Electronic Supporting Information (ESI)

Cadmium Diruthenium(II,III) Carbonates Showing Diverse Magnetism Behavior Arising from Variety Topologies of $[Ru_2(CO_3)_4]_n^{3n-}$ Layer

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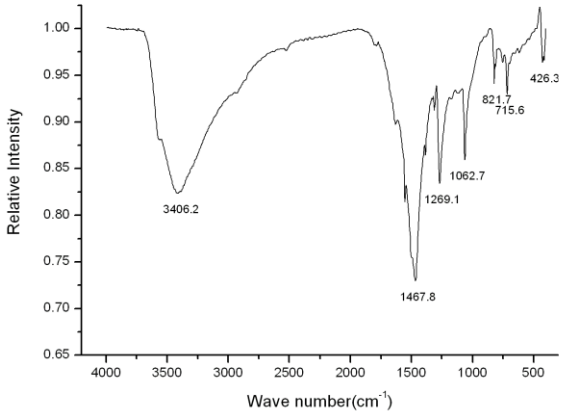

Fig. S1 IR spectra of complex **1**

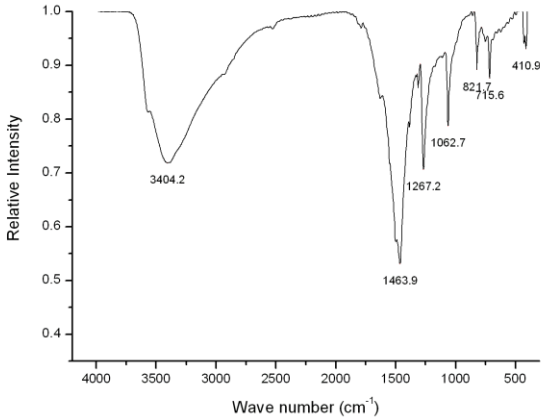

Fig. S2 IR spectra of complex **2**.

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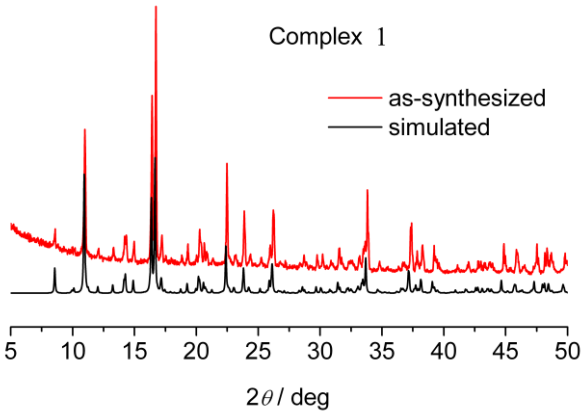

Fig. S3 Comparison of XRPD patterns of the simulated and as-synthesized of **1**

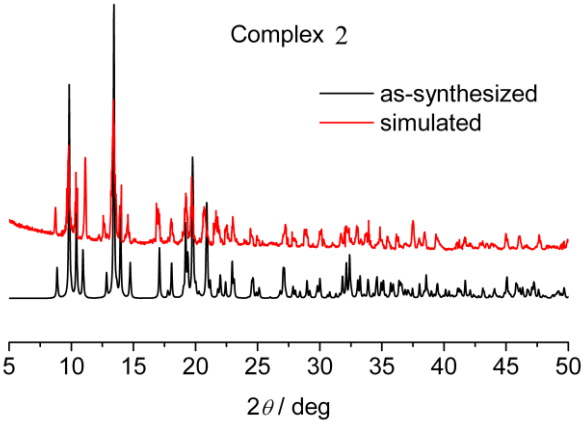

Fig. S4 Comparison of XRPD patterns of the simulated and as-synthesized of **2**

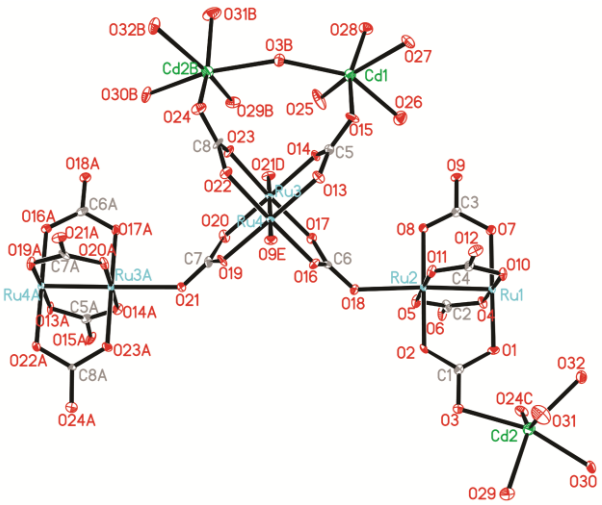

Fig. S5 ORTEP diagram of **1** with thermal ellipsoids at 30% probability. All H atoms are omitted for clarity.

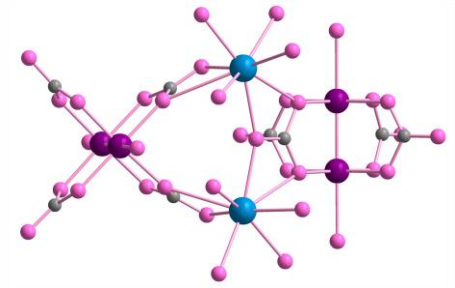

Fig. S6 The eight coordination environment of Cd^{2+} in complex **1**.

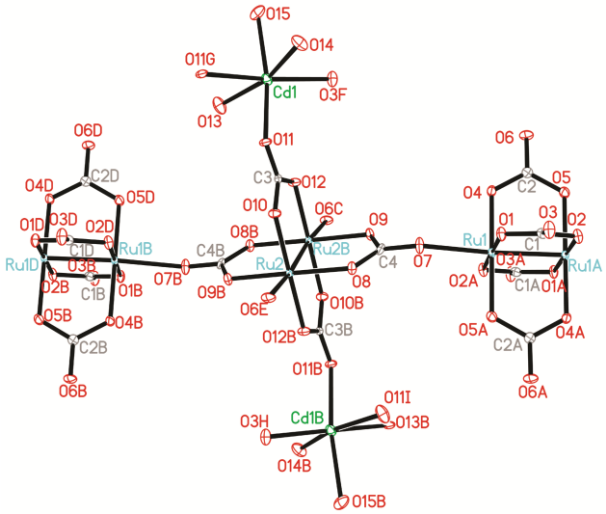

Fig. S7 ORTEP diagram of **2** with thermal ellipsoids at 30% probability. All H atoms are omitted for clarity.

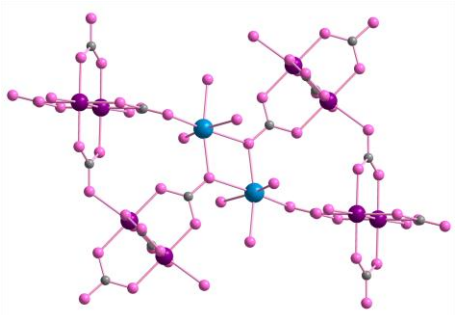

Fig S8. The six coordination environment of Cd^{2+} in complex **2**.

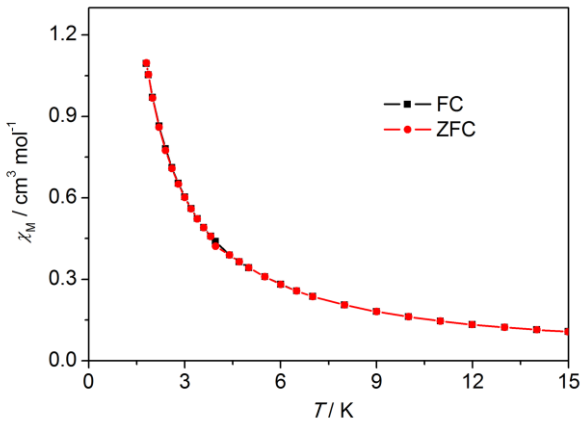

Fig. S9 The FC and ZFC plots of complex **1** measured at 20 Oe.

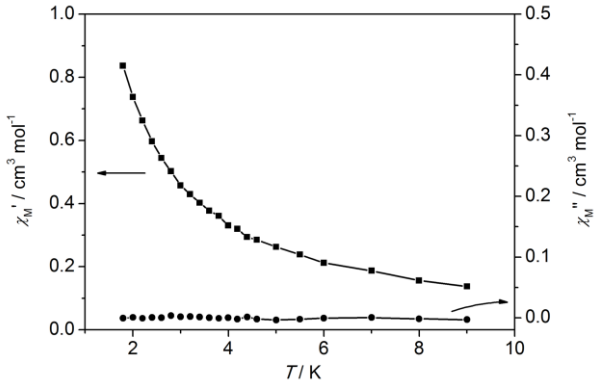

Fig. S10 The ac susceptibilities at 10 Hz of complex **1.**

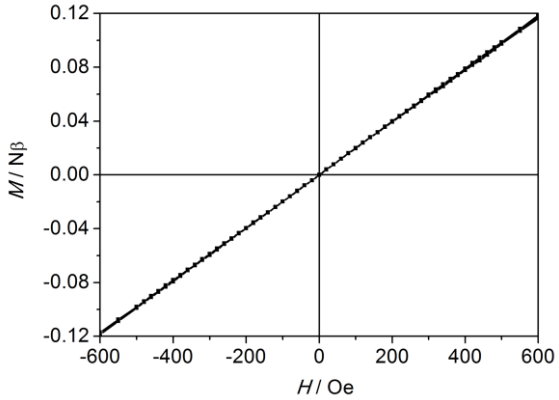

Fig. S11 Magnetization versus applied magnetic field at 2.0 K of complex **1**.

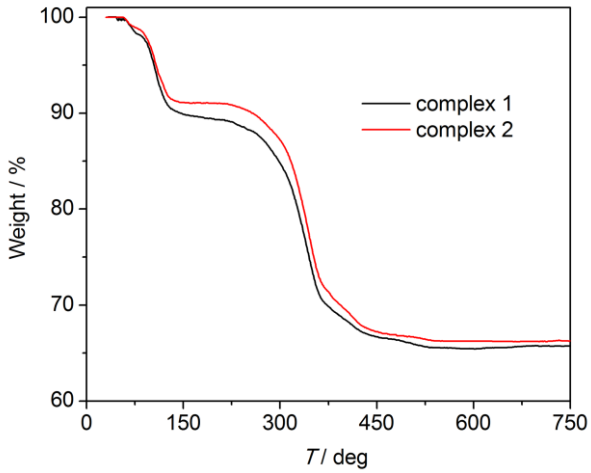

Fig. S12 TG plots of complexes **1** and **2.**

For complexes **1** and **2**, weight loss steps (10.06% for **1** and 8.97% for **2**, respectively) in the temperature range of 30-150 °C correspond to the release of 4.0 lattice water molecules (10.01%) for **1** and 3.5 lattice water molecules (8.87%) for **2**. The weight loss occurs at the range of 150-500 °C, corresponding to the elimination of three coordination water molecules accompanying with the whole architecture decomposition processes to leave a residue of RuO_2/CdO/K_2O mixture.

Table S1. Selected bond lengths [Å] and angles (deg) for **1**

Ru1-Ru2	2.2608(11)	Ru3-Ru4	2.2581(11)	Cd1-O26	2.299(8)
Ru1-O1	2.035(7)	Ru3-O14	2.040(7)	Cd1-O27	2.361(8)
Ru1-O4	2.012(7)	Ru3-O17	2.020(7)	Cd1-O28	2.357(7)
Ru1-O7	2.027(8)	Ru3-O20	2.013(7)	Cd1-O2C	2.694(8)
Ru1-O10	2.043(7)	Ru3-O23	2.018(7)	Cd1-O3C	2.356(7)
Ru1-O12H	2.276(7)	Ru3-O21G	2.277(7)	Cd2-O29	2.332(8)
Ru2-O2	2.043(8)	Ru4-O13	2.042(7)	Cd2-O30	2.333(7)
Ru2-O5	2.028(8)	Ru4-O16	2.029(7)	Cd2-O31	2.340(9)
Ru2-O8	2.030(7)	Ru4-O19	2.024(7)	Cd2-O32	2.389(8)
Ru2-O11	2.052(7)	Ru4-O22	2.048(8)	Cd2-O3F	2.384(7)
Ru2-O18	2.286(7)	Ru4-O9A	2.256(7)	Cd2-O23J	2.686(7)
Cd1-O15	2.314(7)	Cd1-O25	2.377(9)	Cd2-O24J	2.320(7)
Ru1-O1-C1	118.6(6)	Ru4-O13-C5	118.8(6)		
Ru2-O2-C1	119.0(6)	Ru3-O14-C5	119.8(6)		
Ru1-O4-C2	121.0(6)	Ru4-O16-C6	120.3(6)		
Ru2-O5-C2	120.9(6)	Ru3-O17-C6	119.1(6)		
Ru1-O7-C3	119.0(7)	Ru4-O19-C7	120.3(6)		
Ru2-O8-C3	119.4(6)	Ru3-O20-C7	121.0(6)		
Ru1-O10-C4	118.1(6)	Ru4-O22-C8	117.9(6)		
Ru2-O11-C4	119.5(7)	Ru3-O23-C8	121.2(6)		
Ru1F-O12-C4	135.0(6)	Ru4B-O9-C3	129.4(6)		
Ru2-O18-C6	135.5(6)	Ru3E-O21-C7	135.6(6)		

Symmetry transformations used to generate equivalent atoms: A: -1+x, y, z; B: 1+x, y, z; C: 1/2-x, 1-y, -1/2+z; D: 1/2-x, 1-y, 1/2+z; E: -1/2+x, 1/2-y, 1-z; F: -1/2+x, 3/2-y, 1-z; G: 1/2+x,1/2-y,1-z; H: 1/2+x, 3/2-y, 1-z; I: -x,-1/2+y,1/2-z; J: -x, 1/2+y, 1/2-z.

Table S2. Selected bond lengths [Å] and angles (deg) for **2**

Ru1-Ru1H	2.2531(8)	Ru2-Ru2J	2.2577(7)	Cd1-O11	2.270(4)
Ru1-O1	2.020(4)	Ru2-O8	2.009(4)	Cd1-O13	2.287(5)
Ru1-O4	2.009(4)	Ru2-O10	2.020(4)	Cd1-O14	2.349(5)
Ru1-O7	2.269(4)	Ru2-O6D	2.262(3)	Cd1-O15	2.301(5)
Ru1-O2H	2.028(4)	Ru2-O9J	2.038(4)	Cd1-O3E	2.243(4)
Ru1-O5H	2.027(4)	Ru2-O12J	2.025(4)	Cd1-O11K	2.410(3)
Ru1-O1-C1	120.1(3)	Ru2-O8-C4	121.0(4)		
Ru1H-O2-C1	117.9(3)	Ru2J-O9-C4	117.4(3)		
Ru1-O4-C2	120.7(4)	Ru2-O10-C3	121.0(3)		
Ru1H-O5-C2	119.0(3)	Ru2J-O12-C3	118.5(3)		
Ru1-O7-C4	147.3(3)	Ru2C-O6-C2	126.8(3)		

Symmetry transformations used to generate equivalent atoms: A: -1+x, y, -1+z; B: -1+x, y, z; C: x, y, -1+z; D: x, y, 1+z; E: 1+x, y, z; F: 1+x, y, 1+z; G: -1-x, 1-y, -z; H: -1-x, 1-y, 1-z; I: -x, 1-y, 1-z; J: -x, 1-y, 2-z; K:

1-x, -y, 2-z.