

Supporting Information

Porous Interpenetrating Metal–Organic Frameworks with Hierarchical Nodes

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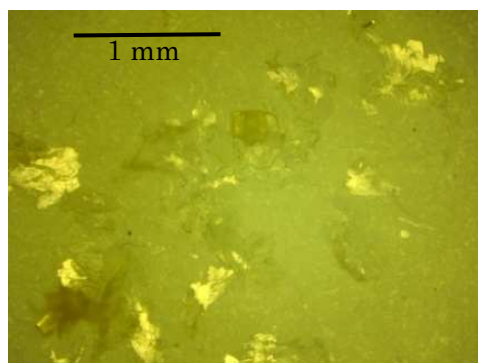


Figure S1. Photographic view of $[\text{Zn}(\text{bdc})(\text{L}_1)]$.

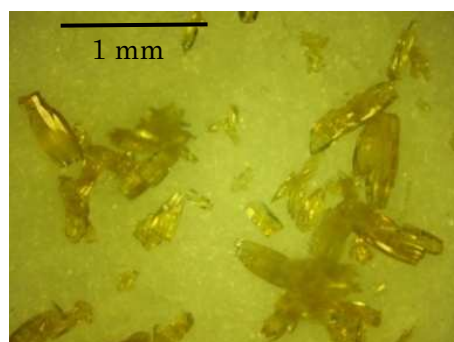


Figure S2. Photographic view of $[\text{Zn}_3(\text{bpdC})_3(\text{L}_1)]$.

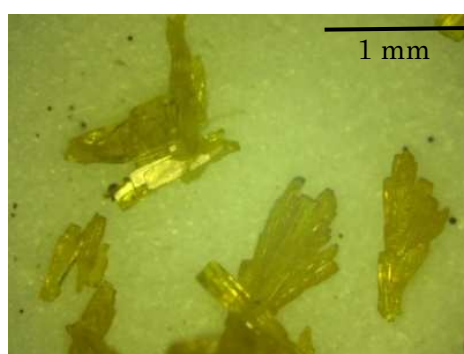


Figure S3. Photographic view of $[\text{Zn}_2(\text{sbpdc})_2(\text{L}_1)]$.

Table S1. Bond lengths and angles of [Zn(bdc)(L₁)].

Bond	Distance (Å)	Bond	Distance (Å)
Zn1-O1	2.035(4)	Zn1-O4	2.022(4)
Zn1-O5	2.182(4)	Zn1-O6	2.270(4)
Zn1-N2	2.154(5)	Zn1-N1	2.165(5)
Zn2-O2	2.073(4)	Zn2-O3	2.014(4)
Zn2-O7	2.124(4)	Zn2-N3	2.148(5)
Zn2-N4	2.164(4)	Zn2-O8	2.291(4)
Bond	Angle (°)	Bond	Angle (°)
O1 Zn1 N1	88.24(17)	O1 Zn1 N2	93.86(17)
O1 Zn1 O5	96.63(16)	O1 Zn1 O6	155.80(15)
O4 Zn1 O1	111.89(16)	O4 Zn1 N2	94.13(17)
O4 Zn1 N1	87.53(18)	N2 Zn1 N1	176.63(18)
O4 Zn1 O5	150.39(16)	N2 Zn1 O5	91.62(17)
N1 Zn1 O5	85.51(18)	O4 Zn1 O6	91.32(15)
N2 Zn1 O6	91.08(15)	N1 Zn1 O6	85.94(16)
O5 Zn1 O6	59.52(15)	O3 Zn2 O2	110.28(16)
O3 Zn2 O7	97.94(16)	O2 Zn2 O7	150.91(16)
O3 Zn2 N3	93.98(17)	O2 Zn2 N3	89.23(18)
O7 Zn2 N3	95.89(17)	O3 Zn2 N4	90.19(16)
O2 Zn2 N4	85.07(17)	O7 Zn2 N4	88.01(16)
N3 Zn2 N4	173.85(19)	O3 Zn2 O8	158.55(16)
O2 Zn2 O8	91.04(15)	O7 Zn2 O8	60.61(15)
N3 Zn2 O8	88.48(15)	N4 Zn2 O8	89.30(14)

Table S2. Various bridging ligands and their lengths and angles of [Zn₃(bpdc)₃(L₁)].

Bond	Distance (Å)	Bond	Distance (Å)
Zn1-O5	2.025(6)	Zn1-O1	2.068(6)
Zn1-O3	2.123(7)	Zn2-N1	1.869(7)
Zn2-O6	1.969(5)	Zn2-O4	2.049(6)
Zn2-O2	2.078(6)	Zn2-O5	2.336(8)
Zn3-O11	1.971(6)	Zn3-O13	1.988(7)
Zn3-O17	2.048(7)	Zn3-O15	2.056(6)
Zn3-O9	2.065(6)	Zn3-O7	2.101(7)
Zn4-N2	1.860(6)	Zn4-O12	1.973(5)
Zn4-O10	2.051(5)	Zn4-O8	2.070(5)
Zn4-O11	2.357(7)	Zn5-O13	2.355(8)
Zn5-N3	1.897(5)	Zn5-O14	1.942(5)
Zn5-O18	2.063(5)	Zn5-O16	2.067(4)
Bond	Angle (°)	Bond	Angle (°)
O5 Zn1 O1	86.4(3)	O5 Zn1 O1	93.6(3)
O5 Zn1 O3	96.7(4)	O5 Zn1 O3	83.3(4)
O1 Zn1 O3	80.4(3)	O1 Zn1 O3	99.6(3)
N1 Zn2 O6	97.1(3)	N1 Zn2 O4	94.4(3)
O6 Zn2 O4	116.5(3)	N1 Zn2 O2	99.1(4)
O6 Zn2 O2	117.1(3)	O4 Zn2 O2	122.1(3)
N1 Zn2 O5	150.6(3)	O6 Zn2 O5	53.9(2)
O4 Zn2 O5	102.8(3)	O2 Zn2 O5	91.8(3)
O11 Zn3 O13	176.4(5)	O11 Zn3 O17	87.2(4)
O13 Zn3 O17	95.7(5)	O11 Zn3 O15	82.5(3)
O13 Zn3 O15	95.0(4)	O17 Zn3 O15	95.7(5)
O11 Zn3 O9	99.5(3)	O13 Zn3 O9	82.8(4)
O17 Zn3 O9	88.8(5)	O15 Zn3 O9	175.2(3)
O11 Zn3 O7	92.0(4)	O13 Zn3 O7	85.1(5)
O17 Zn3 O7	178.8(5)	O15 Zn3 O7	83.3(4)
O9 Zn3 O7	92.3(4)	N2 Zn4 O12	100.2(3)
N2 Zn4 O10	96.4(3)	O12 Zn4 O10	116.0(3)
N2 Zn4 O8	96.0(3)	O12 Zn4 O8	117.2(3)
O10 Zn4 O8	121.7(2)	N2 Zn4 O11	151.3(3)
O12 Zn4 O11	51.2(2)	O10 Zn4 O11	99.3(3)
O8 Zn4 O11	96.0(3)	N3 Zn5 O14	102.5(2)
N3 Zn5 O18	94.3(2)	O14 Zn5 O18	113.2(2)
N3 Zn5 O16	96.8(2)	O14 Zn5 O16	119.2(2)
O18 Zn5 O16	122.2(2)	N3 Zn5 O13	152.8(2)
O14 Zn5 O13	50.4(2)	O18 Zn5 O13	98.1(4)
O16 Zn5 O13	96.8(4)		

Table S3. Various bridging ligands and their lengths and angles of [Zn₂(sbpdc)₂(L₁)].

Bond	Distance (Å)	Bond	Distance (Å)
Zn1-N1	2.010(3)	Zn1-O1	2.024(3)
Zn1-O13	2.025(3)	Zn1-O12	2.033(2)
Zn1-O20	2.057(3)	Zn1-Zn2	3.0010(6)
Zn2-O19	2.024(3)	Zn2-O11	2.024(2)
Zn2-N2	2.025(3)	Zn2-O2	2.031(3)
Zn2-O14	2.085(3)	Zn3-O5	2.008(3)
Zn3-N3	2.023(3)	Zn3-O8	2.025(2)
Zn3-O24	2.035(3)	Zn3-O17	2.059(3)
Zn3-Zn4	2.9865(6)	Zn4-N4	1.990(4)
Zn4-O7	2.022(3)	Zn4-O18	2.027(3)
Zn4-O23	2.035(3)	Zn4-O6	2.057(3)
Zn5-O26	2.026(2)	Zn5-N5	2.027(3)
Zn5-O35	2.035(2)	Zn5-O36	2.044(2)
Zn5-O25	2.047(2)	Zn5-Zn5	2.9734(8)
Zn6-O32	2.009(2)	Zn6-O31	2.016(2)
Zn6-N6	2.026(3)	Zn6-O29	2.034(3)
Zn6-O30	2.066(3)	Zn6-Zn6	2.9849(8)
O17-Zn3	2.059(3)	O18-Zn4	2.027(3)
O23-Zn4	2.035(3)	O24-Zn3	2.035(3)
O29-Zn6	2.034(3)	O30-Zn6	2.066(3)
O31-Zn6	2.016(2)		
Bond	Angle (°)	Bond	Angle (°)
N1 Zn1 O1	102.03(13)	N1 Zn1 O13	104.87(13)
O1 Zn1 O13	87.64(11)	N1 Zn1 O12	101.93(13)
O1 Zn1 O12	155.32(11)	O13 Zn1 O12	91.86(11)
N1 Zn1 O20	92.92(13)	O1 Zn1 O20	87.34(11)
O13 Zn1 O20	162.16(12)	O12 Zn1 O20	85.65(12)
N1 Zn1 Zn2	164.51(10)	O1 Zn1 Zn2	78.74(8)
O13 Zn1 Zn2	90.61(8)	O12 Zn1 Zn2	76.60(8)
O20 Zn1 Zn2	71.61(8)	O19 Zn2 O11	86.84(11)
O19 Zn2 N2	110.78(12)	O11 Zn2 N2	99.54(12)
O19 Zn2 O2	91.40(11)	O11 Zn2 O2	160.91(11)
N2 Zn2 O2	98.85(12)	O19 Zn2 O14	154.25(11)
O11 Zn2 O14	87.33(11)	N2 Zn2 O14	94.91(12)
O2 Zn2 O14	86.04(11)	O19 Zn2 Zn1	86.36(8)
O11 Zn2 Zn1	81.70(8)	N2 Zn2 Zn1	162.84(9)
O2 Zn2 Zn1	79.22(8)	O14 Zn2 Zn1	67.98(8)
O5 Zn3 N3	100.99(13)	O5 Zn3 O8	162.92(12)
N3 Zn3 O8	95.94(12)	O5 Zn3 O24	90.78(11)

N3 Zn3 O24	106.01(13)	O8 Zn3 O24	86.66(11)
O5 Zn3 O17	86.49(11)	N3 Zn3 O17	98.57(12)
O8 Zn3 O17	88.82(11)	O24 Zn3 O17	155.34(12)
O5 Zn3 Zn4	89.07(8)	N3 Zn3 Zn4	167.06(9)
O8 Zn3 Zn4	73.85(8)	O24 Zn3 Zn4	81.72(9)
O17 Zn3 Zn4	73.73(8)	N4 Zn4 O7	107.11(14)
N4 Zn4 O18	99.97(13)	O7 Zn4 O18	92.30(11)
N4 Zn4 O23	97.10(14)	O7 Zn4 O23	85.99(11)
O18 Zn4 O23	162.58(12)	N4 Zn4 O6	98.51(14)
O7 Zn4 O6	154.22(11)	O18 Zn4 O6	85.94(11)
O23 Zn4 O6	88.11(12)	N4 Zn4 Zn3	166.84(12)
O7 Zn4 Zn3	84.52(8)	O18 Zn4 Zn3	85.36(8)
O23 Zn4 Zn3	77.22(9)	O6 Zn4 Zn3	69.70(8)
O26 Zn5 N5	102.27(11)	O26 Zn5 O35	91.89(11)
N5 Zn5 O35	104.18(11)	O26 Zn5 O36	85.65(11)
N5 Zn5 O36	96.97(11)	O35 Zn5 O36	158.74(10)
O26 Zn5 O25	158.97(10)	N5 Zn5 O25	98.45(11)
O35 Zn5 O25	86.44(10)	O36 Zn5 O25	88.36(10)
O26 Zn5 Zn5	81.30(7)	N5 Zn5 Zn5	167.51(9)
O35 Zn5 Zn5	87.53(7)	O36 Zn5 Zn5	71.21(7)
O25 Zn5 Zn5	77.69(7)	O32 Zn6 O31	159.11(11)
O32 Zn6 N6	99.14(12)	O31 Zn6 N6	101.13(12)
O32 Zn6 O29	91.83(11)	O31 Zn6 O29	87.23(10)
N6 Zn6 O29	106.61(12)	O32 Zn6 O30	85.80(11)
O31 Zn6 O30	87.42(11)	N6 Zn6 O30	95.04(12)
O29 Zn6 O30	158.32(10)	O32 Zn6 Zn6	78.39(8)
O31 Zn6 Zn6	80.73(8)	N6 Zn6 Zn6	164.10(9)
O29 Zn6 Zn6	89.22(8)	O30 Zn6 Zn6	69.18(7)

Table S4. Various bridging ligands and their lengths and angles of [Zn₂(sbpdc)₂(bpy)]·4DMF.

Bond	Distance (Å)	Bond	Distance (Å)
Zn1-Zn2	2.9651(11)	Zn1-O2	2.028(5)
Zn1-O4	2.023(5)	Zn1-O5	2.043(5)
Zn1-O7	2.054(5)	Zn1-N2	2.013(6)
Zn2-O1	2.034(5)	Zn2-O3	2.070(5)
Zn2-O6	2.025(5)	Zn2-O8	2.038(5)
Zn2-N1	2.011(6)		
Bond	Angle (°)	Bond	Angle (°)
Zn(2) Zn(1) O(2)	82.74(15)	Zn(2) Zn(1) O(4)	91.20(16)
Zn(2) Zn(1) O(5)	75.40(16)	Zn(2) Zn(1) O(7)	70.15(16)
Zn(2) Zn(1) N(2)	163.13(18)	O(2) Zn(1) O(4)	91.1(2)
O(2) Zn(1) O(5)	158.1(2)	O(2) Zn(1) O(7)	84.8(2)
O(2) Zn(1) N(2)	101.3(2)	O(4) Zn(1) O(5)	88.5(2)
O(4) Zn(1) O(7)	161.3(2)	O(4) Zn(1) N(2)	105.0(2)
O(5) Zn(1) O(7)	88.5(2)	O(5) Zn(1) N(2)	99.9(2)
O(7) Zn(1) N(2)	93.8(2)	Zn(1) Zn(2) O(1)	76.71(15)
Zn(1) Zn(2) O(3)	67.93(16)	Zn(1) Zn(2) O(6)	84.01(15)
Zn(1) Zn(2) O(8)	89.14(14)	Zn(1) Zn(2) N(1)	164.14(18)
O(1) Zn(2) O(3)	88.5(2)	O(1) Zn(2) O(6)	160.6(2)
O(1) Zn(2) O(8)	88.3(2)	O(1) Zn(2) N(1)	98.2(2)
O(3) Zn(2) O(6)	86.4(2)	O(3) Zn(2) O(8)	157.0(2)
O(3) Zn(2) N(1)	97.2(2)	O(6) Zn(2) O(8)	89.1(2)
O(6) Zn(2) N(1)	101.0(2)	O(8) Zn(2) N(1)	105.9(2)

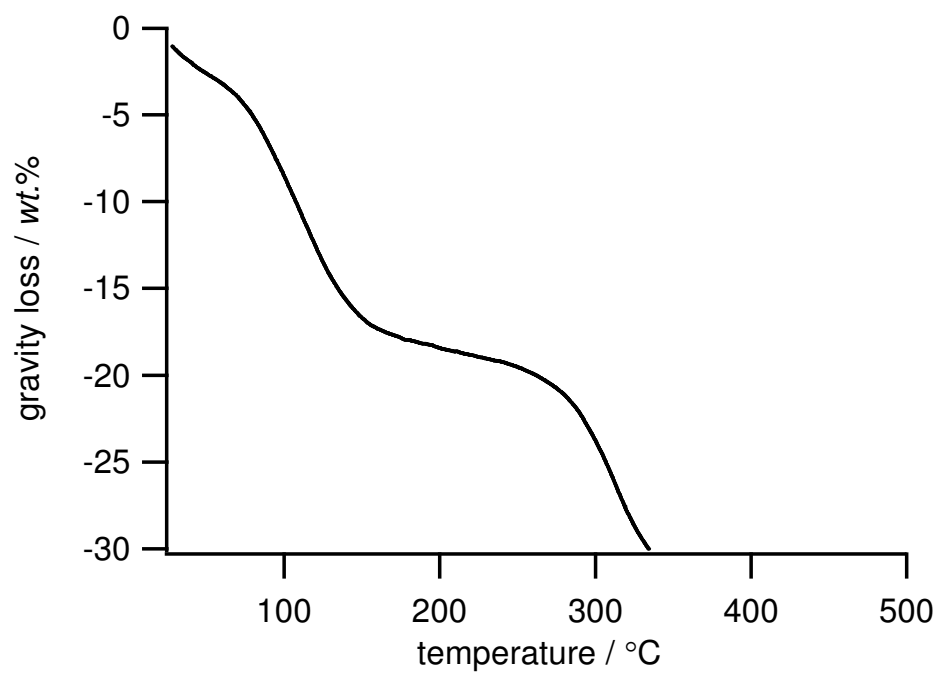


Figure S4. TG curve of Zn(bdc)(L₁).

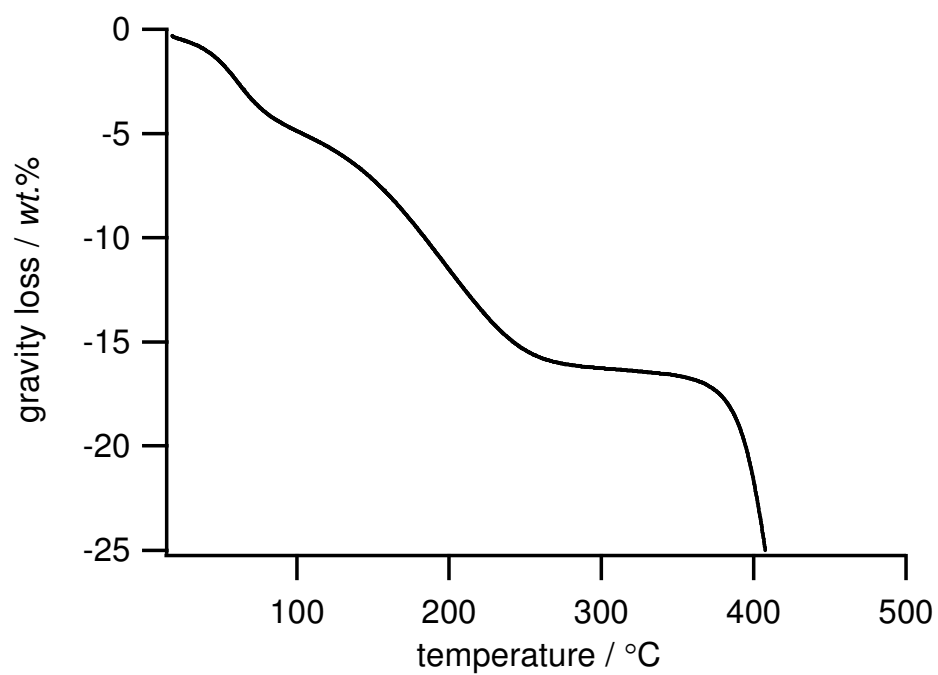


Figure S5. TG curve of [Zn₃(bpdc)₃(L₁)].

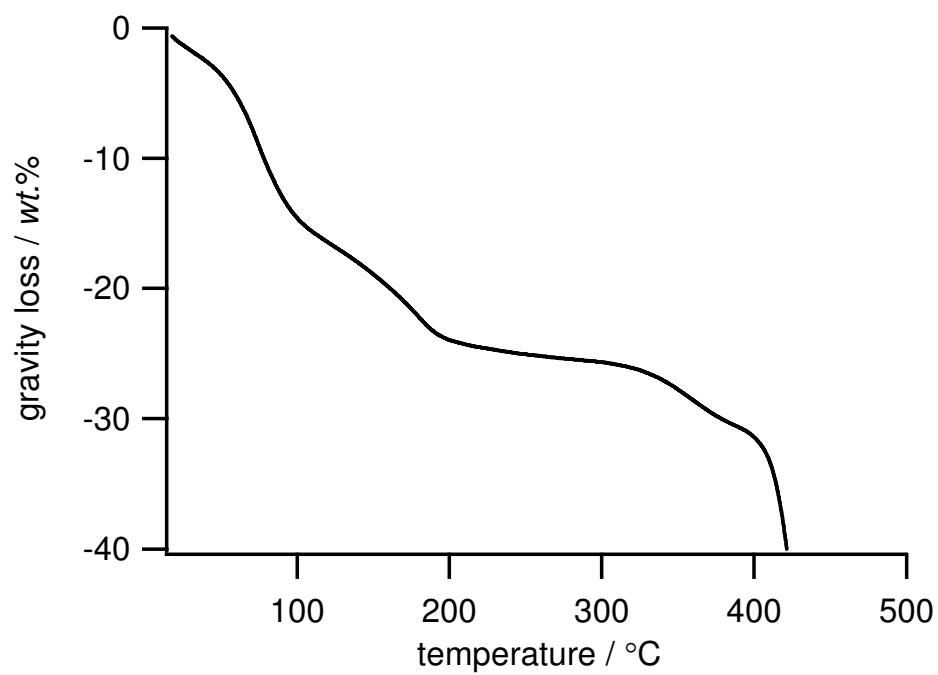


Figure S6. TG curve of $[\text{Zn}_2(\text{sbpdc})_2\text{L}_1]$.

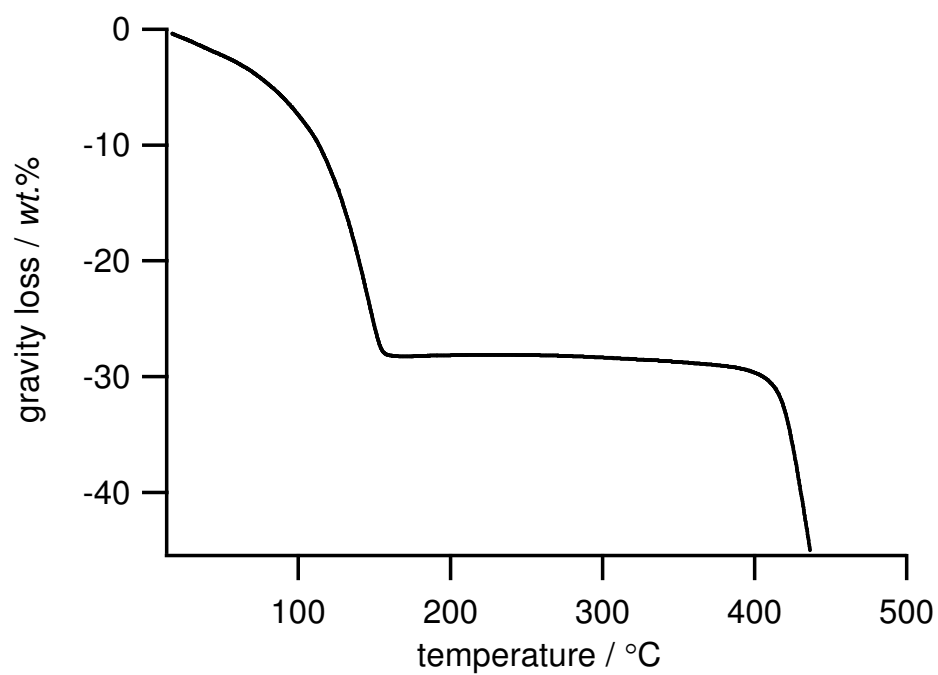


Figure S7. TG curve of $[\text{Zn}_2(\text{sbpdc})_2(\text{bpy})]$.