Supplementary Materials

Fig. S1. The coordination environment of the Zn(II) ion in **1**.

Fig. S2. Coordination environment of Cd(II)) in **2**.

Fig. S3. The right-handed $[Cd_2(L2)(bimh)]_n$ single helix viewed perpendicular to the c axis(a) and viewed from the c axis (b). (L2 ligands, bimh ligands and screw axis are shown as blue line, yellow line and green rods, respectively).

Fig. S4. Comparison of the interconnection of the helices in complex **2** (a) and document **5c** (b) viewed along the *c* axis (R represents right-handed and L represents left-handed).

Fig. S5. Comparison of the asymmetric unit of the complex **2** (a) and document **5c** (b)

Fig. S5. Comparison of PXRD pattern of the simulated pattern from the single-crystal structure determination, the as-synthesized product in compounds **2**.

Fig. S6. Comparison of PXRD pattern of the simulated pattern from the single-crystal structure determination, the as-synthesized product in complexes **1**(a), **2** (b)

Fig. S7. TGA curve of **1, 2** under N_2 atmosphere.

Fig. S8. Emission spectra of **1**, **2.**

Table S1. Selected Bond Lengths (Å) and Angles (°) for Complexes **1-2**

Table S2. Crystal Data and Structure Refinements for Complexes **1-2**

Table S3. Photoluminescent lifetime data for complex **2** at room temperature

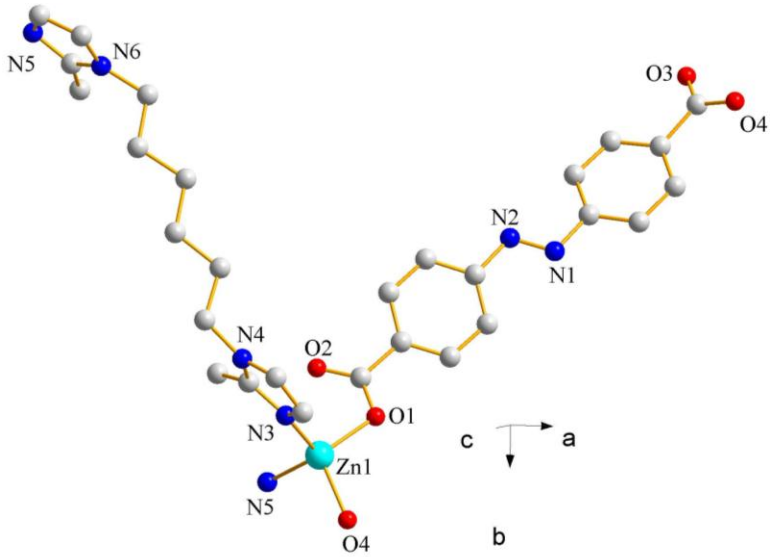


Fig. S1. The coordination environment of the Zn(II) ion in **1**.

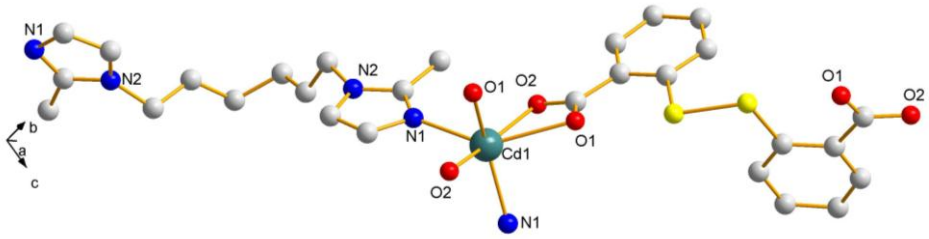
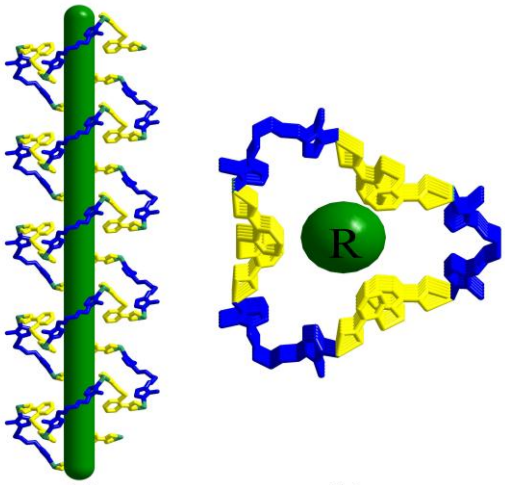
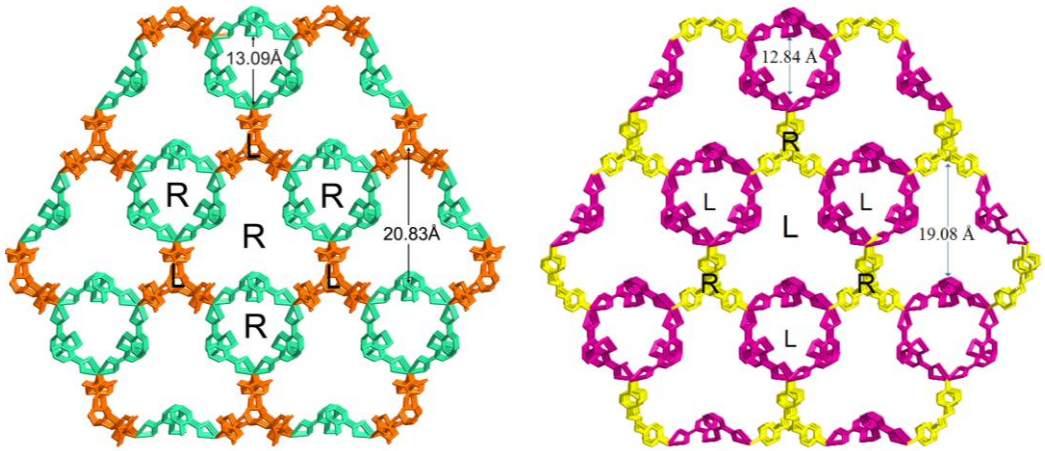


Fig. S2. The coordination environment of Cd(II)) in **2**.



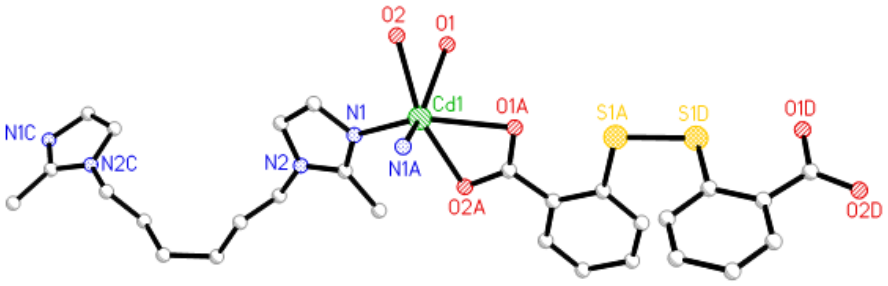
(a) (b)

Fig. S3. The right-handed $[Cd_2(dtba)(bimh)]_n$ single helix viewed perpendicular to the *c* axis(a) and viewed from the *c* axis (b) in **2**. (dtba ligands, bimh ligands and screw axis are shown as blue line, yellow line and green rods, respectively)

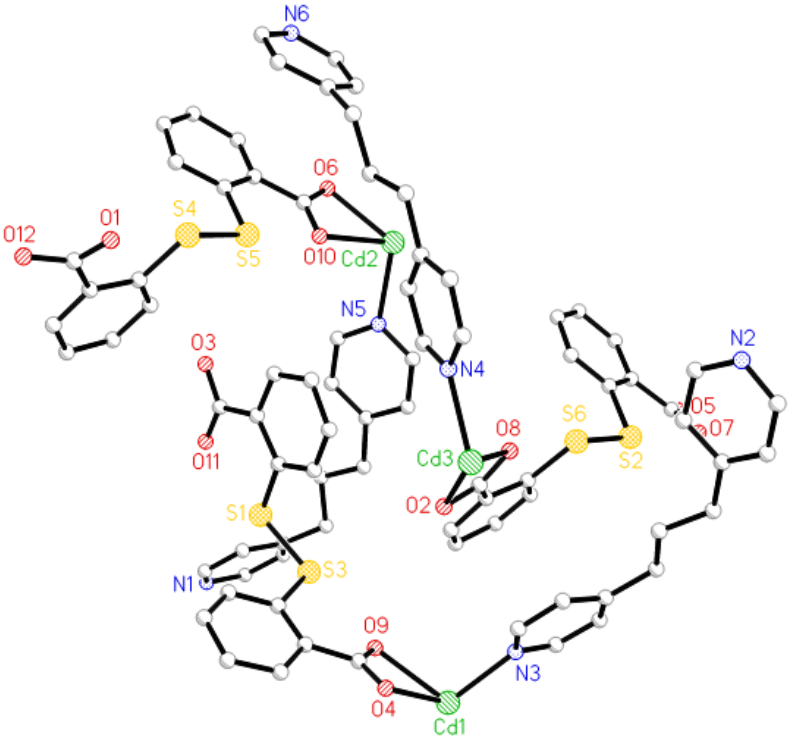


(a) **(b)**

Fig. S4. Comparison of the interconnection of the helices in complex **2** (a) and the document **5c** (b) viewed along the *c* axis (R represents right-handed and L represents left-handed).



(a)



(b)

Fig. S5. Comparison of the asymmetric unit of the complex **2** (a) and document **5c** (b)

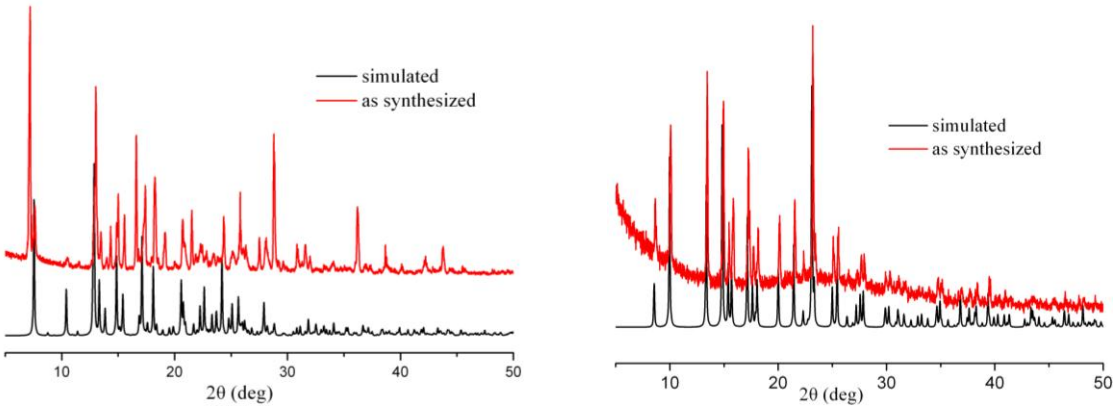


Fig. S6. Comparison of PXRD pattern of the simulated pattern from the single-crystal structure determination, the as-synthesized product in complexes **1**(a), **2** (b)

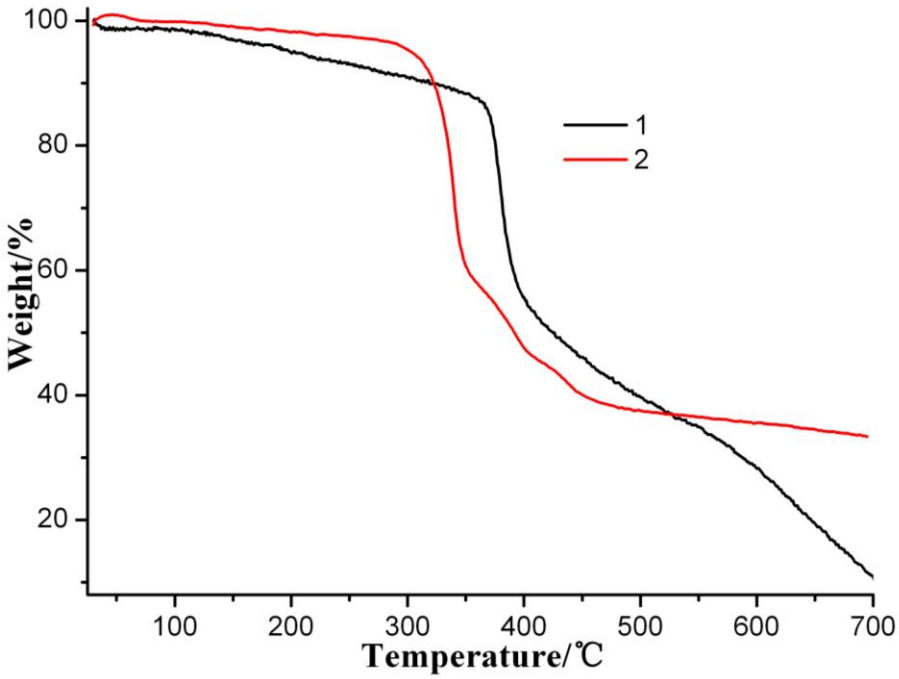


Figure S7. TGA curve of **1, 2** under N_2 atmosphere.

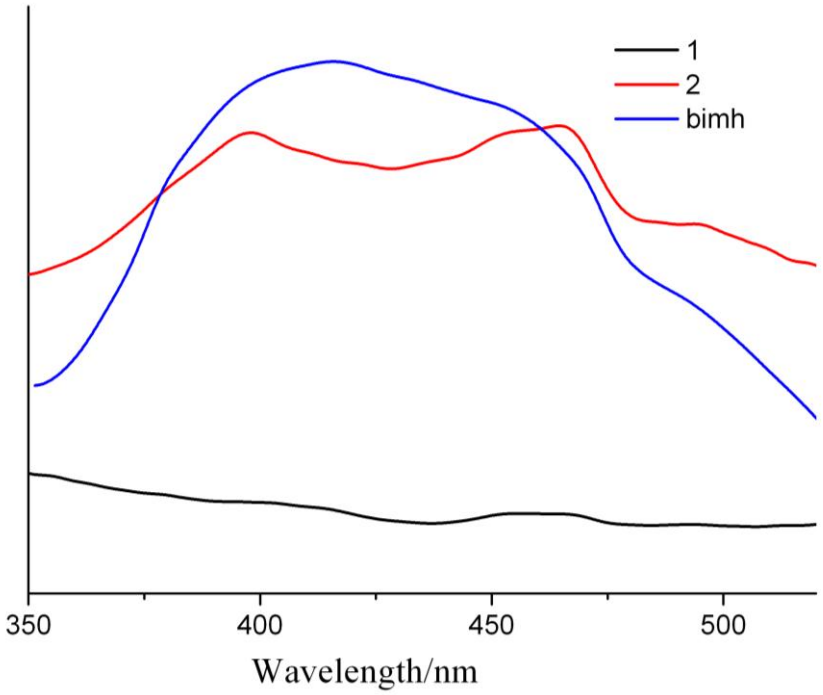


Figure S8. Emission spectra of **1**, **2.**

Table S1. Selected Bond Lengths (Å) and Angles (°) for Compounds **1-2**

1[a]			
N(5)-Zn(1)#1	2.009(3)	O(1)-Zn(1)#2	1.962(2)
Zn(1)-O(1)#3	1.962(2)	Zn(1)-N(5)#4	2.009(3)
Zn(1)-O(4)	1.969(2)	Zn(1)-N(3)	2.001(3)
C(22)-N(5)-Zn(1)#1	125.1(2)	C(28)-N(5)-Zn(1)#1	128.3(2)
C(19)-O(1)-Zn(1)#2	112.1(2)	O(1)#3-Zn(1)-O(4)	106.85(10)
O(1)#3-Zn(1)-N(3)	109.76(10)	O(4)-Zn(1)-N(3)	114.59(11)
O(1)#3-Zn(1)-N(5)#4	118.78(11)	O(4)-Zn(1)-N(5)#4	97.96(10)
N(3)-Zn(1)-N(5)#4	108.67(11)		
2[b]			
Cd(1)-O(2)#1	2.249(4)	Cd(1)-O(2)	2.249(4)
Cd(1)-N(1)	2.286(4)	Cd(1)-N(1)#1	2.286(4)
Cd(1)-O(1)	2.494(4)	Cd(1)-O(1)#1	2.494(4)
S(1)-S(1)#2	2.047(3)	O(2)#1-Cd(1)-O(2)	161.8(2)
O(2)#1-Cd(1)-N(1)	95.10(15)	O(2)-Cd(1)-N(1)	95.11(16)
O(2)#1-Cd(1)-N(1)#1	95.11(16)	O(2)-Cd(1)-N(1)#1	95.10(15)

N(1)-Cd(1)-N(1)#1	111.5(2)	O(2)#1-Cd(1)-O(1)	109.80(15)
O(2)-Cd(1)-O(1)	54.59(14)	N(1)-Cd(1)-O(1)	93.12(15)
N(1)#1-Cd(1)-O(1)	143.35(16)	O(2)#1-Cd(1)-O(1)#1	54.59(14)
O(2)-Cd(1)-O(1)#1	109.80(15)	N(1)-Cd(1)-O(1)#1	143.35(16)
N(1)#1-Cd(1)-O(1)#1	93.12(15)	O(1)-Cd(1)-O(1)#1	80.9(2)
O(2)#1-Cd(1)-C(39)#1	27.54(15)	O(2)-Cd(1)-C(39)#1	136.09(18)
N(1)-Cd(1)-C(39)#1	120.05(17)	N(1)#1-Cd(1)-C(39)#1	95.22(15)
O(1)-Cd(1)-C(39)#1	95.19(17)	O(1)#1-Cd(1)-C(39)#1	27.06(15)
C(26)-S(1)-S(1)#2	104.32(18)	C(39)-O(1)-Cd(1)	86.9(3)
C(39)-O(2)-Cd(1)	97.5(4)	C(57)-N(1)-Cd(1)	134.2(4)

Symmetry transformations used to generate equivalent atoms:

a #1 -x+1/2,y-1/2,-z+1/2 #2 -x+5/2,y+1/2,-z+1/2

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

b #1 -x,-x+y,-z+1/3 #2 x-y+1,-y+2,-z+2/3

Table S2. Crystal Data and Structure Refinements for Complexes **1-2**

	1	**2**
Molecular formula	$C_{28}H_{30}N_6O_4Zn$	$C_{84}H_{90}N_{12}O_{12}S_6Cd_3$
M	579.95	1989.24
T,K	296(2)	296(2)
Crystal system	monoclinic	trigonal
Space group	*P*2(1)/*n*	*P* 3_1 2 1
a (Å)	10.5666(16)	11.9375(13)
b (Å)	23.405(3)	11.9375(13)
c (Å)	11.4006(15)	17.2686(18)
β(°)	101.661(2)	90
γ(°)	90	120
V (Å^3)	2761.3(7)	2131.2(4)
Z	4	1
ρ (g cm^{-3})	1.395	1.550
F(000)	1208	1014
Reflections collected /unique	11309 / 4827	10764 / 2522

[R_{int}]	[0.0361]	[0.0439]
Goodness-of-fit on F^2	1.030	0.905
Final R indices [$I>2\sigma(I)$]	R_1 = 0.0416, wR_2 = 0.0988	R_1 = 0.0379, wR_2 = 0.0971
R indices (all data)	R_1 = 0.0714, wR_2 = 0.1126	R_1 = 0.0527, wR_2 = 0.1110

Table S3. Photoluminescent lifetime data for complex **2** at room temperature

complex	Lifetime(ns)		
	τ_1	τ_2	τ_3
2	1.2881 (15.33 %)	4.9936 (60.56 %)	10.1345 (24.11 %)