Electronic supplementary information

A unique zinc-organic framework constructed through *in situ* ligand synthesis for conversion of CO_2 under mild conditions and as a luminescent sensor for $Cr_2O_7^{2-}/CrO_4^{2-}$

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Table S1. Selected bond lengths (Å) and bond angles (°) for compound **1**.

Bond distances			
Zn1-O4	2.071(5)	Zn2-N1	2.046 (7)
Zn1-O4#2	2.222(6)	Zn2-O3#1	1.915(6)
Zn1-O7#2	2.222(6)	Zn2-O3	1.922(5)
Zn1-O7	2.086(7)	Zn2#3-O3	1.915(5)
Zn1-N11	2.086(7)	Zn2-O5	1.997(6)
Angles			
O4#2-Zn1-O4	180.0(4)	O3#1-Zn2-N1	101.2(3)
O4#2-Zn1-O7#2	90.8(2)	O3-Zn2-N1	108.5(3)
O4-Zn1-O4#2	89.2(2)	O3-Zn2- O3#1	116.6(2)
O4-Zn1-N11	87.4(2)	O5-Zn2- O3#1	107.4(2)
O4-Zn1-N11#2	92.6(2)	O3-Zn2-O5	118.6(2)
O4#2-Zn1-N11#2	87.4(2)	O5-Zn2-N1	102.1(3)
O7-Zn1-O7#2	180.0(3)	N8-Zn1-N1	127.3(6)
N11-Zn1-O7#2	89.5(3)	C12-Zn2-N1	126.6(5)
N11-Zn1-O7	90.5(3)	Zn2-O3-Zn2#3	127.4(3)
C1-O4-Zn1	133.6(6)	C1-O5-Zn2	112.8(5)
N9-N11-Zn1	126.8(5)	N11-Zn1- C12#5	125.3(6)

#1 +X, 1/2-Y, 1/2+Z; #2 -X, -Y, -Z, #3 +X, 1/2-Y, -1/2+Z; #4 1-X, 1/2+Y, 1/2-Z; #5 1-X, -1/2+Y, 1/2-Z

Table S2. Hydrogen bonding data for compound **1**.

D–H···A	d(D–H) (Å)	d(H···A) (Å)	d(D···A) (Å)	D–H···A (°)
O(7)-H(7A)-O(5)	0.90	2.54	3.0759	118
O(7)-H(7B)-N(8)	0.85	2.04	2.8839	176
C(13)-H(13B)-O(5)	0.97	2.37	3.3380	176

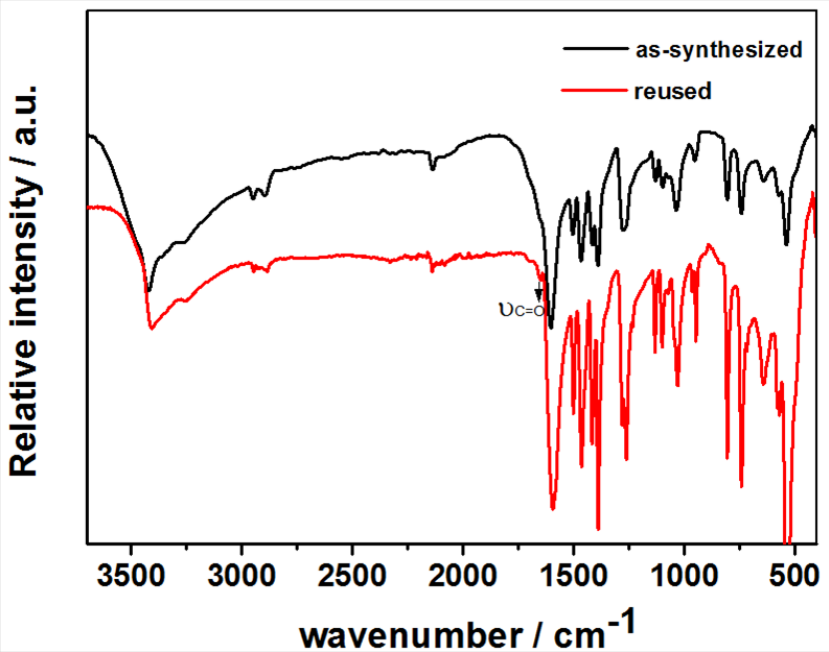
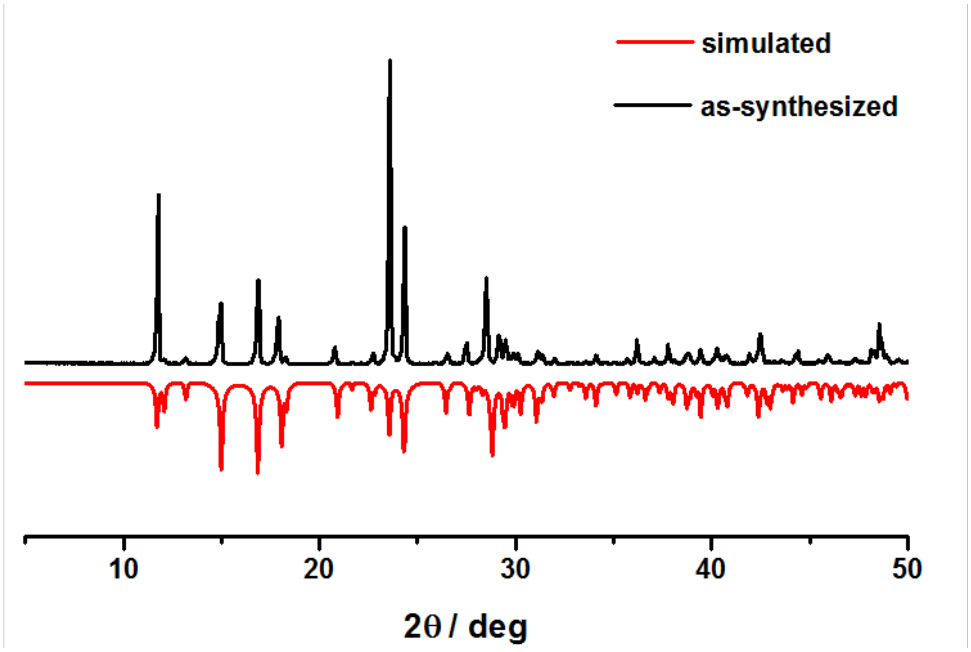
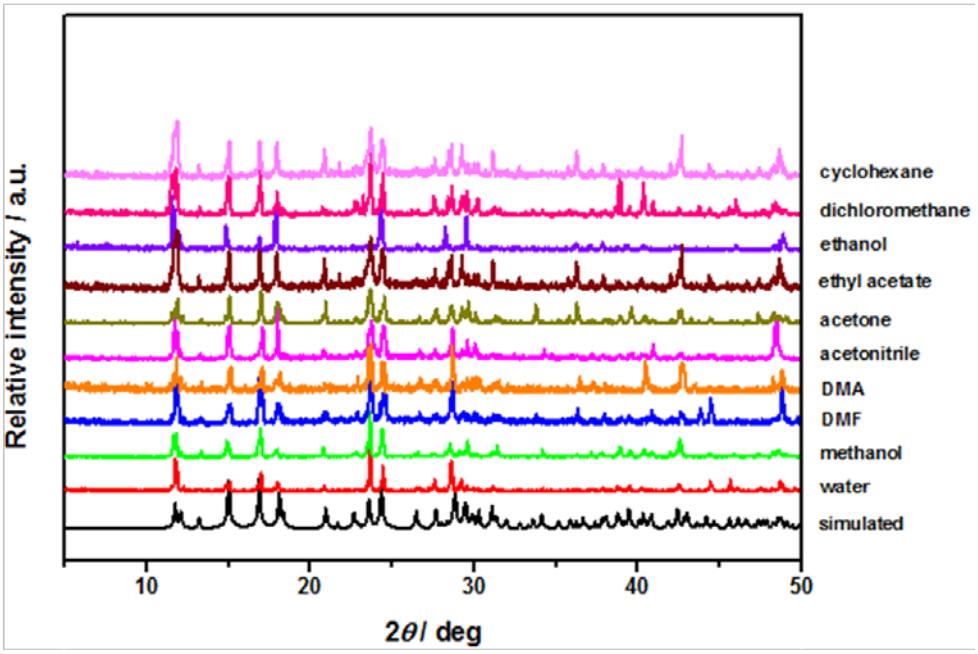


Figure S1. The FT-IR spectra of compound **1** and after catalytic recyclings.

(a)


simulated
as-synthesized
10
20
30
40
50
2θ / deg

(b)


Relative intensity / a.u.
cyclohexane
dichloromethane
ethanol
ethyl acetate
acetone
acetonitrile
DMA
DMF
methanol
water
simulated
10
20
30
40
50
2θ/ deg

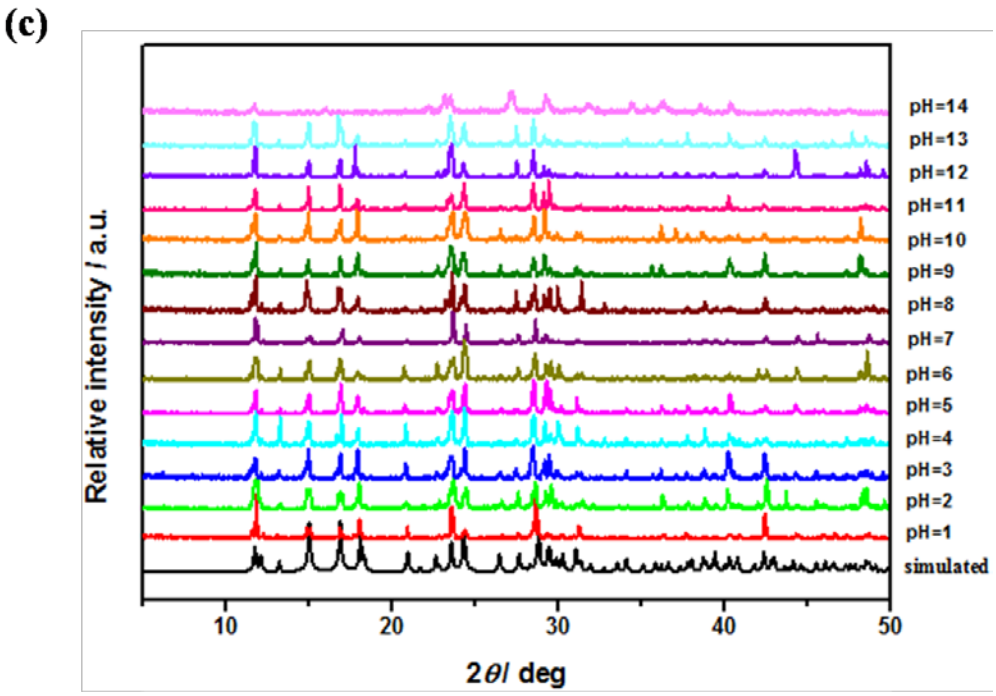


Figure S2. (a) The PXRD patterns for the simulated and as-synthesized samples for **1**; (b) The PXRD patterns for **1** immersing in common organic solvents; (c) The PXRD patterns for **1** in various pH values solutions from 1.0 to 14.0.

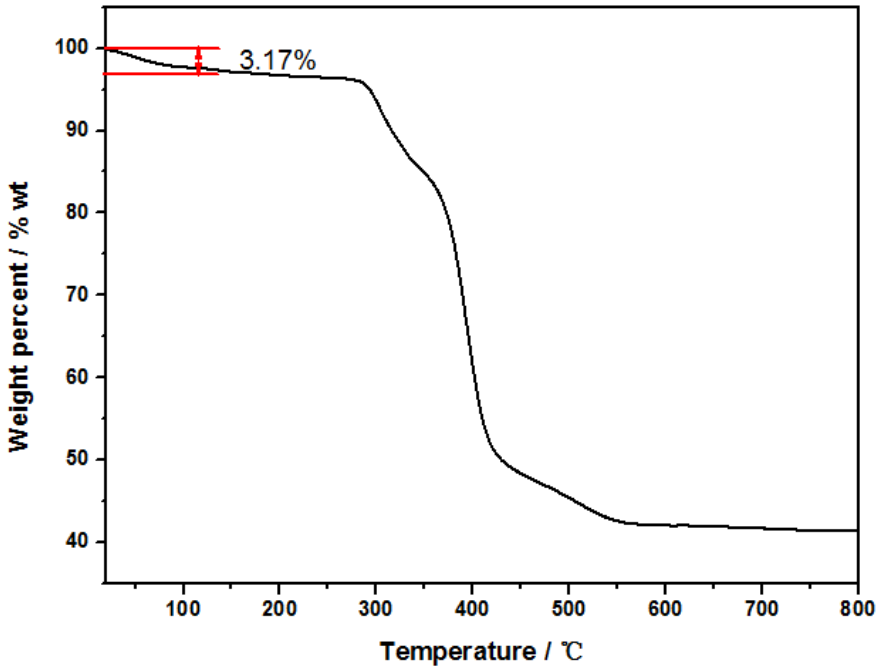


Figure S3. TG curve for compound **1**.

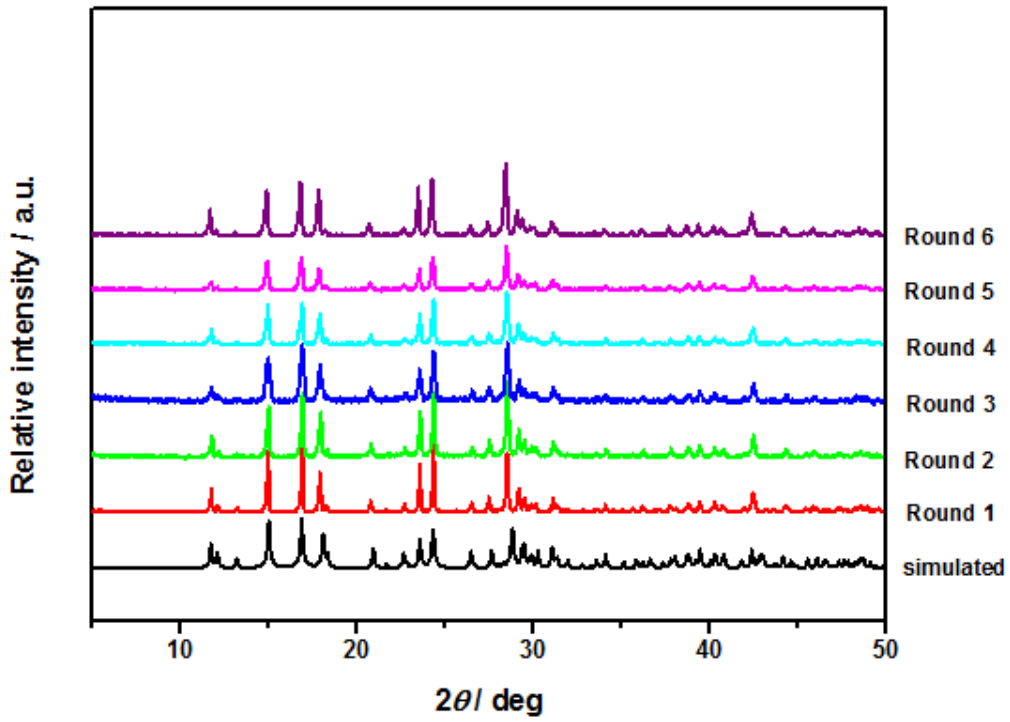


Figure S4. The PXRD patterns of **1** after catalytic recyclings and simulated one from **1**.

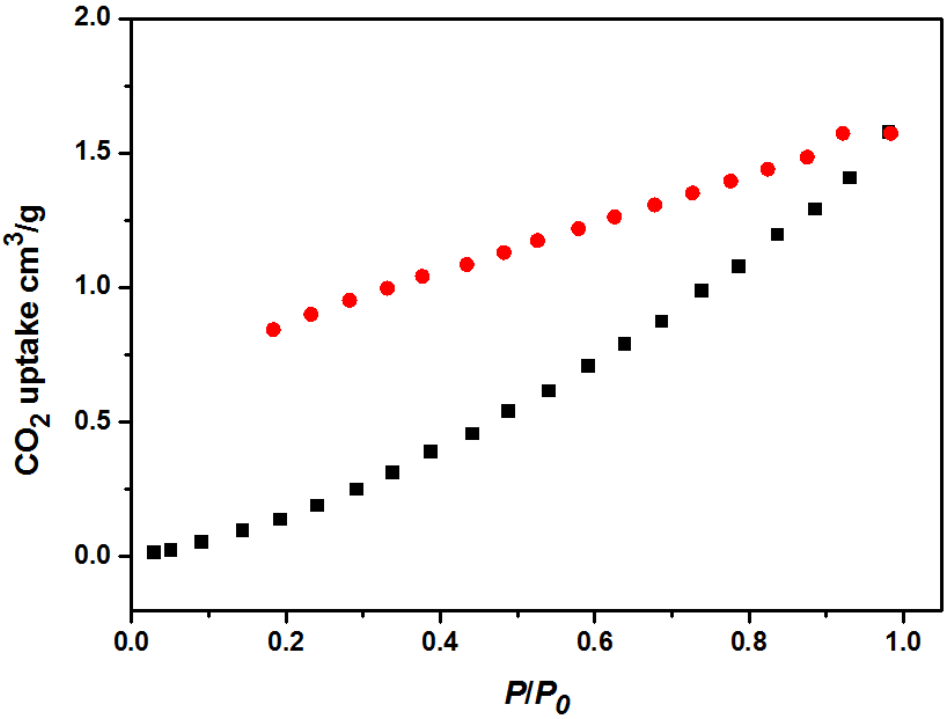


Figure S5. CO_2 isotherm of **1** at 273 K.

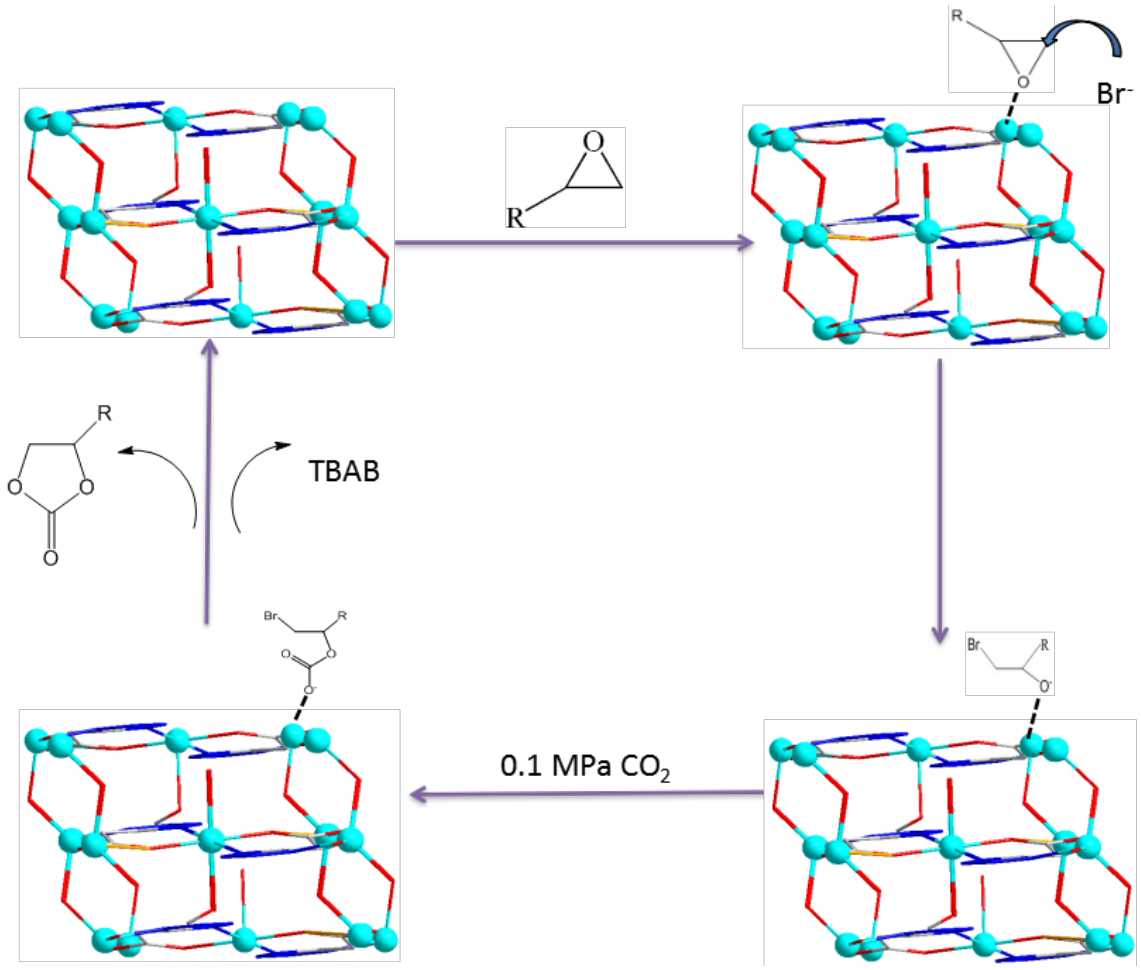


Figure S6. The possible mechanism for the cycloaddition reaction with epoxides and CO_2 into cyclic carbonates.

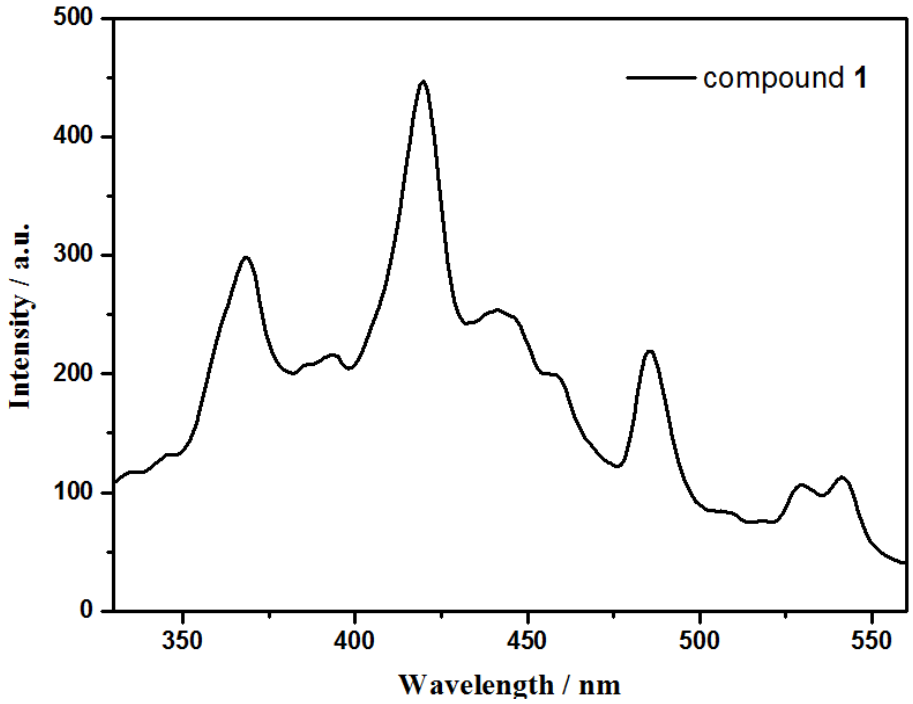


Figure S7. The emission spectrum of **1** ($\lambda_{excited}$ = 270 nm).

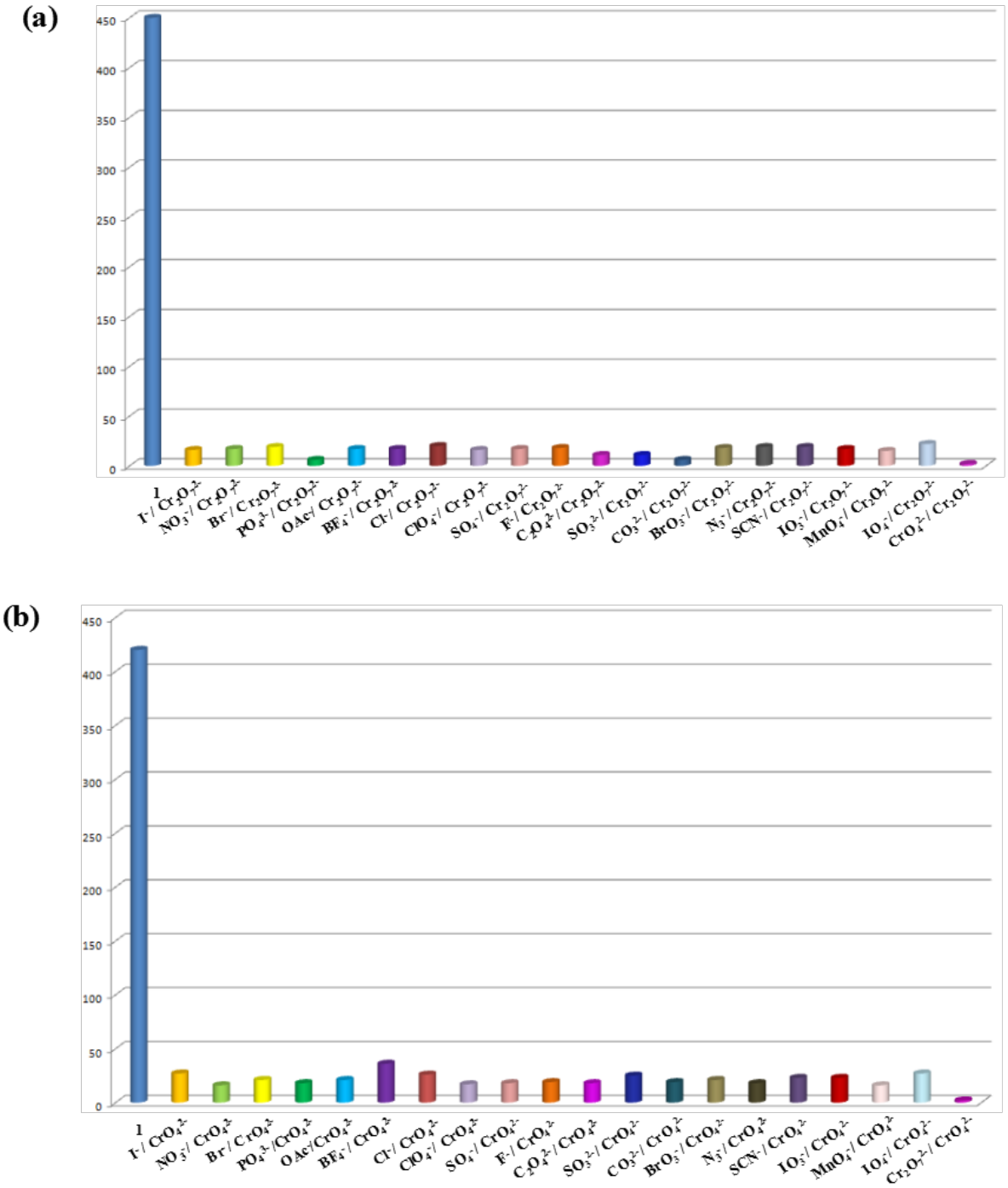


Figure S8. The luminescence intensity of **1**-$Cr_2O_7^{2-}$ (a) and **1**-CrO_4^{2-} (b) under mixed anions.

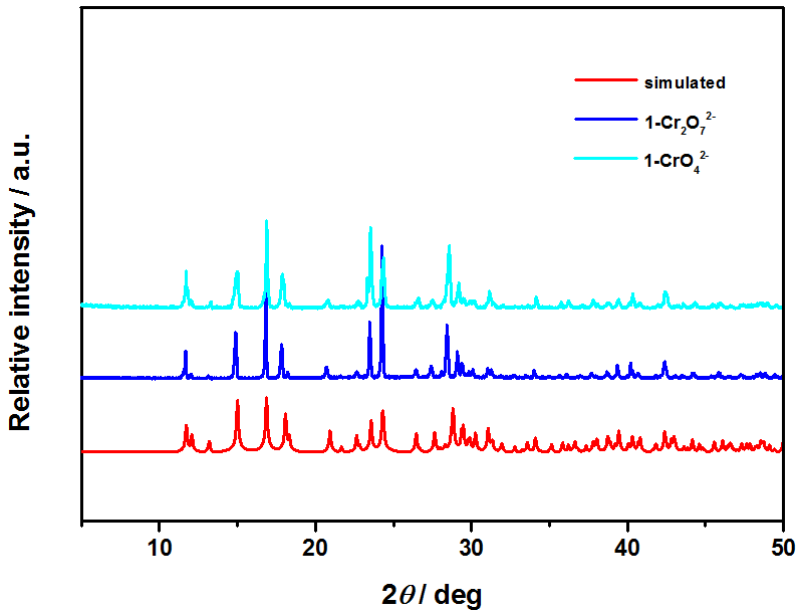


Figure S9. The PXRD patterns of **1** after luminescent recycling and simulated one from **1**.

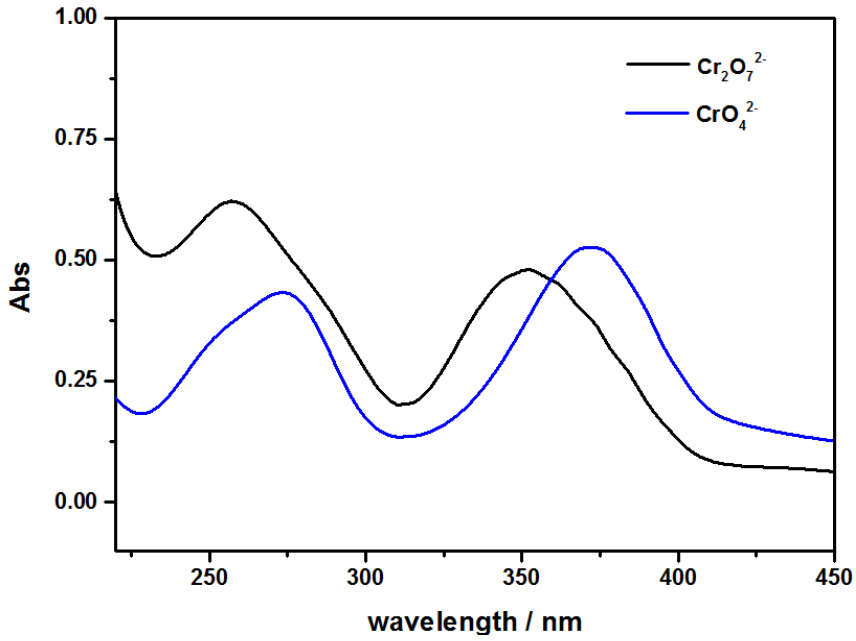


Figure S10. The UV-vis spectra of the $K_2Cr_2O_7$ and K_2CrO_4 solutions.

Table S3. The ICP results of **1** after catalytic recyclings (filter liquor) and luminescent recyclings (soild sample), respectively.

	Compound **1**
1 after catalytic recyclings (Zn^{2+} of filter liquor)	0.69 ppm
1 as $Cr_2O_7^{2-}$ sensor after luminescent recyclings (Cr^{6+} of soild sample)	below detectable limit (0.0069 ppm)
1 as CrO_4^{2-} sensor after luminescent recyclings (Cr^{6+} of soild sample)	below detectable limit (0.0039 ppm)