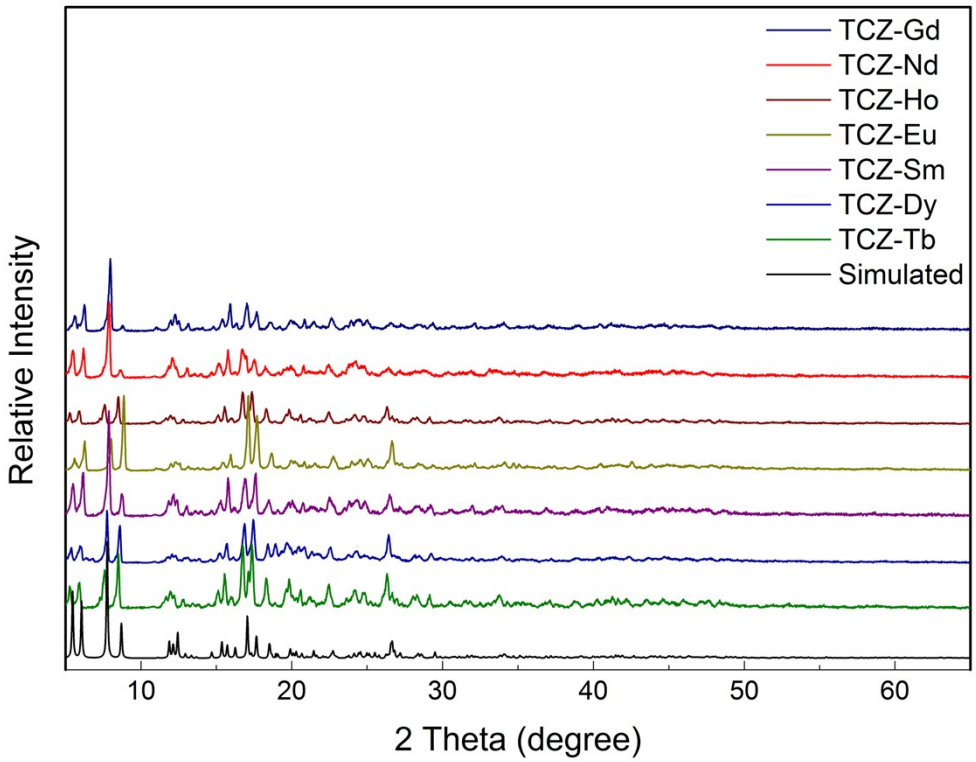


Fig. S3. Simulated (black), experimental powder X-ray diffraction (PXRD) patterns for **TCZ-M**（**M**=Nd, Sm, Eu, Gd, Tb, Dy, Ho）.

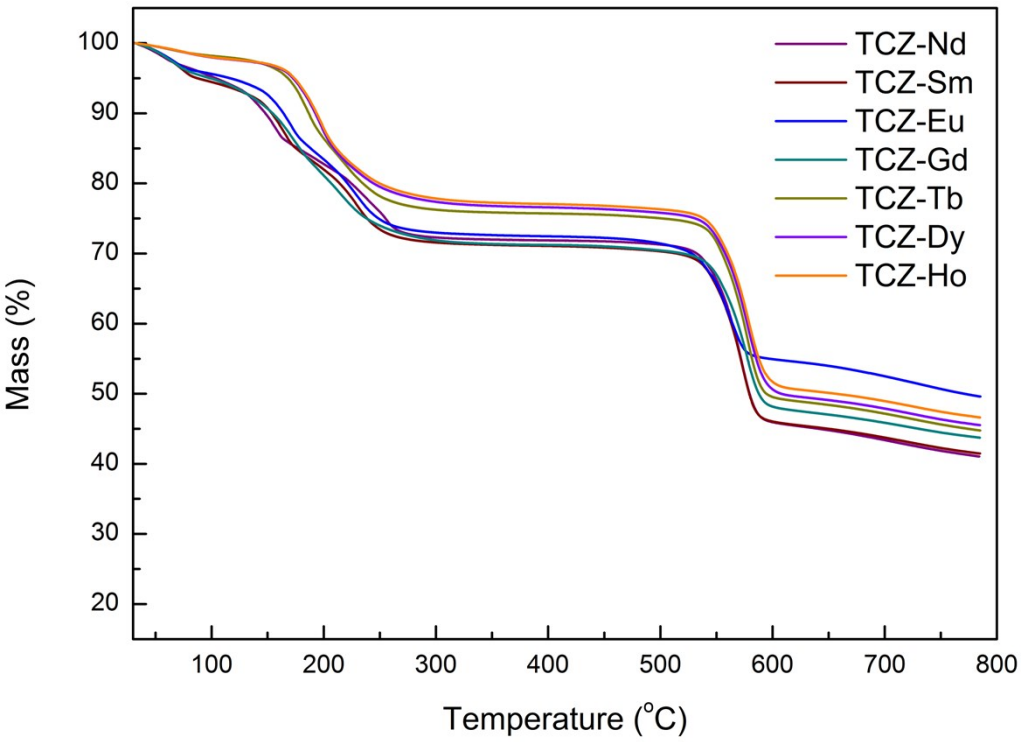


Fig. S4. Thermogravimetric analysis curves for **TCZ-M** (**M**=Nd, Sm, Eu, Gd, Tb, Dy, Ho).