

Supporting Information

A Foldable Metal-Organic Framework with cds Topology Assembled via Four-Connected Square-Planer Single Metal Ions Node and Linear Monodante Linker

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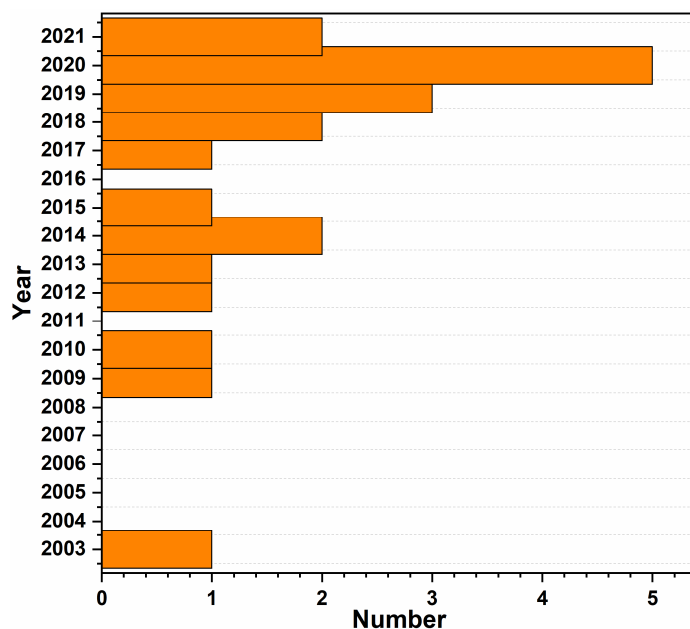


Chart S1. Publication record for MOFs with **cds** topology.

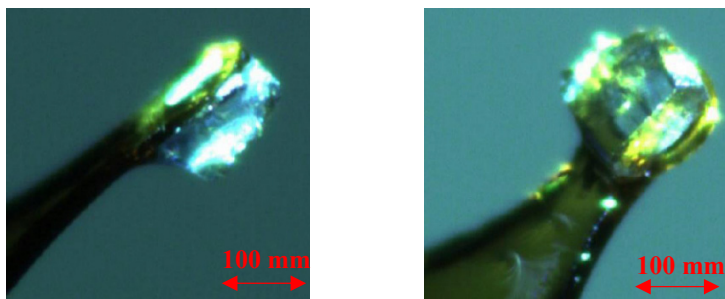


Figure S1. Photographs of the single crystal under white light from different directions.

FT-IR and Raman spectra were collected and compared with each other as **Figure S1** showing. The Ni–N (metal – ligand) stretching vibrations (A_g and B_{3u}) are observed at 295 cm^{-1} in Raman spectrum and absence in FT-IR spectrum. And the peaks in both FT-IR and Raman spectra near 1610 and 1596 cm^{-1} , respectively, can be assigned to the C=N stretches. The stretches near 375 cm^{-1} in Raman and FT-IR is attributed to the Ni–Cl stretch. The broad peaks in FT-IR near 1050 cm^{-1} might be assigned to the complicated vibrational C=C bending and C–N stretch which were influenced by the pressure when preparing the testing sample, resulting in affect the distribution of energy levels. The peaks at 1064 cm^{-1} , 928 cm^{-1} and 621 cm^{-1} in FT-IR spectrum, and the peaks at 906 cm^{-1} and 639 cm^{-1} in Raman spectrum are attributed to the presence of perchlorate, ClO_4^- .

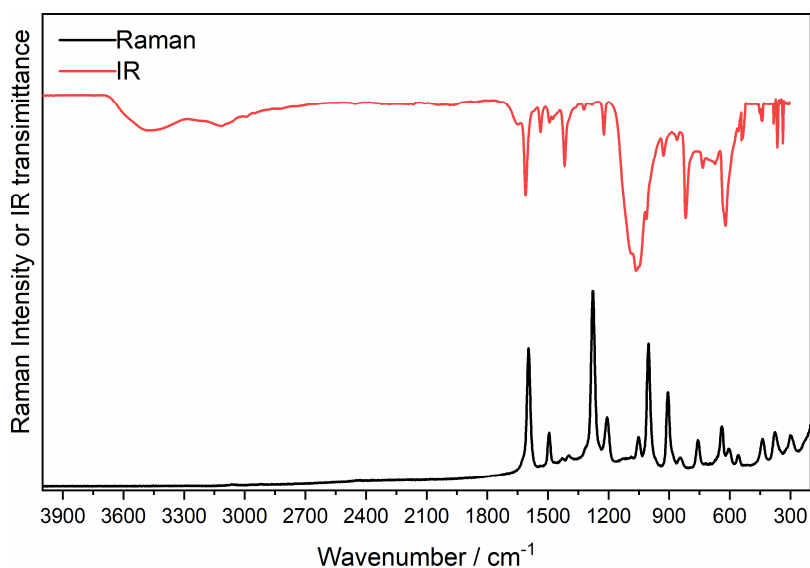


Figure S2. FT-IR and Raman spectra of compound **1**.

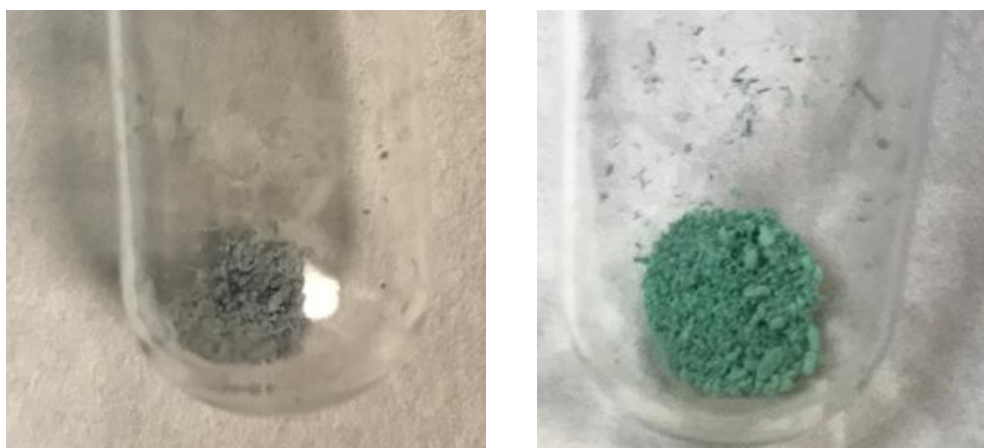


Figure S3. Photographs of **1** before (left) and after (right) activation.

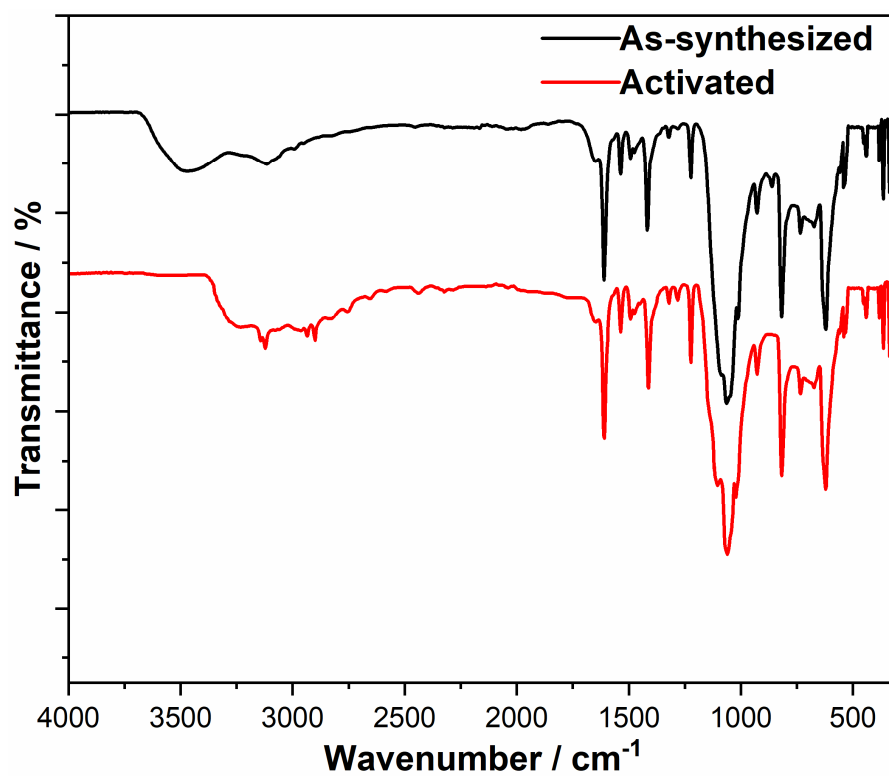


Figure S4. FT-IR spectra of **1** before and after activation.

Table S1. Selected bond length (Å) angle (°) for **1** at 172 K.

Ni1—O1	2.097 (7)	Ni1—N1	2.133 (4)
Ni1—O1 ⁱ	2.097 (7)	Ni1—N2	2.12 (2)
Ni1—N1 ⁱ	2.133 (4)	Ni1—N3	2.10 (2)
O1—Ni1—O1 ⁱ	179.4 (5)	O1—Ni1—N1	90.8 (2)
O1—Ni1—N1 ⁱ	89.2 (2)	O1 ⁱ —Ni1—N2	89.7 (3)
O1 ⁱ —Ni1—N1 ⁱ	90.8 (2)	O1—Ni1—N2	89.7 (3)
O1 ⁱ —Ni1—N1	89.2 (2)	N3—Ni1—O1	90.3 (3)
N1—Ni1—N1 ⁱ	177.5 (4)	N3—Ni1—N1	91.2 (2)
N2—Ni1—N1 ⁱ	88.8 (2)	N3—Ni1—N1 ⁱ	91.2 (2)
N2—Ni1—N1	88.8 (2)	N3—Ni1—N2	180.0
N3—Ni1—O1 ⁱ	90.3 (3)	Ni1—O1—H1A	112.7
C5—N1—Ni1	121.1 (3)	Ni1—O1—H1B	114.0
C1—N1—Ni1	118.9 (3)	C6—N2—Ni1	124.2 (9)
C11 ⁱ —N3—Ni1	118.5 (1)	C6 ⁱ —N2—Ni1	124.2 (9)
C11—N3—Ni1	119 (1)	Ni1—N2—C6—C7	178 (1)
Ni1—N1—C5—C4	178.8 (5)	Ni1—N3—C11—C10 ^{iv}	179.7 (8)
Ni1—N1—C1—C2	−178.8 (5)		

Symmetry codes: (i) $-x-2, -y, z$; (ii) $-x-3/2, -y+1/2, z$; (iii) $x, -y, z-1/2$; (iv) $x, -y, z+1/2$.

Table S2. The EDS analysis of **1**.

Element	At. No.	Netto	Mass [%]	Mass Norm. [%]	Atom [%]	Abs. error [%] (1 sigma)	Rel. error [%] (1 sigma)
Carbon	6	25645	23.47	36.25	48.58	1.18	5.27
Nitrogen	7	4977	6.94	10.70	12.66	0.40	5.46
Oxygen	8	29961	18.02	27.83	28.79	0.88	4.99
Chlorine	17	83139	10.02	15.47	7.22	0.31	2.77
Nickel	28	8933	6.31	9.75	2.75	0.23	3.66
Copper	29	7294	0.00	0.00	0.00	0.00	0.00
Gold	79	15400	0.00	0.00	0.00	0.00	0.00
		Sum	64.76	100.00	100.00		

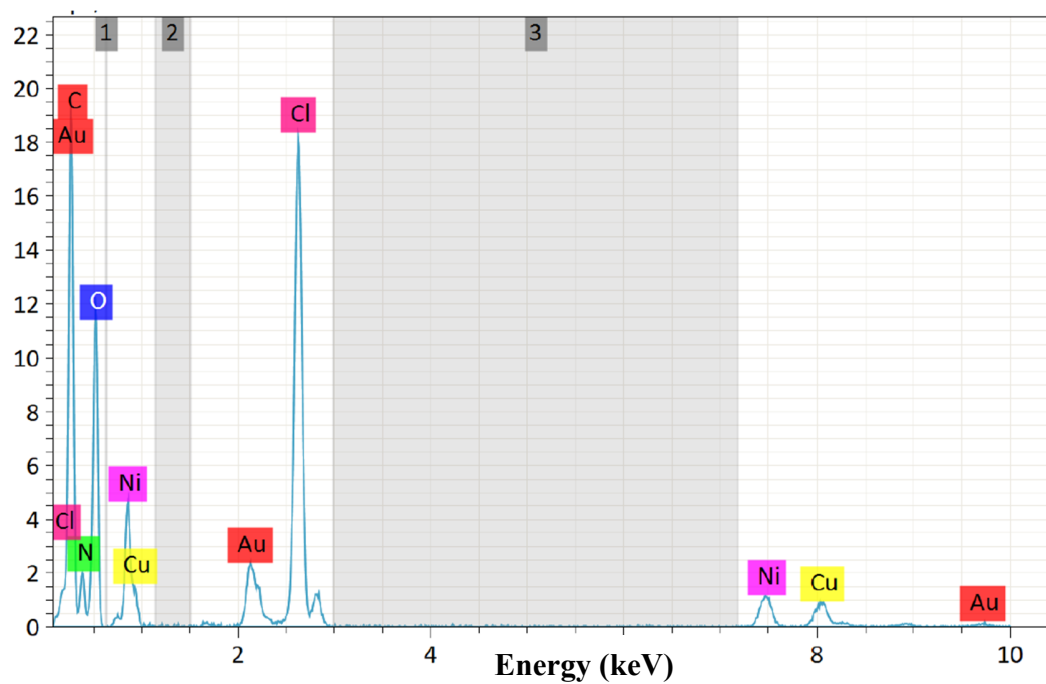
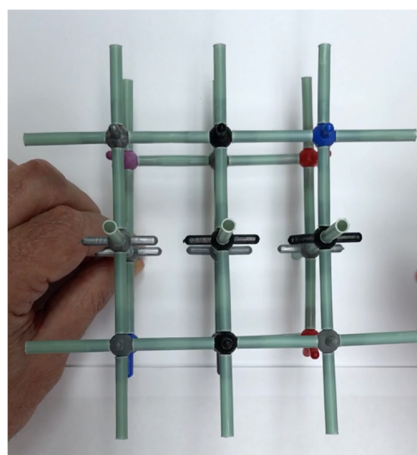


Figure S5. The EDS analysis for **1** (the presence of Cu is attributed to the Cu-based tape).



Video S1. Video of **1** collapsing/expanding along the a -axis, viewed parallel to the c -axis.

<https://youtube.com/shorts/ecfPHPMQpO8?feature=share>



Video S2. Video of 2-D planes of **1** gliding along the b -axis, viewed parallel to the a -axis.

<https://youtube.com/shorts/htCFexBuzW4?feature=share>