Supporting Information

A series of three-dimensional 3d-4f cyanide heterometallic coordination polymers: synthesis, crystal structure, photoluminescent and magnetic properties

Table S1. Selected Bond Distances (Å) and angles (°) for HCPs **I-A** to **V-B**

I-A					
Cu(1)–C(3)	2.157(8)	Cu(3)–N(3)	1.875(8)	Cu(5)–N(11)	2.110(6)
Cu(1)–N(1)#4	1.881(9)	Cu(3)–N(9)#5	2.082(6)	Cu(5)–Cu(5)#8	3.034(2)
Cu(1)–N(7)	1.989(6)	Cu(3)–C(2)	1.861(9)	Cu(6)–N(6)	2.033(9)
Cu(1)–Cu(4)	2.4557(16)	Cu(3)–Cu(3)#6	2.884(3)	Cu(6)–C(5)	1.836(9)
Cu(2)–N(2)	1.894(8)	Cu(4)–C(4)#7	1.874(9)	Cu(6)–N(12)	2.169(11)
Cu(2)–C(1)	1.909(9)	Cu(4)–C(3)	1.934(9)	Cu(6)–Cu(6)#3	2.801(4)
Cu(2)–N(8)	2.075(6)	Cu(4)–N(10)	2.005(7)	Cu(7)–N(13)	1.946(7)
Cu(2)–C(1)#1	2.340(9)	Cu(5)–N(5)	1.878(8)	Cu(7)–N(14)	1.978(6)
Cu(2)–Cu(2)#1	2.630(2)	Cu(5)–N(4)	1.907(7)	Cu(7)–C(6)	1.911(11)
N(1)#4–Cu(1)–N(7)	124.0(3)	C(4)#7–Cu(4)–C(3)	133.8(4)		
N(1)#4–Cu(1)–C(3)	117.6(3)	C(4)#7–Cu(4)–N(10)	120.6(3)		
N(7)–Cu(1)–C(3)	103.7(3)	C(3)–Cu(4)–N(10)	104.1(3)		
N(1)#4–Cu(1)–Cu(4)	112.6(2)	C(4)#7–Cu(4)–Cu(1)	76.4(3)		
N(7)–Cu(1)–Cu(4)	123.0(2)	C(3)–Cu(4)–Cu(1)	57.4(2)		
C(3)–Cu(1)–Cu(4)	49.1(3)	N(10)–Cu(4)–Cu(1)	158.1(2)		
N(2)–Cu(2)–C(1)	122.3(3)	N(5)–Cu(5)–N(4)	143.3(3)		
N(2)–Cu(2)–N(8)	118.5(3)	N(5)–Cu(5)–N(11)	113.6(3)		
C(1)–Cu(2)–N(8)	105.7(3)	N(4)–Cu(5)–N(11)	102.8(3)		
N(2)–Cu(2)–C(1)#1	107.6(3)	N(5)–Cu(5)–Cu(5)#8	85.6(3)		
C(1)–Cu(2)–C(1)#1	104.3(3)	N(4)–Cu(5)–Cu(5)#8	96.1(2)		
N(8)–Cu(2)–C(1)#1	93.8(3)	N(11)–Cu(5)–Cu(5)#8	93.8(2)		
N(2)–Cu(2)–Cu(2)#1	131.1(2)	C(5)–Cu(6)–N(6)	141.7(4)		
C(1)–Cu(2)–Cu(2)#1	59.6(3)	C(5)–Cu(6)–N(12)	109.4(4)		
N(8)–Cu(2)–Cu(2)#1	104.7(2)	N(6)–Cu(6)–N(12)	107.2(4)		
C(1)#1–Cu(2)–Cu(2)#1	44.7(2)	C(5)–Cu(6)–Cu(6)#3	111.1(3)		
C(2)–Cu(3)–N(3)	134.4(3)	N(6)–Cu(6)–Cu(6)#3	79.5(2)		
C(2)–Cu(3)–N(9)#5	112.6(3)	N(12)–Cu(6)–Cu(6)#3	90.2(3)		
N(3)–Cu(3)–N(9)#5	111.3(3)	C(6)–Cu(7)–N(13)	111.0(4)		
C(2)–Cu(3)–Cu(3)#6	81.8(3)	C(6)–Cu(7)–N(14)	105.2(3)		
N(3)–Cu(3)–Cu(3)#6	105.1(2)	N(13)–Cu(7)–N(14)	141.9(3)		
N(9)#5–Cu(3)–Cu(3)#6	96.3(2)				

Symmetry code for :

I-A: #1 –x, –y + 2, –z + 1 #3 –x + 1, –y + 1, –z + 1 #4 x + 1, y, z #5 x, y, z – 1
#6 –x + 1, –y + 2, –z + 1 #7 x + 1, y + 1, z #8 –x, –y + 1, –z + 1

I-B					
Cu(1)–N(1)	1.875(6)	Cu(6)–N(6)	1.875(6)	Eu(2)–O(15)#3	2.376(4)
Cu(1)–N(7)#4	1.972(5)	Cu(6)–N(12)	2.181(6)	Eu(2)–O(11)	2.387(4)
Cu(1)–Cu(4)	2.5022(12)	Cu(7)–N(13)#9	1.952(5)	Eu(2)–O(10)	2.398(4)
Cu(2)–N(2)	1.891(6)	Cu(7)–N(14)	1.954(5)	Eu(2)–O(2)	2.434(4)
Cu(2)–N(8)	2.064(5)	Eu(1)–O(5)	2.358(4)	Eu(2)–O(18)	2.486(4)
Cu(2)–C(1)#1	2.421(7)	Eu(1)–O(7)	2.371(4)	Eu(2)–O(22W)	2.489(4)
Cu(2)–Cu(2)#1	2.9176(19)	Eu(1)–O(3)	2.377(4)	Eu(3)–O(4)	2.347(4)
Cu(3)–N(3)#5	1.882(6)	Eu(1)–O(14)	2.382(3)	Eu(3)–O(9)	2.350(3)
Cu(3)–N(9)#1	2.093(5)	Eu(1)–O(8)#2	2.390(4)	Eu(3)–O(16)#3	2.364(4)
Cu(4)–N(4)	1.898(6)	Eu(1)–O(6)#2	2.432(4)	Eu(3)–O(13)	2.370(4)
Cu(4)–N(10)	2.021(5)	Eu(1)–O(21W)	2.482(4)	Eu(3)–O(20)	2.436(4)
Cu(5)–N(5)	1.882(6)	Eu(1)–O(17)	2.521(4)	Eu(3)–O(19)	2.455(4)
Cu(5)–C(4)#1	1.893(6)	Eu(2)–O(1)#9	2.341(4)	Eu(3)–O(18)	2.498(3)
Cu(5)–N(11)#7	2.146(5)	Eu(2)–O(12)#9	2.369(4)	Eu(3)–O(17)	2.521(3)
N(1)–Cu(1)–N(7)#4	133.0(3)	N(4)–Cu(4)–C(3)	140.9(3)		
N(1)–Cu(1)–C(3)	115.0(3)	N(4)–Cu(4)–N(10)	116.3(3)		
N(7)#4–Cu(1)–C(3)	103.5(2)	C(3)–Cu(4)–N(10)	101.7(2)		
N(2)–Cu(2)–C(1)	119.5(3)	N(4)–Cu(4)–Cu(1)	84.2(2)		
N(2)–Cu(2)–N(8)	121.6(2)	C(3)–Cu(4)–Cu(1)	56.8(2)		
C(1)–Cu(2)–N(8)	107.1(2)	N(10)–Cu(4)–Cu(1)	153.39(16)		
N(2)–Cu(2)–C(1)#1	113.5(2)	N(5)–Cu(5)–C(4)#1	147.8(3)		
C(1)–Cu(2)–C(1)#1	96.4(2)	N(5)–Cu(5)–N(11)#7	111.6(2)		
N(8)–Cu(2)–C(1)#1	92.9(2)	C(4)#1–Cu(5)–N(11)#7	100.4(2)		
N(2)–Cu(2)–Cu(2)#1	130.9(2)	N(6)–Cu(6)–C(5)	152.7(3)		
C(1)–Cu(2)–Cu(2)#1	55.6(2)	N(6)–Cu(6)–N(12)	107.7(2)		
N(8)–Cu(2)–Cu(2)#1	103.58(17)	C(5)–Cu(6)–N(12)	98.4(2)		
C(1)#1–Cu(2)–Cu(2)#1	40.81(16)	N(13)#9–Cu(7)–N(14)	144.5(2)		
C(2)–Cu(3)–N(3)#5	136.4(3)	N(13)#9–Cu(7)–C(6)	107.1(2)		
C(2)–Cu(3)–N(9)#1	109.7(3)	N(14)–Cu(7)–C(6)	106.8(2)		
N(3)#5–Cu(3)–N(9)#1	112.1(2)				

Symmetry code for :

I-B: #1 –x + 2, –y + 2, –z #2 –x + 1 ,–y + 2, –z + 1 #3 –x + 1, –y + 1, – z
#4 – x + 1, –y + 2, –z #5 x + 1, y, z #7 –x + 2, –y + 1, –z + 1 #9 –x + 1, –y + 1, –z + 1

I-C

Cu(1)–N(1)#2	1.886(7)	Cu(2)–Cu(2)#1	2.914(2)	Cu(4)–N(10)	2.018(5)
Cu(1)–N(7)	1.965(5)	Cu(3)–C(2)#1	1.866(7)	Cu(5)–N(5)#3	1.887(6)
Cu(2)–N(2)	1.902(6)	Cu(3)–N(3)	1.879(6)	Cu(5)–N(11)#4	2.139(5)
Cu(2)–N(8)	2.061(5)	Cu(3)–N(9)	2.095(5)	Cu(6)–N(6)	1.880(6)
Cu(2)–C(1)#1	2.430(7)	Cu(4)–N(4)	1.905(6)	Cu(6)–N(12)	2.176(5)

N(1)#2–Cu(1)–N(7)	132.7(3)	N(3)–Cu(3)–N(9)	111.6(2)
N(1)#2–Cu(1)–Cu(4)	103.8(2)	N(4)–Cu(4)–C(3)	141.1(3)
N(2)–Cu(2)–C(1)	119.3(3)	N(4)–Cu(4)–N(10)	116.0(3)
N(2)–Cu(2)–N(8)	121.3(2)	C(3)–Cu(4)–N(10)	101.7(2)
C(1)–Cu(2)–N(8)	107.1(2)	N(10)–Cu(4)–Cu(1)	153.48(17)
N(2)–Cu(2)–C(1)#1	113.7(3)	N(5)#3–Cu(5)–C(4)	147.9(3)
C(1)–Cu(2)–C(1)#1	96.5(3)	N(5)#3–Cu(5)–N(11)#4	111.4(2)
N(8)–Cu(2)–C(1)#1	93.1(2)	C(4)–Cu(5)–N(11)#4	100.4(2)
N(2)–Cu(2)–Cu(2)#1	130.95(19)	N(6)–Cu(6)–C(5)	153.1(3)
C(1)–Cu(2)–Cu(2)#1	55.9(2)	N(6)–Cu(6)–N(12)	107.5(2)
N(8)–Cu(2)–Cu(2)#1	103.80(17)	C(5)–Cu(6)–N(12)	98.3(2)
C(1)#1–Cu(2)–Cu(2)#1	40.60(18)	N(14)#6–Cu(7)–N(13)	144.7(2)
C(2)#1–Cu(3)–N(3)	136.7(3)	N(14)#6–Cu(7)–C(6)	107.0(2)
C(2)#1–Cu(3)–N(9)	109.8(3)	N(13)–Cu(7)–C(6)	106.9(2)

Symmetry code for :

I-C: #1 –x, –y, –z + 2 #2 –x + 1, –y, –z + 2 #3 –x + 2, –y + 1, –z + 1
#4 –x + 1, –y + 1, –z + 1

I-D

Cu(1)–N(1)	1.896(5)	Cu(5)–Cu(5)#7	3.0440(15)	O(11)–Tb(2)	2.364(3)
Cu(1)–N(7)#3	1.974(4)	O(3)–Tb(1)	2.357(3)	O(12)–Tb(2)#14	2.344(3)
Cu(2)–N(2)	1.906(5)	O(5)–Tb(1)	2.324(3)	O(15)–Tb(2)	2.351(3)
Cu(2)–N(8)	2.078(4)	O(6)–Tb(1)#15	2.412(3)	O(17)–Tb(2)	2.470(3)
Cu(2)–C(1)#1	2.413(6)	O(7)–Tb(1)	2.351(3)	O(4)–Tb(3)	2.321(3)
Cu(2)–Cu(2)#1	2.9120(16)	O(8)–Tb(1)#15	2.359(3)	O(17)–Tb(3)	2.480(3)
Cu(3)–N(3)#4	1.881(5)	O(14)–Tb(1)	2.356(3)	O(18)–Tb(3)	2.505(3)
Cu(3)–N(9)#1	2.100(4)	O(18)–Tb(1)	2.510(3)	O(19)–Tb(3)	2.443(3)
Cu(3)–Cu(3)#5	2.9349(16)	O(21W)–Tb(1)	2.466(3)	O(20)–Tb(3)	2.423(3)
Cu(4)–N(4)	1.905(5)	O(1)–Tb(2)#14	2.317(3)	O(9)–Tb(3)	2.317(3)
Cu(4)–N(10)	2.030(4)	O(2)–Tb(2)	2.409(3)	O(13)–Tb(3)	2.343(3)
Cu(5)–N(5)	1.895(5)	O(10)–Tb(2)	2.379(3)	O(16)–Tb(3)	2.343(3)
Cu(5)–N(11)#6	2.148(4)				

N(1)–Cu(1)–N(7)#3	133.0(2)	N(2)–Cu(2)–C(1)#1	113.54(19)
N(1)–Cu(1)–C(3)	114.8(2)	N(8)–Cu(2)–C(1)#1	93.31(18)
N(7)#3–Cu(1)–C(3)	103.63(19)	C(1)–Cu(2)–Cu(2)#1	55.43(17)
C(1)–Cu(2)–N(2)	118.8(2)	N(2)–Cu(2)–Cu(2)#1	130.45(14)
C(1)–Cu(2)–N(8)	107.5(2)	N(8)–Cu(2)–Cu(2)#1	104.27(14)
N(2)–Cu(2)–N(8)	121.54(19)	C(1)#1–Cu(2)–Cu(2)#1	40.94(14)
C(1)–Cu(2)–C(1)#1	96.37(19)		

Symmetry code for :

I-D: #1 –x + 1, –y + 1, –z + 1 #3 –x, –y + 1, –z + 1 #4 x + 1, y, z #5 –x + 2, –y + 1, –z + 1 #6 x, y + 1, z – 1 #7 –x + 1, –y + 2, –z + 1 #14 –x, –y, –z + 2 #15 –x, –y + 1, –z + 2

I-E

Cu(1)–N(1)#2	1.897(7)	Cu(5)–N(11)#4	2.139(6)	Dy(2)–O(12)	2.326(4)
Cu(1)–N(7)	1.978(6)	Cu(5)–Cu(5)#5	3.038(2)	Dy(2)–O(15)	2.343(4)
Cu(1)–Cu(4)	2.5048(13)	Cu(6)–N(6)	1.895(6)	Dy(2)–O(11)#4	2.354(4)
Cu(2)–N(2)	1.907(7)	Cu(6)–N(12)	2.186(6)	Dy(2)–O(10)	2.358(4)
Cu(2)–N(8)	2.070(6)	Cu(7)–N(13)	1.953(6)	Dy(2)–O(2)	2.388(4)
Cu(2) –C(1)	1.911(9)	Cu(7)–N(14)#6	1.959(5)	Dy(2)–O(22W)	2.455(4)
Cu(2)–C(1)#1	2.411(8)	Dy(1)–O(5)	2.314(4)	Dy(2)–O(17)	2.462(4)
Cu(2)–Cu(2)#1	2.905(2)	Dy(1)–O(14)	2.333(4)	Dy(3)–O(9)	2.302(4)
Cu(3)–C(2)#1	1.865(8)	Dy(1)–O(8)#6	2.337(4)	Dy(3)–O(4)	2.308(4)
Cu(3)–N(3)	1.888(6)	Dy(1)–O(7)#2	2.343(4)	Dy(3)–O(16)	2.323(4)
Cu(3)–N(9)	2.089(6)	Dy(1)–O(3)	2.348(4)	Dy(3)–O(13)	2.329(4)
Cu(3)–Cu(3)#2	2.924(2)	Dy(1)–O(6)#7	2.408(4)	Dy(3)–O(20)	2.411(4)
Cu(4)–N(4)	1.902(7)	Dy(1)–O(21W)	2.448(4)	Dy(3)–O(19)	2.430(4)
Cu(4)–N(10)	2.031(6)	Dy(1)–O(18)	2.508(4)	Dy(3)–O(17)	2.468(4)
Cu(5)–N(5)#3	1.891(6)	Dy(2)–O(1)#4	2.303(4)	Dy(3)–O(18)	2.487(4)

N(1)#2–Cu(1)–N(7)	132.1(3)	N(4)–Cu(4)–C(3)	140.2(3)
N(1)#2–Cu(1)–Cu(4)	103.6(2)	N(4)–Cu(4)–N(10)	116.3(3)
N(7)–Cu(1)–Cu(4)	123.26(17)	C(3)–Cu(4)–N(10)	102.1(3)
C(1)–Cu(2)–N(2)	118.7(3)	N(4)–Cu(4)–Cu(1)	83.9(2)
C(1)–Cu(2)–N(8)	107.4(3)	C(3)–Cu(4)–Cu(1)	56.3(2)
N(2)–Cu(2)–N(8)	121.7(3)	N(10)–Cu(4)–Cu(1)	153.26(18)
C(1)–Cu(2)–C(1)#1	96.4(3)	C(4)–Cu(5)–N(5)#3	147.9(3)
N(2)–Cu(2)–C(1)#1	113.2(3)	C(4)–Cu(5)–N(11)#4	100.3(3)
N(8)–Cu(2)–C(1)#1	93.8(2)	N(5)#3–Cu(5)–N(11)#4	111.6(3)
C(1)–Cu(2)–Cu(2)#1	55.6(2)	C(4)–Cu(5)–Cu(5)#5	103.5(2)
N(2)–Cu(2)–Cu(2)#1	130.0(2)	N(5)#3–Cu(5)–Cu(5)#5	79.8(2)
N(8)–Cu(2)–Cu(2)#1	104.62(18)	N(11)#4–Cu(5)–Cu(5)#5	92.33(19)
C(1)#1–Cu(2)–Cu(2)#1	40.8(2)	C(5)–Cu(6)–N(6)	152.9(3)
C(2)#1–Cu(3)–N(3)	136.0(3)	C(5)–Cu(6)–N(12)	98.4(2)
C(2)#1–Cu(3)–N(9)	110.0(3)	N(6)–Cu(6)–N(12)	107.5(3)
N(3)–Cu(3)–N(9)	111.9(3)	N(13)–Cu(7)–N(14)#6	145.3(3)
C(2)#1–Cu(3)–Cu(3)#2	74.6(3)	N(13)–Cu(7)–C(6)	106.9(3)
N(3)–Cu(3)–Cu(3)#2	111.5(2)	N(14)#6–Cu(7)–C(6)	106.3(3)
N(9)–Cu(3)–Cu(3)#2	98.0(2)		

Symmetry code for :

I-E: #1 –x, –y, –z + 2 #2 –x + 1, –y, –z + 2 #3 –x + 2, –y + 1, –z + 1 #4 –x + 1, –y + 1, –z + 1 #5 –x + 2, –y + 1, –z + 2 #6 x, y, z – 1 #7 –x + 1, –y, –z + 1

II-A

Cl(1)–Cu(2)	2.285(3)	Cu(3)–N(6)#7	2.082(7)	O(6)–Tb(2)	2.431(5)
Cl(1)–Cu(1)	2.332(3)	Cu(3)–Cu(1)#7	2.7860(18)	O(7)–Tb(1)	2.293(5)
Cl(2)–Cu(4)	2.423(3)	Cu(4)–N(7)	2.035(6)	O(8)–Tb(1)#11	2.356(5)
Cl(2)–Cu(4)#4	2.438(2)	Cu(4)–Cl(2)#4	2.438(2)	O(9)–Tb(1)	2.333(5)
Cl(3)–Cu(6)	2.054(3)	Cu(4)–Cu(5)	2.504(19)	O(10)–Tb(1)#12	2.301(5)
Cl(3)–Cu(5)	2.307(3)	Cu(5)–N(8)#4	2.014(7)	O(11)–Tb(1)	2.429(5)
Cu(1)–C(1)	1.892(8)	Cu(6)–Cl(3)#5	2.054(3)	O(15W)–Tb(1)	2.463(5)
C(3)–Cu(5)	1.941(9)	Cu(7)–N(9)	1.917(7)	O(16W)–Tb(1)	2.397(4)
C(3)–Cu(4)	2.019(9)	Cu(7)–N(10)	1.923(6)	O(17W)–Tb(1)	2.537(4)
Cu(1)–N(4)#6	2.046(7)	Tb(1)–O(10)#12	2.301(5)	O(18W)–Tb(2)	2.456(5)
Cu(1)–Cu(3)#3	2.7859(18)	Tb(1)–O(8)#11	2.356(5)	O(19W)–Tb(2)	2.429(5)
Cu(2)–N(5)	2.041(6)	Tb(2)–O(3)#10	2.284(5)	O(20W)–Tb(2)	2.493(5)
Cu(2)–C(2)#2	2.174(13)	Tb(2)–O(1)#9	2.298(5)	Tb(1)–O(10)#12	2.301(5)
Cu(2)–C(2)	2.206(12)	O(1)–Tb(2)#9	2.298(5)	Tb(1)–O(8)#11	2.356(5)
Cu(2)–Cu(2)#2	2.391(2)	O(2)–Tb(2)	2.352(4)	Tb(2)–O(3)#10	2.284(5)
Cu(3)–N(3)	1.895(9)	O(3)–Tb(2)#10	2.284(5)	Tb(2)–O(1)#9	2.298(5)
Cu(3)–N(2)	2.042(11)	O(4)–Tb(2)	2.338(5)		

C(1)–Cu(1)–N(4)#6	118.3(3)	N(2)–Cu(3)–Cu(1)#7	124.3(3)
C(1)–Cu(1)–Cl(1)	123.8(3)	N(6)#7–Cu(3)–Cu(1)#7	114.2(2)
N(4)#6–Cu(1)–Cl(1)	103.6(2)	C(3)–Cu(4)–N(7)	114.8(3)
C(1)–Cu(1)–Cu(3)#3	63.8(2)	C(3)–Cu(4)–Cl(2)	108.7(3)
N(4)#6–Cu(1)–Cu(3)#3	127.2(2)	N(7)–Cu(4)–Cl(2)	104.4(2)
Cl(1)–Cu(1)–Cu(3)#3	117.60(8)	C(3)–Cu(4)–Cl(2)#4	115.1(2)
N(5)–Cu(2)–C(2)#2	109.5(4)	N(7)–Cu(4)–Cl(2)#4	112.4(2)
N(5)–Cu(2)–C(2)	104.1(4)	Cl(2)–Cu(4)–Cl(2)#4	99.72(8)
C(2)#2–Cu(2)–C(2)	113.8(4)	C(3)–Cu(4)–Cu(5)	49.4(2)
N(5)–Cu(2)–Cl(1)	102.1(2)	N(7)–Cu(4)–Cu(5)	115.8(2)
C(2)#2–Cu(2)–Cl(1)	116.9(4)	Cl(2)–Cu(4)–Cu(5)	139.33(7)
C(2)–Cu(2)–Cl(1)	109.1(3)	Cl(2)#4–Cu(4)–Cu(5)	71.02(7)
N(5)–Cu(2)–Cu(2)#2	121.8(2)	C(3)–Cu(5)–N(8)#4	121.4(3)
C(2)#2–Cu(2)–Cu(2)#2	57.6(3)	C(3)–Cu(5)–Cl(3)	129.1(3)
C(2)–Cu(2)–Cu(2)#2	56.3(3)	N(8)#4–Cu(5)–Cl(3)	106.4(2)
Cl(1)–Cu(2)–Cu(2)#2	135.43(9)	C(3)–Cu(5)–Cu(4)	52.2(3)
N(3)–Cu(3)–N(2)	142.2(4)	N(8)#4–Cu(5)–Cu(4)	132.0(2)
N(3)–Cu(3)–N(6)#7	107.2(3)	Cl(3)–Cu(5)–Cu(4)	107.33(9)
N(2)–Cu(3)–N(6)#7	103.0(3)	Cl(3)–Cu(6)–Cl(3)#5	179.999(1)
N(3)–Cu(3)–Cu(1)#7	61.1(2)	N(9)–Cu(7)–N(10)	174.6(3)

Symmetry code for :

II-A: #2 –x + 1, –y, –z #3 x – 1, y , z #4 –x + 2, –y + 1, –z #5 –x + 3, –y + 1, –z
#6 x , y, z – 1 #7 x + 1, y, z #9 –x, –y, –z + 1 #10 –x + 1, –y, –z + 1
#11 –x + 3, –y + 1, –z + 1 #12 –x + 2, –y + 1, –z + 1

II-B

Cl(1)–Cu(2)	2.268(3)	Cu(3)–Cu(1B)#5	2.522(12)	Dy(1)–O(9)	2.321(5)
Cl(1)–Cu(1)	2.321(5)	Cu(3)–Cu(1)#5	2.849(5)	Dy(1)–O(8)	2.343(5)
Cl(2)–Cu(4)	2.405(2)	Cu(4)–C(3)	1.983(9)	Dy(1)–O(16W)	2.413(5)
Cl(2)–Cu(4)#3	2.459(3)	Cu(4)–N(7)	2.041(6)	Dy(1)–O(11)	2.415(5)
Cl(3)–Cu(6)	1.991(4)	Cu(4)–Cl(2)#3	2.459(3)	Dy(1)–O(15W)	2.456(5)
Cl(3)–Cu(5)	2.337(5)	Cu(4)–Cu(5)	2.503(2)	Dy(1)–O(17W)	2.517(5)
Cu(1)–C(1)	1.861(9)	Cu(5)–C(3)	1.948(10)	Dy(2)–O(3)#10	2.278(5)
Cu(1)–N(4)#1	2.072(9)	Cu(5)–N(8)#6	2.030(7)	Dy(2)–O(1)	2.294(5)
Cu(1)–Cu(3)#4	2.849(5)	Cu(3)–C(5)	1.948(10)	Dy(2)–O(4)	2.318(5)
Cu(2)–N(5)	2.043(6)	Cu(6)–Cl(3)#7	1.991(4)	Dy(2)–O(2)#11	2.330(5)
Cu(2)–C(2)#2	2.126(12)	Cu(7)–N(10)	1.923(7)	Dy(2)–O(19W)	2.415(6)
Cu(2)–Cu(2)#2	2.375(2)	Cu(7)–N(9)	1.927(7)	Dy(2)–O(6)	2.429(5)
Cu(3)–N(3)	1.918(8)	Dy(1)–O(10)#8	2.281(5)	Dy(2)–O(18W)	2.443(5)
Cu(3)–N(2)	1.936(10)	Dy(1)–O(7)#9	2.283(5)	Dy(2)–O(20W)	2.489(5)
Cu(3)–N(6)#5	2.086(7)				

Cu(2)–Cl(1)–Cu(1)	99.55(16)	N(3)–Cu(3)–Cu(1)#5	60.7(3)
Cu(4)–Cl(2)–Cu(4)#3	82.14(8)	N(2)–Cu(3)–Cu(1)#5	123.3(3)
Cu(6)–Cl(3)–Cu(5)	116.69(19)	N(6)#5–Cu(3)–Cu(1)#5	112.8(2)
C(1)–Cu(1)–N(4)#1	117.8(4)	C(3)–Cu(4)–N(7)	115.9(3)
C(1)–Cu(1)–Cl(1)	127.8(4)	C(3)–Cu(4)–Cl(2)	117.6(3)
N(4)#1–Cu(1)–Cl(1)	103.7(3)	N(7)–Cu(4)–Cl(2)	113.3(2)
C(1)–Cu(1)–Cu(3)#4	63.5(3)	C(3)–Cu(4)–Cl(2)#3	105.7(3)
N(4)#1–Cu(1)–Cu(3)#4	124.0(3)	N(7)–Cu(4)–Cl(2)#3	103.2(2)
Cl(1)–Cu(1)–Cu(3)#4	117.2(2)	Cl(2)–Cu(4)–Cl(2)#3	97.86(8)
N(5)–Cu(2)–C(2)#2	109.5(3)	C(3)–Cu(4)–Cu(5)	49.8(3)
N(5)–Cu(2)–C(2)	104.7(3)	N(7)–Cu(4)–Cu(5)	116.2(2)
C(2)#2–Cu(2)–C(2)	112.6(3)	Cl(2)–Cu(4)–Cu(5)	75.24(8)
N(5)–Cu(2)–Cl(1)	101.3(2)	Cl(2)#3–Cu(4)–Cu(5)	139.60(8)
C(2)#2–Cu(2)–Cl(1)	117.8(3)	C(3)–Cu(5)–N(8)#6	121.6(4)
C(2)–Cu(2)–Cl(1)	109.5(3)	C(3)–Cu(5)–Cl(3)	131.4(3)
N(5)–Cu(2)–Cu(2)#2	122.0(2)	N(8)#6–Cu(5)–Cl(3)	106.5(3)
C(2)#2–Cu(2)–Cu(2)#2	56.9(3)	C(3)–Cu(5)–Cu(4)	51.1(3)
C(2)–Cu(2)–Cu(2)#2	55.7(3)	N(8)#6–Cu(5)–Cu(4)	129.1(3)
Cl(1)–Cu(2)–Cu(2)#2	136.07(10)	Cl(3)–Cu(5)–Cu(4)	103.62(12)
N(3)–Cu(3)–N(2)	143.0(3)	Cl(3)–Cu(6)–Cl(3)#7	180.000(1)
N(3)–Cu(3)–N(6)#5	107.7(3)	N(10)–Cu(7)–N(9)	172.0(4)
N(2)–Cu(3)–N(6)#5	103.4(3)		

Symmetry code for :

II-B: #1 –x – 1, –y + 1, –z #2 –x, –y + 1, –z #3 –x + 1, –y + 2, –z #4 x – 1, y, z
#5 x + 1, y, z #6 x – 1, y, z – 1 #7 –x + 2, –y + 2, –z #8 –x + 3, –y + 2, –z + 1
#9 –x + 2, –y + 2, –z + 1 #10 –x , –y + 1, –z + 1 #11 –x – 1, –y + 1, –z + 1

III-A

Cu(1)–C(1)	1.845(7)	Cu(3)–Cu(2)#7	2.9772(10)	O(1)W–Tb(1)	2.525(4)
Cu(1)–N(2)	1.870(6)	F(1)–Tb(2)	2.503(4)	O(2)–Tb(1)	2.326(4)
Cu(1)–N(5)#3	2.077(6)	F(1)–Tb(1)	2.525(4)	O(3)–Tb(2)#10	2.383(4)
Cu(2)–C(2)#4	1.885(7)	F(2)–Tb(1)	2.340(3)	O(4)–Tb(2)	2.344(4)
Cu(2)–N(1)	1.941(7)	F(2)–Tb(2)#8	2.369(3)	O(5)–Tb(1)#12	2.379(4)
Cu(2)–N(4)	2.059(2)	F(2)–Tb(1)#9	2.438(3)	O(6)–Tb(1)	2.345(4)
Cu(2)–C(2)#5	2.499(7)	F(3)–Tb(2)	2.268(3)	O(7)–Tb(2)	2.403(4)
Cu(2)–Cu(2)#6	2.712(2)	F(3)–Tb(1)	2.272(3)	O(8)–Tb(2)#13	2.304(3)
Cu(2)–Cu(3)	2.9772(10)	F(3)–Tb(2)#10	2.437(3)	O(9)–Tb(1)	2.313(4)
Cu(3)–N(3)#7	1.925(2)	O(1)W–Tb(2)	2.503(4)		

C(1)–Cu(1)–N(2)	136.6(3)	N(4)–Cu(2)–Cu(3)	118.28(7)
C(1)–Cu(1)–N(5)#3	112.9(3)	C(2)#5–Cu(2)–Cu(3)	149.10(15)
N(2)–Cu(1)–N(5)#3	110.5(2)	Cu(2)#6–Cu(2)–Cu(3)	123.22(5)
C(2)#4–Cu(2)–N(1)	131.1(3)	N(3)–Cu(3)–N(3)#7	180.00(16)
C(2)#4–Cu(2)–N(4)	115.8(2)	N(3)–Cu(3)–Cu(2)	80.57(7)
N(1)–Cu(2)–N(4)	106.6(2)	N(3)#7–Cu(3)–Cu(2)	99.43(15)
C(2)#4–Cu(2)–C(2)#5	105.0(2)	N(3)–Cu(3)–Cu(2)#7	99.43(7)
N(1)–Cu(2)–C(2)#5	96.5(3)	N(3)#7–Cu(3)–Cu(2)#7	80.57(15)
N(4)–Cu(2)–C(2)#5	91.82(16)	Tb(2)–F(1)–Tb(1)	100.81(14)
C(2)#4–Cu(2)–Cu(2)#6	62.9(2)	Tb(1)–F(2)–Tb(2)#8	127.63(15)
N(1)–Cu(2)–Cu(2)#6	124.1(2)	Tb(1)–F(2)–Tb(1)#9	106.22(12)
N(4)–Cu(2)–Cu(2)#6	109.40(9)	Tb(2)#8–F(2)–Tb(1)#9	109.19(12)
C(2)#5–Cu(2)–Cu(2)#6	42.17(17)	Tb(2)–F(3)–Tb(1)	117.20(13)
C(2)#4–Cu(2)–Cu(3)	69.6(2)	Tb(2)–F(3)–Tb(2)#10	117.72(12)
N(1)–Cu(2)–Cu(3)	69.6(2)	Tb(1)–F(3)–Tb(2)#10	112.60(12)

Symmetry code for :

III-A: #3 x + 1/2, y + 1/2, z #4 x, –y + 1, z + 1/2 #5 –x + 1/2, y + 1/2, –z + 1/2
#6 –x + 1/2, –y + 3/2, –z + 1 #7 –x + 1/2, –y + 1/2, –z + 1 #8 x, y – 1, z
#9 –x, –y, –z + 1 #10 –x, –y + 1, –z + 1 #12 x, y + 1, z
#13 –x, y – 1, –z + 1/2 #14 –x, y, –z + 1/2 #15 –x, y + 1, –z + 1/2

III-B

Cu(1)–C(1)	1.857(8)	Dy(1)–F(3)	2.271(3)	Dy(1)–Dy(2)#10	3.9120(5)
Cu(1)–N(2)	1.871(7)	Dy(1)–O(9)	2.309(4)	Dy(2)–F(3)	2.259(3)
Cu(1)–N(5)#3	2.085(6)	Dy(1)–O(2)	2.315(4)	Dy(2)–O(8)#11	2.306(4)
Cu(2)–N(4)	2.055(3)	Dy(1)–O(6)	2.322(4)	Dy(2)–O(4)	2.341(4)
Cu(2)–C(2)#4	1.887(8)	Dy(1)–F(2)	2.340(4)	Dy(2)–F(2)#12	2.365(4)
Cu(2)–N(1)	1.931(9)	Dy(1)–O(5)#8	2.378(4)	Dy(2)–O(3)#10	2.377(5)
Cu(2)–C(2)#5	2.496(9)	Dy(1)–F(2)#9	2.436(4)	Dy(2)–O(7)	2.393(4)
Cu(2)–Cu(2)#6	2.713(2)	Dy(1)–F(1)	2.524(4)	Dy(2)–F(3)#10	2.434(3)
Cu(2)–Cu(3)	2.9827(11)	Dy(1)–O(1)W	2.524(4)	Dy(2)–F(1)	2.502(4)
Cu(3)–N(3)	1.929(3)	Dy(1)–Dy(1)#9	3.8177(6)	Dy(2)–O(1)W	2.502(4)
Cu(3)–Cu(2)#7	2.9827(11)				

C(1)–Cu(1)–N(2)	135.4(3)	F(2)–Dy(1)–F(1)	144.80(13)
C(1)–Cu(1)–N(5)#3	113.8(3)	F(2)#9–Dy(1)–F(1)	130.53(12)
N(2)–Cu(1)–N(5)#3	110.6(3)	F(3)–Dy(1)–Dy(1)#9	86.91(9)
C(2)#4–Cu(2)–N(1)	130.0(3)	F(2)–Dy(1)–Dy(1)#9	37.79(9)
C(2)#4–Cu(2)–N(4)	116.4(3)	F(2)#9–Dy(1)–Dy(1)#9	36.06(8)
N(1)–Cu(2)–N(4)	106.9(3)	F(1)–Dy(1)–Dy(1)#9	156.25(10)
C(2)#4–Cu(2)–C(2)#5	104.9(3)	F(3)–Dy(1)–Dy(2)#10	35.11(8)
N(1)–Cu(2)–C(2)#5	97.2(3)	F(2)–Dy(1)–Dy(2)#10	101.33(9)
N(4)–Cu(2)–C(2)#5	91.84(19)	F(2)#9–Dy(1)–Dy(2)#10	34.84(8)
C(2)#4–Cu(2)–Cu(2)#6	62.7(3)	F(1)–Dy(1)–Dy(2)#10	96.06(9)
N(1)–Cu(2)–Cu(2)#6	124.2(3)	Dy(1)#9–Dy(1)–Dy(2)#10	66.220(10)
N(4)–Cu(2)–Cu(2)#6	109.79(10)	F(3)–Dy(2)–F(2)#12	124.78(12)
C(2)#5–Cu(2)–Cu(2)#6	42.22(18)	F(2)#12–Dy(2)–F(3)#10	65.05(12)
C(2)#4–Cu(2)–Cu(3)	69.2(3)	F(3)–Dy(2)–F(1)	70.78(13)
N(1)–Cu(2)–Cu(3)	68.9(3)	F(2)#12–Dy(2)–F(1)	150.52(13)
N(4)–Cu(2)–Cu(3)	118.30(8)	F(3)#10–Dy(2)–F(1)	114.55(13)
C(2)#5–Cu(2)–Cu(3)	149.09(17)	F(3)–Dy(2)–Dy(1)#10	88.75(8)
Cu(2)#6–Cu(2)–Cu(3)	122.84(5)	F(2)#12–Dy(2)–Dy(1)#10	36.03(9)
N(3)#7–Cu(3)–N(3)	180.0(3)	F(3)#10–Dy(2)–Dy(1)#10	32.45(8)
N(3)#7–Cu(3)–Cu(2)	99.55(17)	F(1)–Dy(2)–Dy(1)#10	146.06(10)
N(3)–Cu(3)–Cu(2)	80.45(8)	Dy(2)–F(1)–Dy(1)	100.87(16)
N(3)#7–Cu(3)–Cu(2)#7	80.45(17)	Dy(1)–F(2)–Dy(2)#8	127.67(17)
N(3)–Cu(3)–Cu(2)#7	99.55(8)	Dy(1)–F(2)–Dy(1)#9	106.15(14)
F(3)–Dy(1)–F(2)	109.17(13)	Dy(2)#8–F(2)–Dy(1)#9	109.13(13)
F(3)–Dy(1)–F(2)#9	66.42(11)	Dy(2)–F(3)–Dy(1)	117.56(15)
F(2)–Dy(1)–F(2)#9	73.85(14)	Dy(2)–F(3)–Dy(2)#10	117.82(13)
F(3)–Dy(1)–F(1)	70.18(13)	Dy(1)–F(3)–Dy(2)#10	112.43(13)

Symmetry code for :

III-B: #3 x + 1/2, y + 1/2, z #4 x, –y + 1, z + 1/2 #5 –x + 1/2, y + 1/2, –z + 1/2
#6 –x + 1/2, –y + 3/2, –z + 1 #7 –x + 1/2, –y + 1/2, –z + 1 #8 x, y – 1, z
#9 –x, –y, –z + 1 #10 –x, –y + 1, –z + 1 #11 –x, y + 1, –z + 1/2 #12 x, y + 1, z
#13 x – 1/2, y – 1/2, z #14 –x, y – 1, –z + 1/2 #15 –x, y, –z + 1/2

IV-A

Cu(1)–C(1)	1.941(6)	Cu(5)–N(4)#7	1.981(10)	Tb(2)–O(11)	2.388(4)
Cu(1)–N(5)#2	1.990(5)	Cu(5)–N(4)	1.981(10)	Tb(2)–O(17)#8	2.420(3)
Cu(1)–N(6)	2.008(5)	Tb(1)–O(5)#5	2.361(4)	Tb(2)–O(3)	2.420(4)
Cu(2)–C(2)	1.878(7)	Tb(1)–O(18)#5	2.360(4)	Tb(2)–O(14)	2.446(4)
Cu(2)–N(1)#3	1.891(6)	Tb(1)–O(4)	2.378(4)	Tb(2)–O(13)	2.456(4)
Cu(2)–N(7)	2.145(5)	Tb(1)–O(17)	2.390(3)	Tb(3)–O(8)	2.300(4)
Cu(2)–Cu(4)#4	2.8874(15)	Tb(1)–O(2)#8	2.406(4)	Tb(3)–O(10)	2.328(4)
Cu(3)–C(3)	1.884(6)	Tb(1)–O(13)	2.406(4)	Tb(3)–O(18)	2.376(3)
Cu(3)–N(2)#5	1.904(6)	Tb(1)–O(16)#5	2.413(3)	Tb(3)–O(6)	2.392(4)
Cu(3)–N(8)	2.098(5)	Tb(1)–O(12)#8	2.441(4)	Tb(3)–O(1)	2.400(4)
Cu(4)–C(4)	2.151(8)	Tb(2)–O(9)	2.298(4)	Tb(3)–O(18)#9	2.417(4)
Cu(4)–N(9)	1.946(5)	Tb(2)–O(7)	2.308(4)	Tb(3)–O(15)	2.440(4)
Cu(4)–N(10)#6	1.957(5)	Tb(2)–O(17)	2.361(4)	Tb(3)–O(16)	2.446(4)
Cu(4)–Cu(2)#4	2.8874(15)				

N(5)#2–Cu(1)–N(6)	128.4(2)	C(3)–Cu(3)–N(8)	102.5(2)
C(2)–Cu(2)–N(1)#3	153.4(3)	N(2)#5–Cu(3)–N(8)	111.6(2)
C(2)–Cu(2)–N(7)	104.6(2)	N(9)–Cu(4)–N(10)#6	159.6(3)
N(1)#3–Cu(2)–N(7)	101.9(2)	N(9)–Cu(4)–C(4)	97.8(3)
C(2)–Cu(2)–Cu(4)#4	98.01(19)	N(10)#6–Cu(4)–C(4)	101.0(3)
N(1)#3–Cu(2)–Cu(4)#4	68.6(2)	N(9)–Cu(4)–Cu(2)#4	80.62(18)
N(7)–Cu(2)–Cu(4)#4	120.92(16)	N(10)#6–Cu(4)–Cu(2)#4	94.08(17)
C(3)–Cu(3)–N(2)#5	145.0(3)	C(4)–Cu(4)–Cu(2)#4	127.3(3)
C(3)#1–X(3)–Cu(3)	171.9(8)	N(4)#7–Cu(5)–N(4)	179.998(2)

Symmetry code for :

IV-A: #1 –x, –y, –z #2 x, y, z + 1 #3 –x ,–y, –z + 1 #4 –x, –y + 1, –z + 1
#5 x, y – 1, z #6 –x + 1, –y + 1, –z + 2 #8 –x + 1, –y, –z + 1 #9 –x + 1, –y + 1, –z + 1

IV-B

Cu(1)–C(1)	1.953(8)	Cu(5)–N(4)#7	1.946(12)	Dy(2)–O(17)#8	2.409(4)
Cu(1)–N(5)#2	1.994(6)	Dy(1)–O(5)#5	2.351(4)	Dy(2)–O(3)	2.408(4)
Cu(1)–N(6)	1.997(6)	Dy(1)–O(18)#5	2.362(4)	Dy(2)–O(13)	2.441(4)
Cu(2)–C(2)	1.873(8)	Dy(1)–O(4)	2.368(4)	Dy(2)–O(14)	2.449(5)
Cu(2)–N(1)#3	1.888(7)	Dy(1)–O(17)	2.373(4)	Dy(3)–O(8)	2.291(4)
Cu(2)–N(7)	2.142(6)	Dy(1)–O(2)#8	2.388(4)	Dy(3)–O(10)	2.316(4)
Cu(2)–Cu(4)#4	2.8815(17)	Dy(1)–O(16)#5	2.397(4)	Dy(3)–O(18)	2.363(4)
Cu(3)–C(3)	1.893(7)	Dy(1)–O(13)	2.406(4)	Dy(3)–O(6)	2.376(4)
Cu(3)–N(2)#5	1.899(7)	Dy(1)–O(12)#8	2.435(4)	Dy(3)–O(1)	2.391(4)
Cu(3)–N(8)	2.102(6)	Dy(2)–O(9)	2.290(5)	Dy(3)–O(18)#9	2.408(4)
Cu(4)–N(9)	1.940(7)	Dy(2)–O(7)	2.298(4)	Dy(3)–O(15)	2.429(5)
Cu(4)–N(10)#6	1.959(6)	Dy(2)–O(17)	2.368(4)	Dy(3)–O(16)	2.440(4)
Cu(5)–N(4)	1.946(12)	Dy(2)–O(11)	2.375(5)		

N(1)–C(1)–Cu(1)	166.8(7)	N(7)–Cu(2)–Cu(4)#4	121.3(2)
N(2)–C(2)–Cu(2)	168.4(7)	C(3)–Cu(3)–N(2)#5	144.9(3)
C(3)#1–C(3)–Cu(3)	171.4(10)	C(3)–Cu(3)–N(8)	102.5(3)
C(1)–Cu(1)–N(5)#2	111.6(3)	N(2)#5–Cu(3)–N(8)	111.9(3)
C(1)–Cu(1)–N(6)	110.0(3)	N(9)–Cu(4)–N(10)#6	159.5(3)
N(5)#2–Cu(1)–N(6)	129.4(2)	N(9)–Cu(4)–C(4)	97.9(3)
C(2)–Cu(2)–N(1)#3	153.3(3)	N(10)#6–Cu(4)–C(4)	100.6(3)
C(2)–Cu(2)–N(7)	105.1(3)	N(9)–Cu(4)–Cu(2)#4	81.0(2)
N(1)#3–Cu(2)–N(7)	101.6(3)	N(10)#6–Cu(4)–Cu(2)#4	94.4(2)
C(2)–Cu(2)–Cu(4)#4	97.1(2)	C(4)–Cu(4)–Cu(2)#4	128.1(4)
N(1)#3–Cu(2)–Cu(4)#4	69.1(2)	N(4)–Cu(5)–N(4)#7	179.999(3)

Symmetry code for :

IV-B: #1 –x, –y, –z #2 x, y, z + 1 #3 –x ,–y, –z + 1 #4 –x, –y + 1, –z + 1
#5 x, y – 1, z #6 –x + 1, –y + 1, –z + 2 #7 –x + 1, –y + 2, –z + 2
#8 –x + 1, –y, –z + 1 #9 –x + 1, –y + 1, –z + 1

V-A

Cu(1)–N(4)	1.938(4)	Cu(4)–N(8)	2.104(4)	Tb(1)–O(15W)	2.491(3)
Cu(1)–N(5)	2.111(4)	Cu(4)–Cu(5)	3.0071(10)	Tb(1)–O(13)	2.524(3)
Cu(1)–C(1)#2	2.350(5)	Cu(5)–N(10)#3	1.907(4)	Tb(2)–O(10)	2.319(3)
Cu(1)–Cu(1)#2	2.5029(11)	Cu(5)–N(9)	1.909(4)	Tb(2)–O(3)#6	2.343(3)
Cu(2)–C(2)#1	1.922(5)	Tb(1)–O(7)#5	2.251(3)	Tb(2)–O(6)	2.345(3)
Cu(2)–N(1)	1.925(4)	Tb(1)–O(8)#4	2.332(3)	Tb(2)–O(1)#7	2.348(3)
Cu(2)–N(6)	2.106(6)	Tb(1)–O(5)	2.340(3)	Tb(2)–O(2)	2.354(3)
Cu(3)–N(2)	1.988(4)	Tb(1)–O(11)	2.340(3)	Tb(2)–O(4)#5	2.377(3)
Cu(3)–N(7)#3	2.098(4)	Tb(1)–O(9)	2.356(3)	Tb(2)–O(16W)	2.460(3)
Cu(3)–Cu(4)	2.6777(8)	Tb(1)–O(14)	2.427(3)	Tb(2)–O(13)	2.524(3)
Cu(4)–N(3)#4	1.919(4)				

N(4)–Cu(1)–C(1)	134.24(18)	N(7)#3–Cu(3)–C(4)	93.83(15)
N(4)–Cu(1)–N(5)	102.23(15)	C(3)–Cu(3)–Cu(4)	87.11(15)
C(1)–Cu(1)–N(5)	105.23(18)	N(2)–Cu(3)–Cu(4)	128.45(11)
N(4)–Cu(1)–C(1)#2	101.14(16)	N(7)#3–Cu(3)–Cu(4)	107.84(11)
C(1)–Cu(1)–C(1)#2	109.46(15)	C(4)–Cu(3)–Cu(4)	43.97(11)
N(5)–Cu(1)–C(1)#2	99.47(16)	C(4)–Cu(4)–N(3)#4	141.97(18)
N(4)–Cu(1)–Cu(1)#2	136.40(12)	C(4)–Cu(4)–N(8)	114.00(16)
C(1)–Cu(1)–Cu(1)#2	62.28(14)	N(3)#4–Cu(4)–N(8)	101.79(15)
N(5)–Cu(1)–Cu(1)#2	111.03(11)	C(4)–Cu(4)–Cu(3)	58.14(13)
C(1)#2–Cu(1)–Cu(1)#2	47.18(12)	N(3)#4–Cu(4)–Cu(3)	122.68(13)
C(2)#1–Cu(2)–N(1)	137.3(2)	N(8)–Cu(4)–Cu(3)	108.40(10)
C(2)#1–Cu(2)–N(6)	118.3(2)	C(4)–Cu(4)–Cu(5)	68.62(13)
N(1)–Cu(2)–N(6)	102.7(2)	N(3)#4–Cu(4)–Cu(5)	82.41(12)
C(3)–Cu(3)–N(2)	120.79(18)	N(8)–Cu(4)–Cu(5)	121.19(10)
C(3)–Cu(3)–N(7)#3	113.54(17)	Cu(3)–Cu(4)–Cu(5)	117.99(3)
N(2)–Cu(3)–N(7)#3	99.36(15)	N(10)#3–Cu(5)–N(9)	168.56(19)
C(3)–Cu(3)–C(4)	130.23(18)	N(10)#3–Cu(5)–Cu(4)	102.17(12)
N(2)–Cu(3)–C(4)	92.38(15)	N(9)–Cu(5)–Cu(4)	76.05(11)

Symmetry code for :

V-A: #1 –x+2, –y + 1, –z + 3 #2 –x + 2, –y + 1, –z + 2 #3 x + 1, y, z + 1
#4 x, –y + 3/2, z – 1/2 #5 x, y, z – 1 #6 –x + 1, –y + 1,–z + 2
#7 –x + 1, –y + 1, –z + 1

V-B

Cu(1)–N(4)	1.930(5)	Cu(4)–N(3)#4	1.922(6)	Dy(1)–O(15W)	2.482(4)
Cu(1)–N(5)	2.107(6)	Cu(4)–N(8)	2.102(5)	Dy(1)–O(13)	2.518(4)
Cu(1)–C(1)	1.946(8)	Cu(4)–Cu(5)	3.0079(16)	Dy(2)–O(10)	2.293(4)
Cu(1)–C(1)#2	2.344(8)	Cu(5)–N(10)#3	1.904(6)	Dy(2)–O(6)	2.325(4)
Cu(1)–Cu(1)#2	2.4989(17)	Cu(5)–N(9)	1.906(5)	Dy(2)–O(2)	2.339(5)
Cu(2)–C(2)#1	1.928(8)	Dy(1)–O(7)#5	2.250(5)	Dy(2)–O(1)#6	2.339(5)
Cu(2)–N(1)	1.929(7)	Dy(1)–O(8)#4	2.322(4)	Dy(2)–O(3)#7	2.340(5)
Cu(2)–N(6)	2.098(9)	Dy(1)–O(5)	2.323(4)	Dy(2)–O(4)#5	2.360(5)
Cu(3)–N(2)	1.981(6)	Dy(1)–O(11)	2.332(4)	Dy(2)–O(16W)	2.445(4)
Cu(3)–N(7)#3	2.090(5)	Dy(1)–O(9)	2.346(4)	Dy(2)–O(13)	2.520(4)
Cu(3)–Cu(4)	2.6737(14)	Dy(1)–O(14)	2.419(4)		

N(4)–Cu(1)–C(1)	134.2(3)	N(7)#3–Cu(3)–C(4)	94.2(2)
N(4)–Cu(1)–N(5)	102.5(2)	C(3)–Cu(3)–Cu(4)	87.3(2)
C(1)–Cu(1)–N(5)	105.3(3)	N(2)–Cu(3)–Cu(4)	128.20(17)
N(4)–Cu(1)–C(1)#2	100.9(2)	N(7)#3–Cu(3)–Cu(4)	108.42(17)
C(1)–Cu(1)–C(1)#2	109.5(3)	C(4)–Cu(3)–Cu(4)	44.10(16)
N(5)–Cu(1)–C(1)#2	99.4(3)	C(4)–Cu(4)–N(3)#4	141.6(3)
N(4)–Cu(1)–Cu(1)#2	136.06(18)	C(4)–Cu(4)–N(8)	114.1(3)
C(1)–Cu(1)–Cu(1)#2	62.2(2)	N(3)#4–Cu(4)–N(8)	101.9(2)
N(5)–Cu(1)–Cu(1)#2	111.08(16)	C(4)–Cu(4)–Cu(3)	58.0(2)
C(1)#2–Cu(1)–Cu(1)#2	47.26(18)	N(3)#4–Cu(4)–Cu(3)	122.73(19)
C(2)#1–Cu(2)–N(1)	136.9(3)	N(8)–Cu(4)–Cu(3)	108.80(16)
C(2)#1–Cu(2)–N(6)	118.3(4)	C(4)–Cu(4)–Cu(5)	68.5(2)
N(1)–Cu(2)–N(6)	103.2(3)	N(3)#4–Cu(4)–Cu(5)	82.12(19)
C(3)–Cu(3)–N(2)	120.4(3)	N(8)–Cu(4)–Cu(5)	121.11(16)
C(3)–Cu(3)–N(7)#3	113.3(2)	Cu(3)–Cu(4)–Cu(5)	117.66(4)
N(2)–Cu(3)–N(7)#3	99.5(2)	N(10)#3–Cu(5)–N(9)	169.1(3)
C(3)–Cu(3)–C(4)	130.6(3)	N(10)#3–Cu(5)–Cu(4)	102.21(19)
N(2)–Cu(3)–C(4)	92.3(2)	N(9)–Cu(5)–Cu(4)	75.87(18)

Symmetry code for :

V-B: #1 –x+2, –y + 1, –z + 3 #2 –x + 2, –y + 1, –z + 2 #3 x + 1, y, z + 1
#4 x, –y + 3/2, z – 1/2 #5 x, y, z – 1 #6 –x + 1, –y + 1,–z + 1
#7 –x + 1, –y + 1, –z + 2

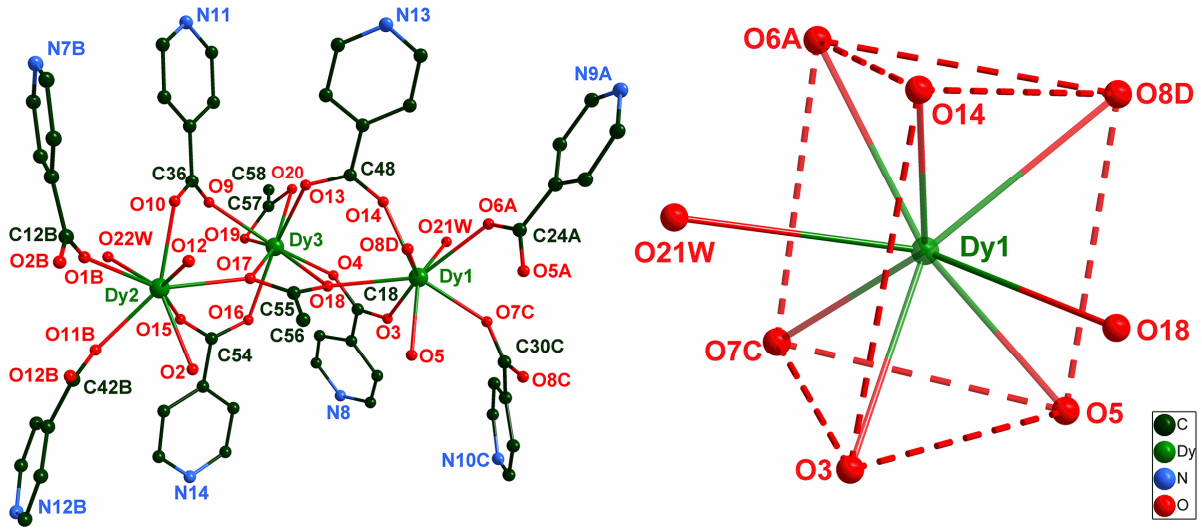

Fig. S1 View of the coordination environments of Dy (left) and the slightly distorted dicapped trigonal prism coordination geometry of Dy1 center (right). All H atoms and lattice water molecules are omitted for clarity. Symmetry codes: A $(1 - x, - y, 1 - z)$; B $(1 - x, 1 - y, 1 - z)$; C $(1 - x, - y, 2 - z)$; D $(x, y, -1 + z)$.

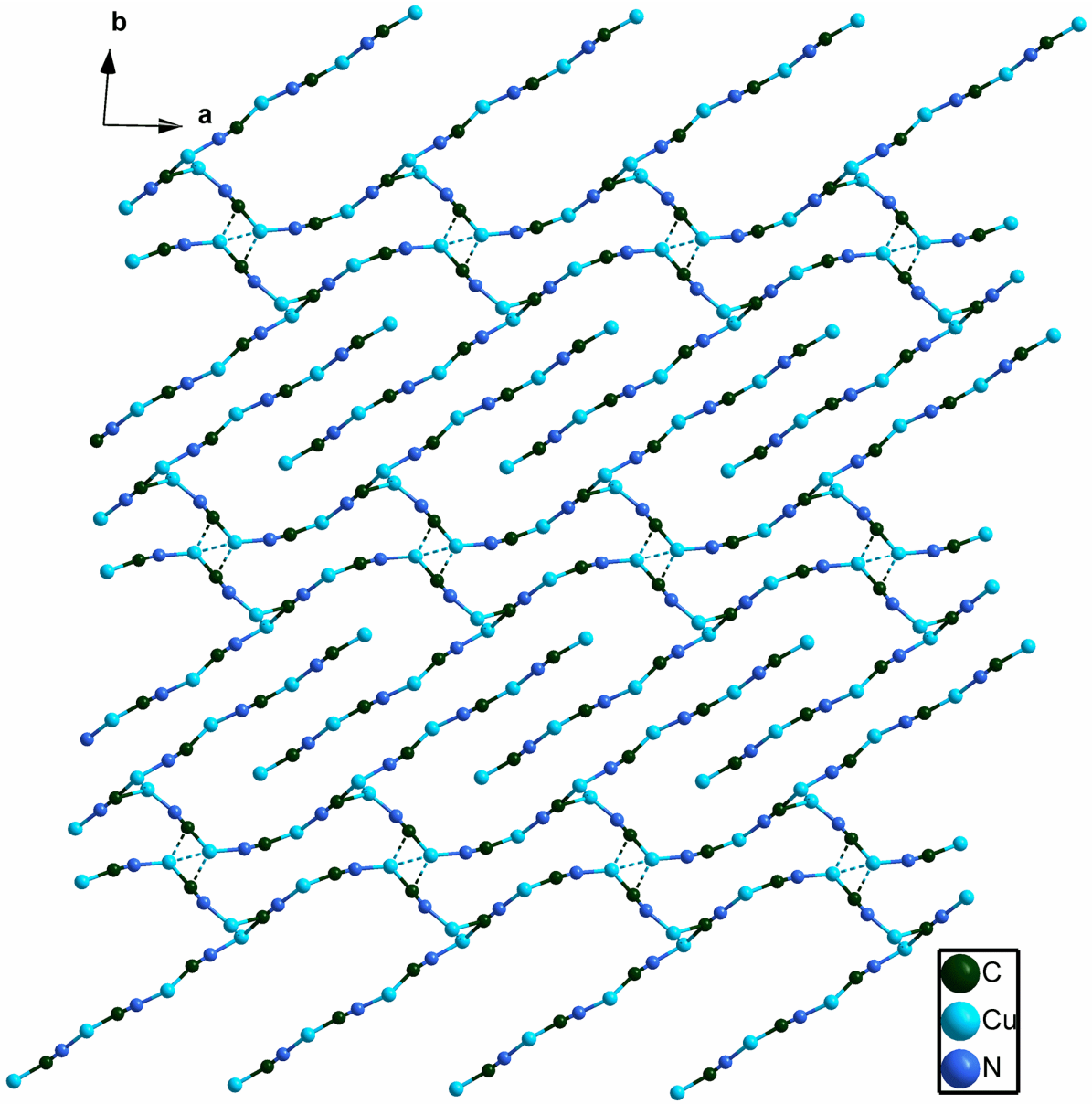

Fig. S2 View of Cu-inorganic motifs of **I-E**. The sidearms of adjacent double-stranded ribbons interdigitate to occupy the inter-ribbon space. Cu-Cu and Cu-C interactions within the dimer units are shown as dashed lines

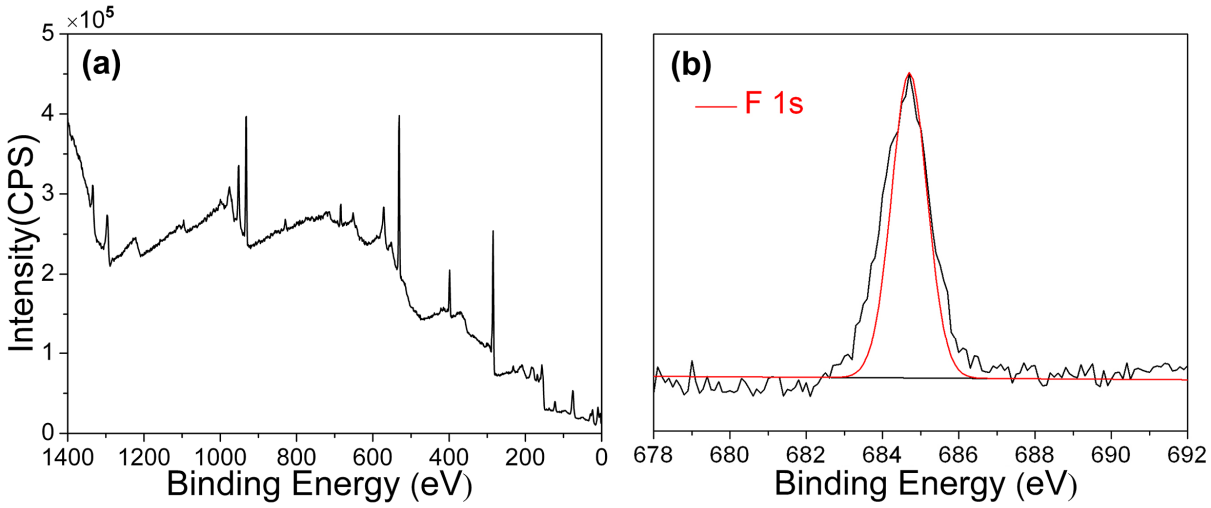

Fig. S3 The XPS spectrum of HCP **III-B**: (a) wide spectrum, (b) F 1s spectrum.

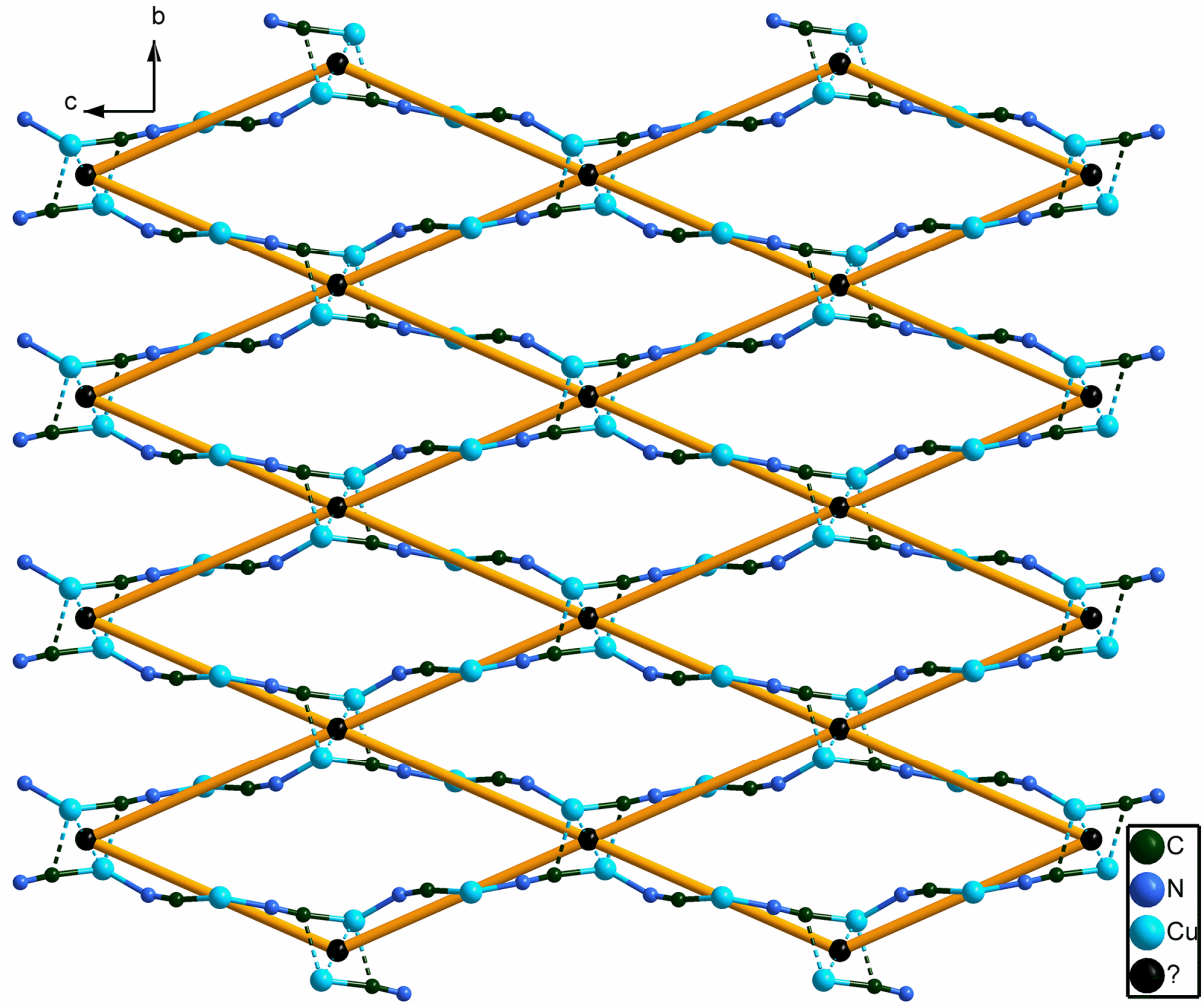

Fig. S4 The topological network of 2D (4, 4) net in layered $\{Cu(CN)\}_{\infty}$ motif in **III-B**. Cu-Cu and Cu-C interactions within the dimer units are shown as dashed lines.

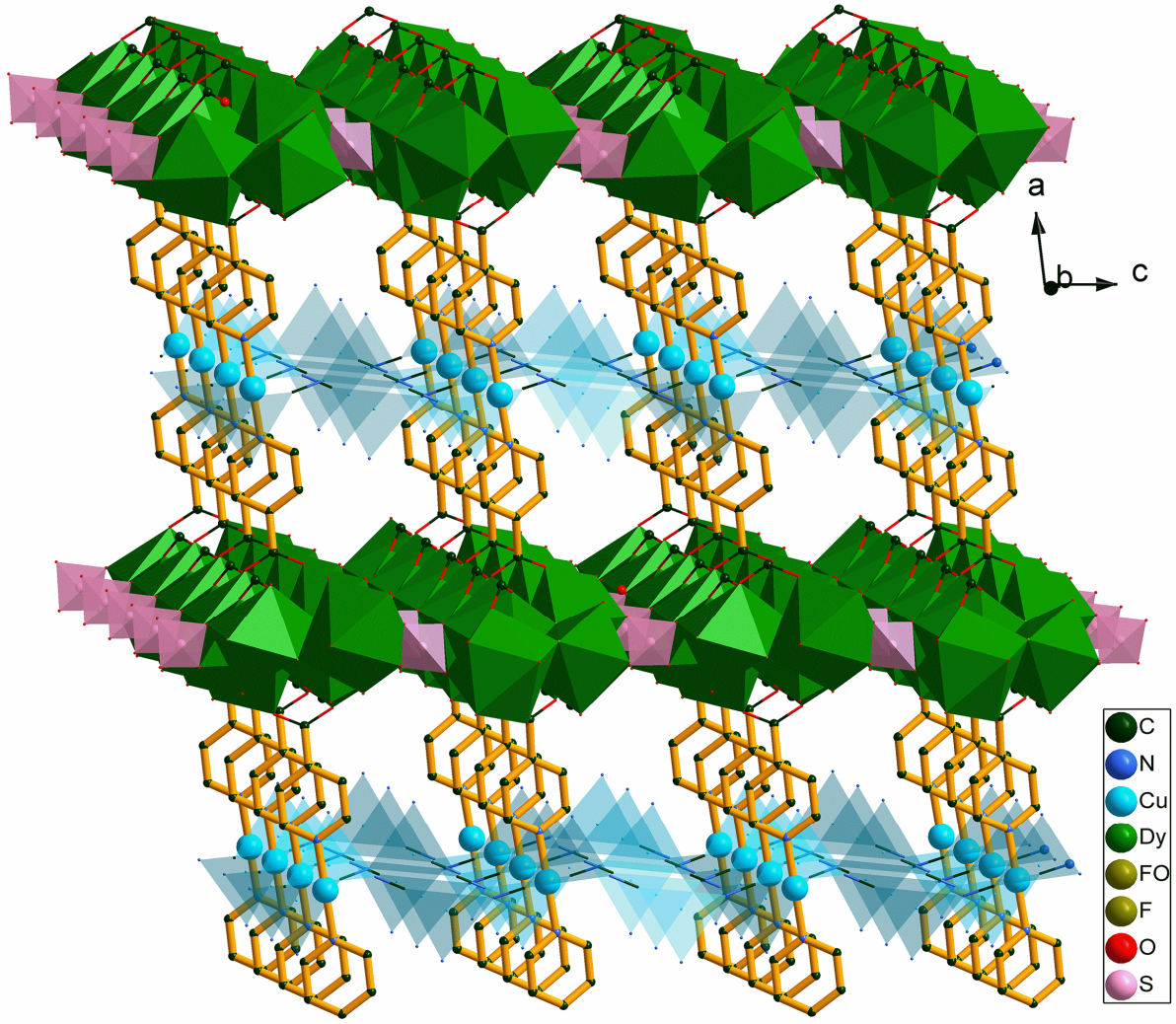

Fig. S5 View of the [Cu(ina)$_2$] long pillar in the 3D structure of **III-B**. The discrete [Cu(ina)$_2$] long pillar units thread through the {Cu(CN)}$_\infty$ layer motifs to directly link two adjacent Dy-organic layer motifs.

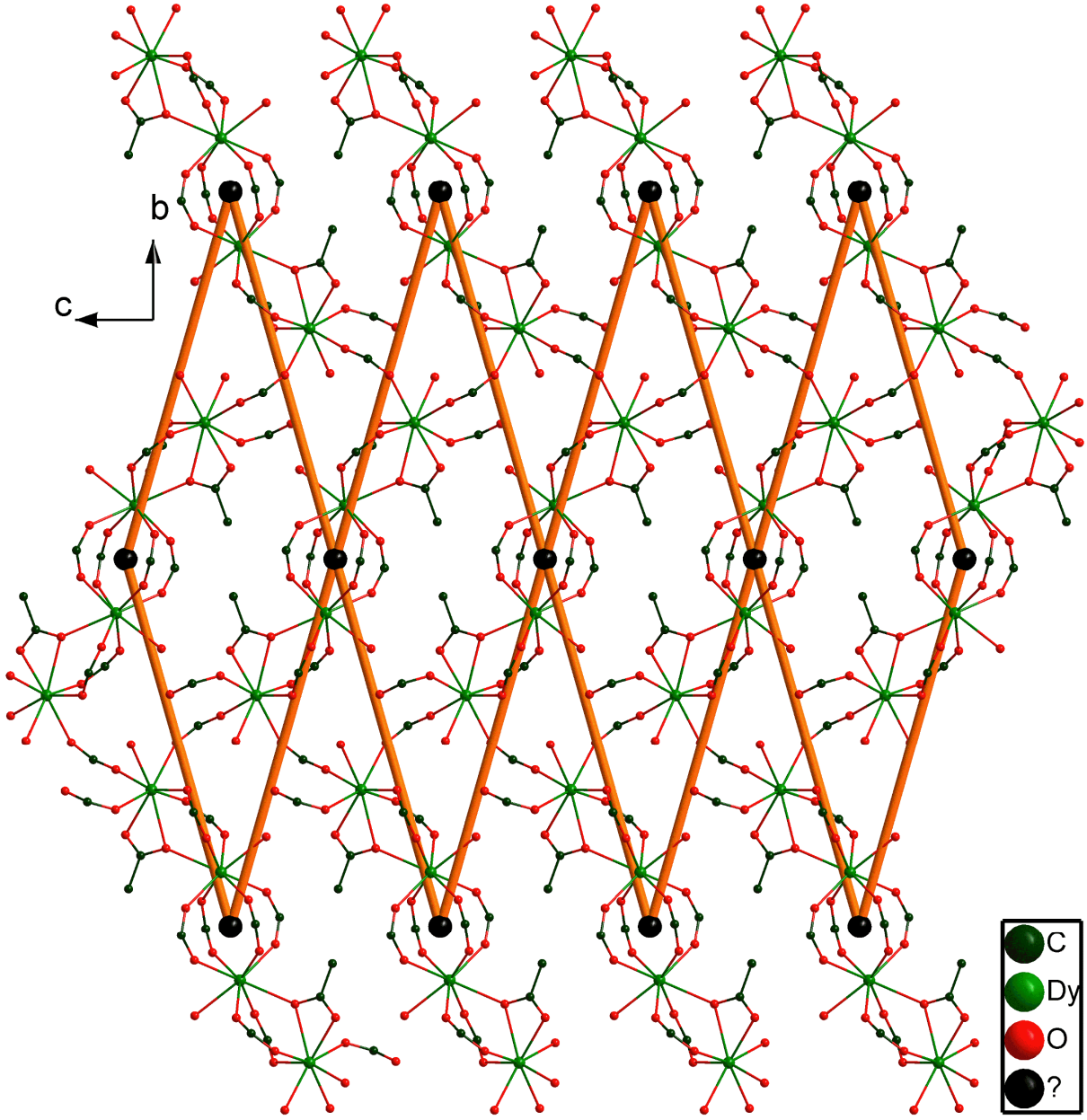

Fig. S6 The topological network of 2D (4, 4) net in layered Dy-organic motif in **V-B**.

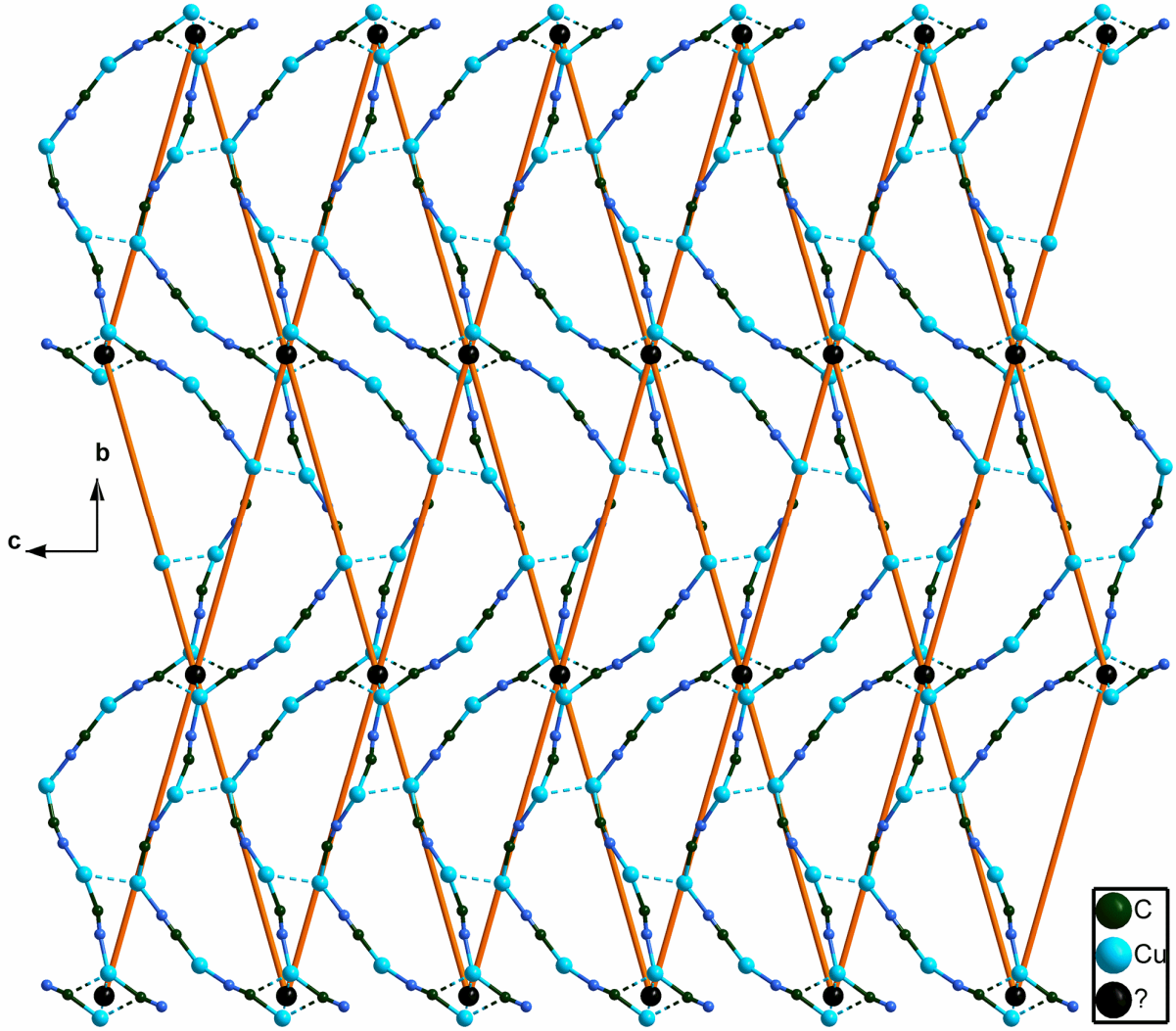

Fig. S7 The topological network of 2D (4, 4) net in layered $\{Cu(CN)\}_{\infty}$ motif in **V-B**. Cu-Cu and Cu-C interactions are shown as dashed lines.

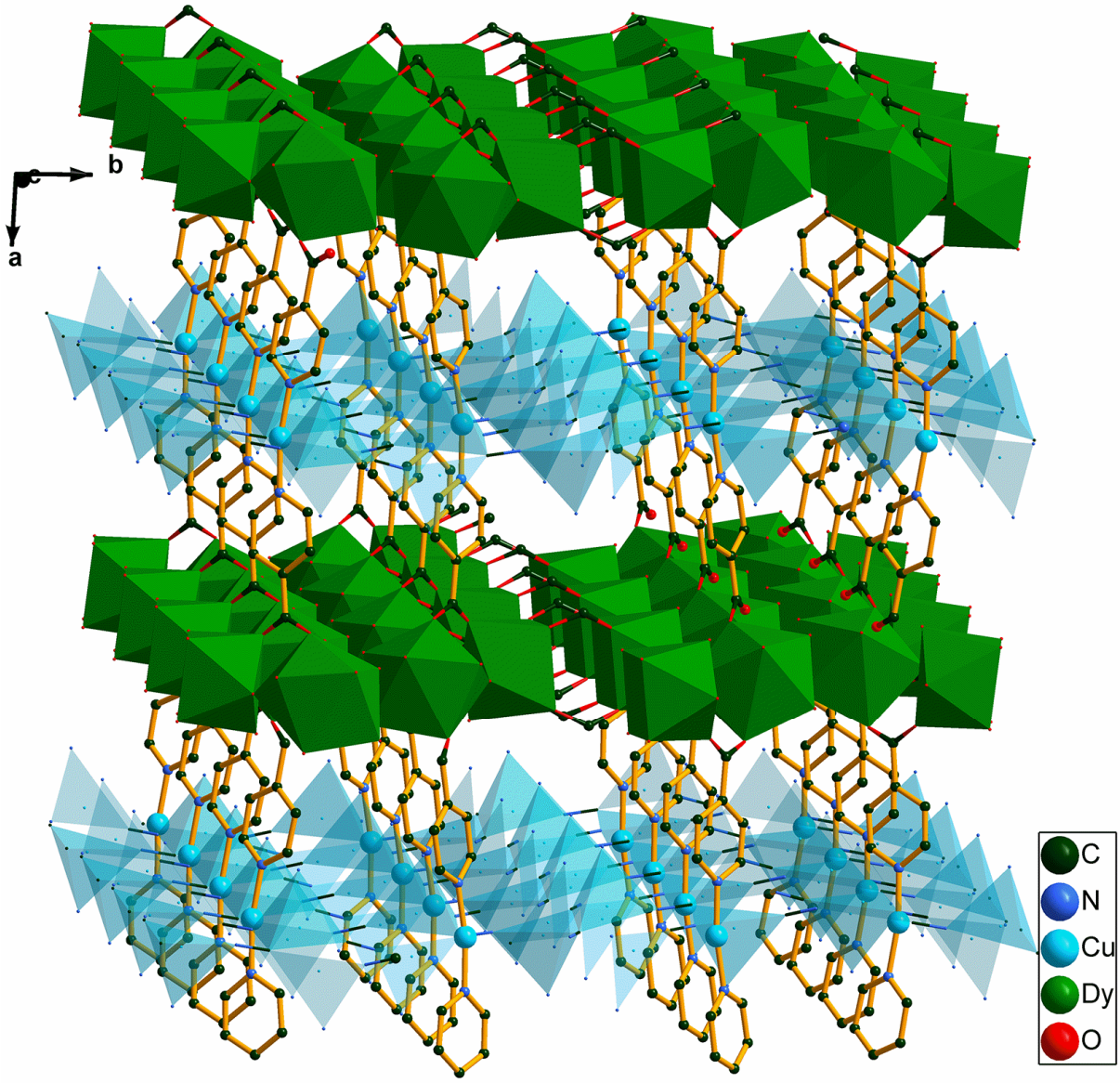

Fig. S8 View of the discrete $[Cu(ina)_2]$ long pillar units in **V-B**. The discrete $[Cu(ina)_2]$ long pillar units thread through the $\{Cu(CN)\}_\infty$ layer motifs to directly link two adjacent Dy-organic layer motifs.

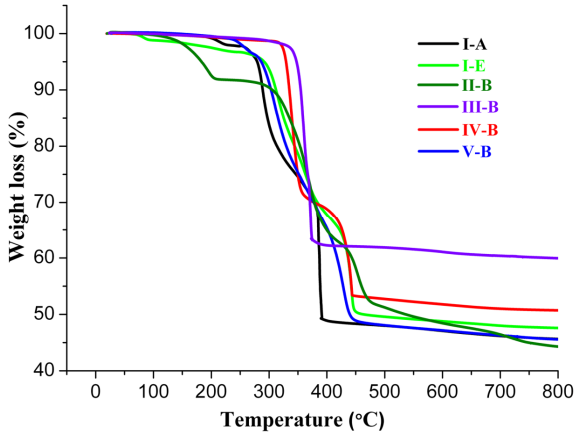

Fig. S9 The themogravimetric analysis (TGA) curves of **I-A**, **I-E**, **II-B**, **III-B**, **IV-B** and **V-B**.

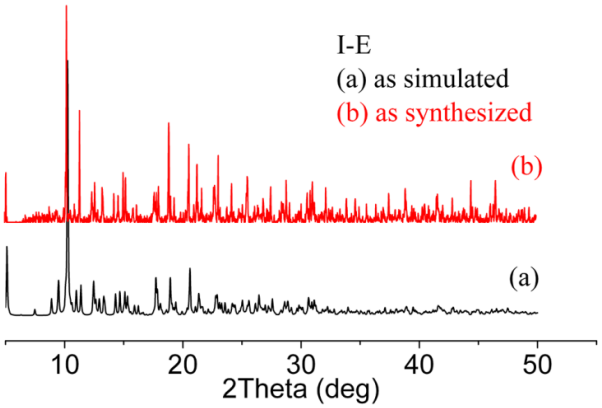

Fig. S10 Powder X-ray diffraction measurements (PXRD) patterns for **I-E**.

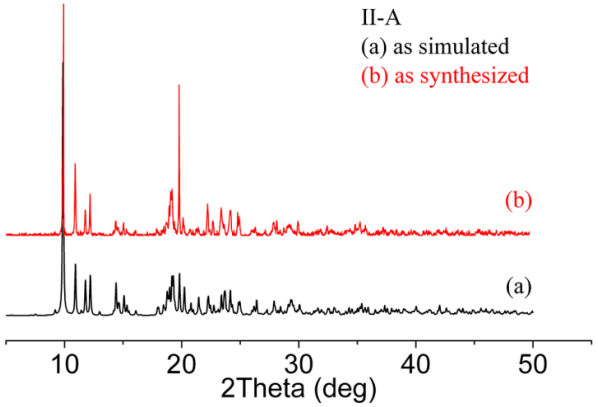

Fig. S11 Powder X-ray diffraction measurements (PXRD) patterns for **II-A**.

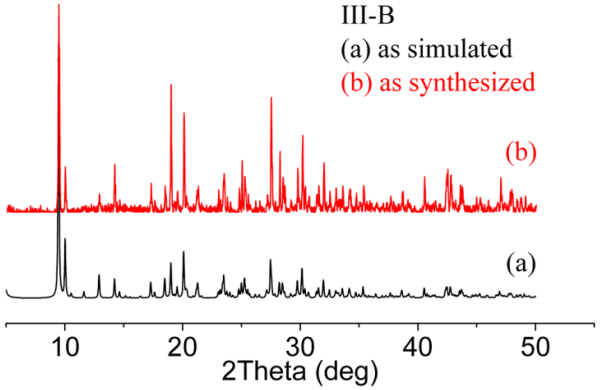

Fig. S12 Powder X-ray diffraction measurements (PXRD) patterns for **III-B**.

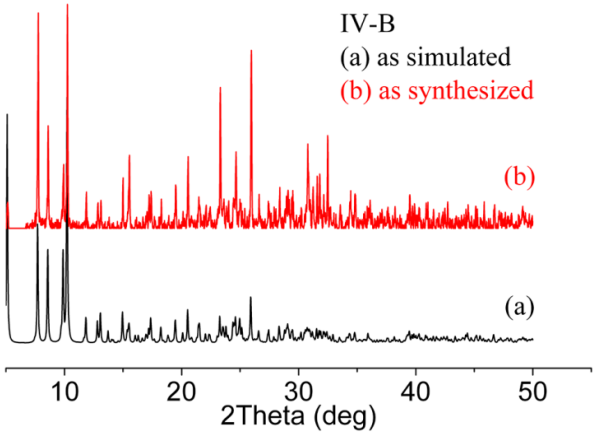

Fig. S13 Powder X-ray diffraction measurements (PXRD) patterns for **IV-B**.

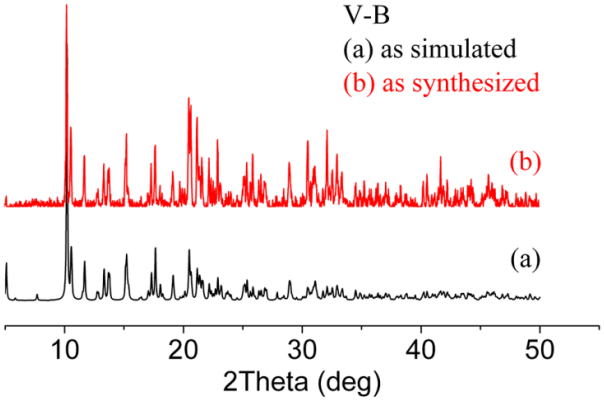

Fig. S14 Powder X-ray diffraction measurements (PXRD) patterns for **V-B**.