

# A Stable 2D Luminescent Metal-Organic Framework as Highly Sensitive Sensor for $\text{Fe}^{3+}$ and $\text{Cr}_2\text{O}_7^{2-}/\text{CrO}_4^{2-}$ in Water

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## Supporting Information:

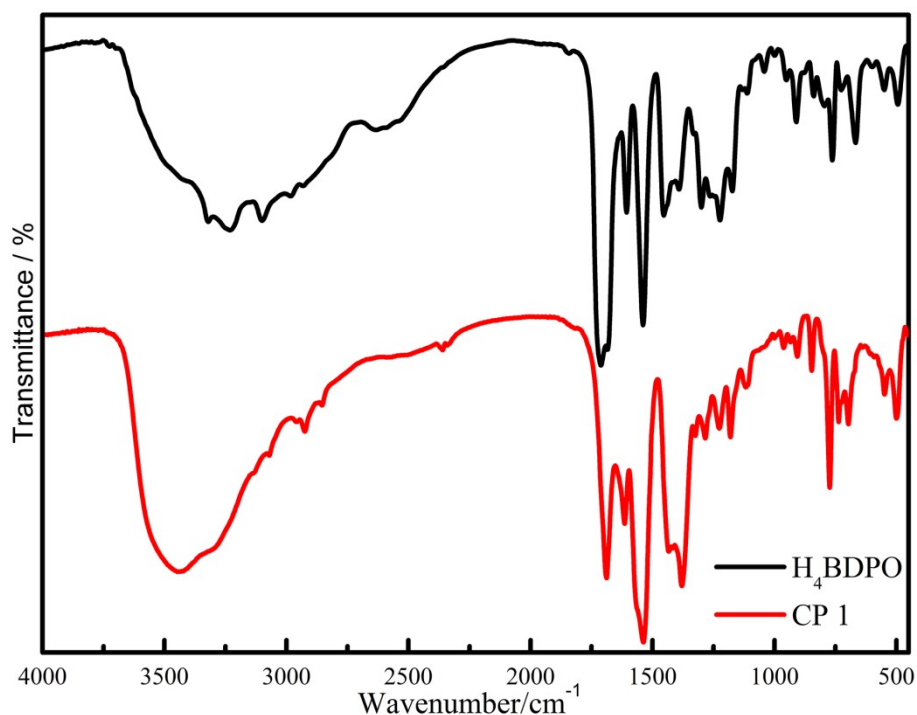
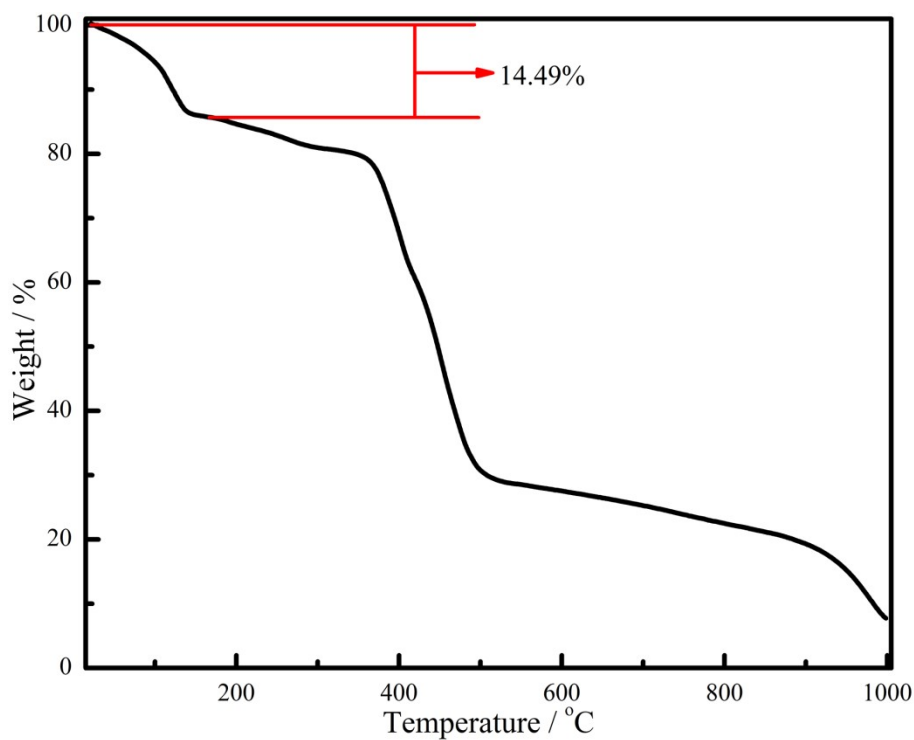


Fig. S1 The IR spectra of **1** and the  $\text{H}_4\text{BDPO}$  ligand at room temperature.



**Fig. S2** The TG curve of **1** on crystalline samples under the  $N_2$  atmosphere in the range of 25–1000 °C.

**Table S1.** *SHAPE* analysis of Cd1 ion in **1**.

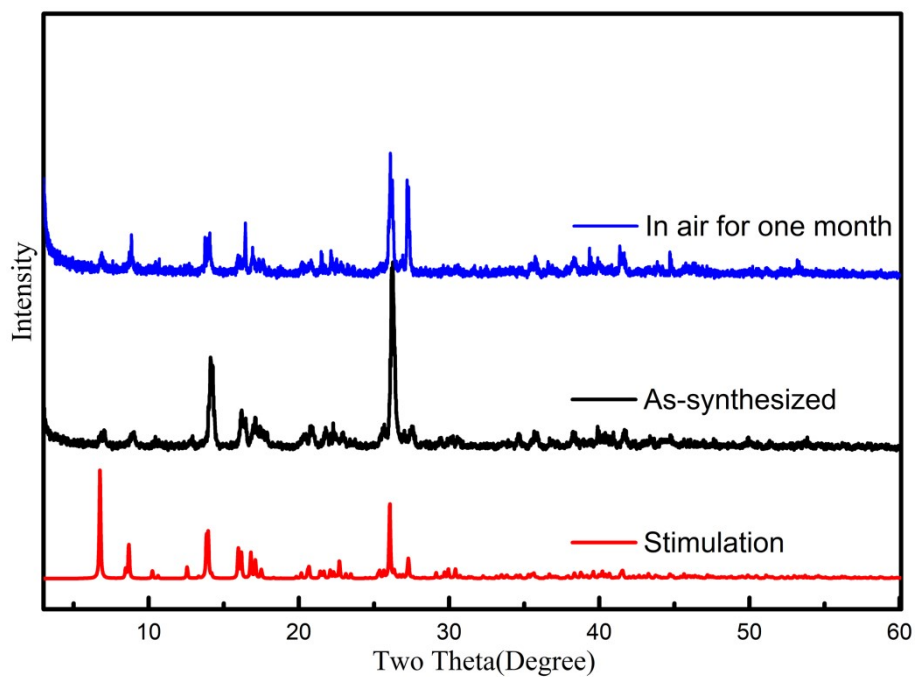
Label	Shape	Symmetry	Distortion
HP-7	Heptagon	$D_{7h}$	33.055
HPY-7	Hexagonal pyramid	$C_{6v}$	23.061
PBPY-7	Pentagonal bipyramid	$D_{5h}$	1.717
COC-7	Capped octahedron	$C_{3v}$	7.041
CTPR-7	Capped trigonal prism	$C_{2v}$	5.191
JPBPY-7	Johnson pentagonal bipyramid	$D_{5h}$	4.962
JETPY-7	Johnson elongated triangular pyramid	$C_{3v}$	22.146

**Table S2.** *SHAPE* analysis of Cd<sup>2+</sup> ion in **1**.

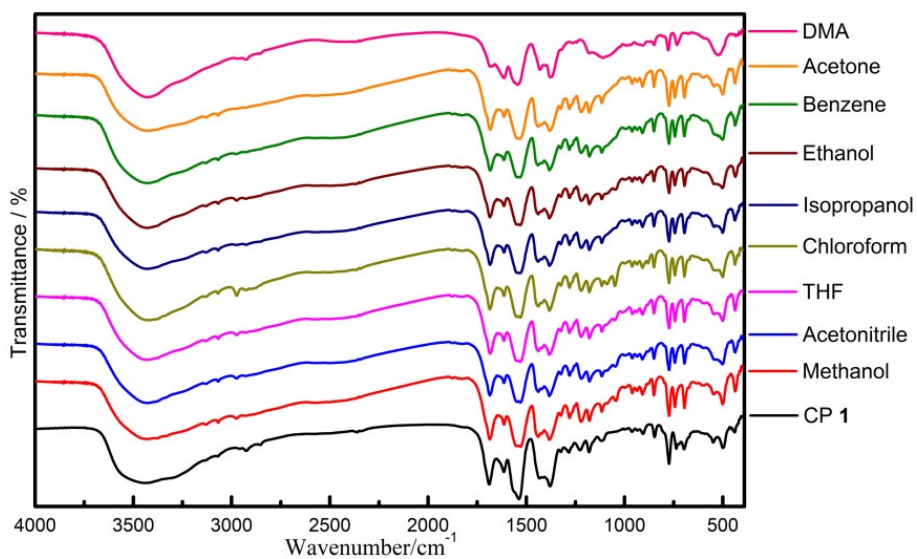
Label	Shape	Symmetry	Distortion
HP-6	Hexagon	$D_{6h}$	34.672
PPY-6	Pentagonal pyramid	$C_{5v}$	18.660
OC-6	Octahedron	$O_h$	6.946
TPR-6	Trigonal prism	$D_{3h}$	8.506
JPPY-6	Johnson pentagonal pyramid	$C_{5v}$	22.567

**Table S3.** Distance (Å) and angle (°) of hydrogen bonds for **1**.

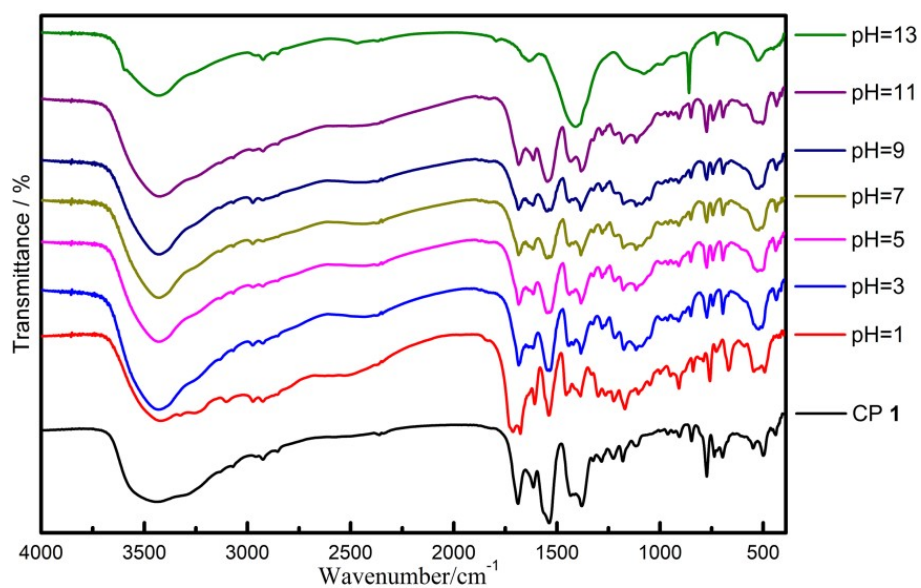
D-H	d(D-H)	d(H $\cdots$ A)	<DHA	d(D $\cdots$ A)	A
O8-H8	0.820	1.824	160.64	2.612	O2 [ x, y+1, z ]
O11-H11A	0.894	2.349	149.05	3.149	O5 [ x+1/2, y-1/2, z ]
O11-H11B	0.892	1.913	153.86	2.742	O4 [ -x+1/2, -y+1/2, -z+1 ]
O12-H12A	0.943	2.260	115.78	2.801	O7 [ x, y-1, z ]
O13-H13B	0.875	1.862	151.65	2.664	O1 [ -x+1/2, -y+3/2, -z+1 ]
O14-H14A	0.846	2.095	145.52	2.833	O9 [ -x+1/2, y+1/2, -z+3/2 ]
O14-H14B	0.844	1.954	159.31	2.759	O15 [ -x+1/2, y+1/2, -z+3/2 ]
N1-H1	0.860	2.178	112.92	2.635	O10
N1-H1	0.860	2.447	166.93	3.291	O16
N2-H2	0.860	2.325	159.06	3.143	O15
C6-H6	0.930	2.362	121.66	2.958	O9
C12-H12	0.930	2.203	123.21	2.821	O10
C16-H16	0.930	2.482	146.19	3.296	O15



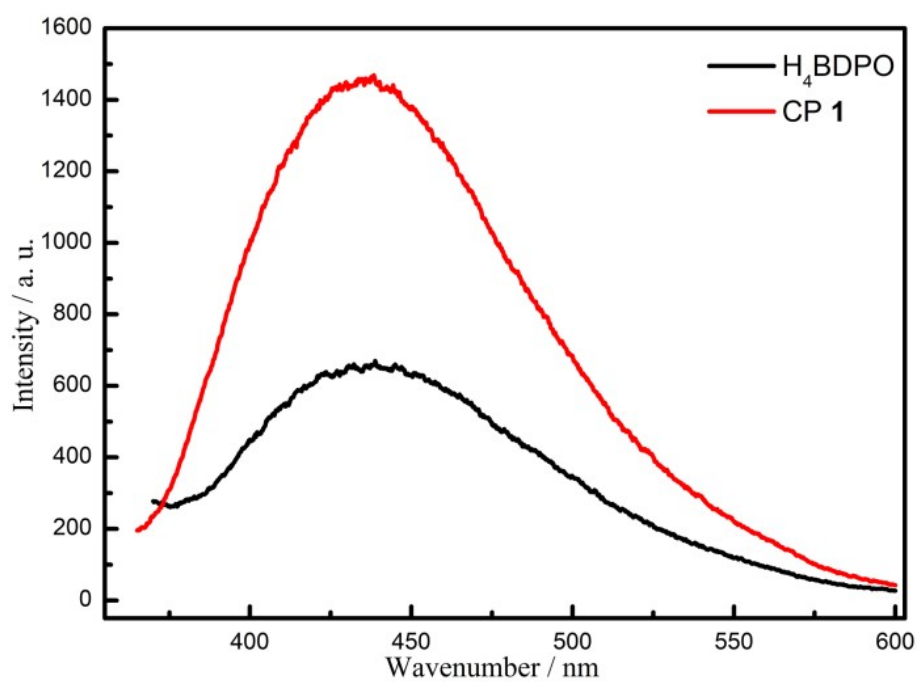
**Fig. S3** PXRD patterns of simulated from the X-ray single structure of **1**, as-synthesized **1**, and **1** samples exposed in air for one month.



**Fig. S4** IR spectra of **1** and **1** in the solutions of MeOH, CH<sub>3</sub>CN, THF, CHCl<sub>3</sub>, *i*-propanol, EtOH, benzene, acetone, and DMA for one week.



**Fig. S5** IR spectra of **1** and **1** in the aqueous solutions ranging from pH = 1 to 13 for one week.



**Fig. S6** The solid-state emission spectra of **1** and H<sub>4</sub>BDPO ligand at room temperature ( $\lambda_{\text{ex}} = 350 \text{ nm}$ ).

**Table S4.** A comparison of selected MOFs-based luminescent sensors for the detection of Fe<sup>3+</sup> ion.

Coordination Polymers	Media	K <sub>sv</sub> / (mol <sup>-1</sup> )	LOD / (mol·L <sup>-1</sup> )	Ref.
{[Cd <sub>3</sub> (HBDPO) <sub>2</sub> (H <sub>2</sub> O) <sub>7</sub> ]·4H <sub>2</sub> O} <sub>n</sub> ( <b>1</b> )	H <sub>2</sub> O	3.798 × 10 <sup>4</sup> 5.868 × 10 <sup>3</sup> (low concentration)	4.08 × 10 <sup>-6</sup>	This work
{[Zn(L <sup>1</sup> )(dcdps)]} <sub>n</sub>	H <sub>2</sub> O	7.004 × 10 <sup>3</sup>	6.21 × 10 <sup>-5</sup>	S1
{Zn(L <sup>1</sup> )(bdc)} <sub>n</sub>	H <sub>2</sub> O	9.066 × 10 <sup>3</sup>	4.45 × 10 <sup>-5</sup>	S1
{[Cd(L <sup>1</sup> )(oba)]·0.5DMF} <sub>n</sub>	H <sub>2</sub> O	4.984 × 10 <sup>3</sup>	1.152 × 10 <sup>-4</sup>	S1
{[Cd(L <sup>1</sup> )(bdc)·2H <sub>2</sub> O] 2DMF} <sub>n</sub>	H <sub>2</sub> O	6.387 × 10 <sup>3</sup>	6.36 × 10 <sup>-5</sup>	S1
{[Co <sub>3</sub> (L <sup>2</sup> ) <sub>3</sub> (phen) <sub>2</sub> ]·4H <sub>2</sub> O} <sub>n</sub>	H <sub>2</sub> O	8.10 × 10 <sup>3</sup>	9.39 × 10 <sup>-6</sup>	S2
{[Co <sub>3</sub> (L <sup>2</sup> ) <sub>3</sub> (2,2'-bipy) <sub>2</sub> ]·8H <sub>2</sub> O} <sub>n</sub>	H <sub>2</sub> O	6.27 × 10 <sup>3</sup>	1.14 × 10 <sup>-5</sup>	S2
{Cd <sub>2</sub> (L <sup>3</sup> )(2,2'-bipy)} <sub>n</sub>	H <sub>2</sub> O	2.99 × 10 <sup>5</sup>	2.47 × 10 <sup>-8</sup>	S3
{Cd <sub>2</sub> (L <sup>3</sup> )(H <sub>2</sub> O) <sub>4</sub> } <sub>n</sub>	H <sub>2</sub> O	1.23 × 10 <sup>6</sup>	1.35 × 10 <sup>-9</sup>	S3
[Zn <sub>3</sub> (L <sup>4</sup> ) <sub>2</sub> (2,2'-bipy)(μ <sub>3</sub> -OH) <sub>2</sub> ]·3H <sub>2</sub> O	H <sub>2</sub> O	2.3 × 10 <sup>4</sup>	-	S4
{Cd(L <sup>5</sup> )(bbibp)} <sub>n</sub>	H <sub>2</sub> O	6.83 × 10 <sup>3</sup>	4.39 × 10 <sup>-6</sup>	S5
{Cd <sub>3</sub> ·L <sup>6</sup> ·(BTB) <sub>2</sub> ·2DMF} <sub>n</sub>	DMF	1.01 × 10 <sup>4</sup>	1.12 × 10 <sup>-6</sup>	S6

$\{(\text{Cd}_3\text{O}_2) \cdot \text{L}^6 \cdot \text{btc}\}_n$	DMF	$1.31 \times 10^4$	$2.29 \times 10^{-6}$	S6
$\{\text{Cd}_3(\text{L}^7)_2(\text{Br-bdc})_6(\text{DMF})_2\}_n$	DMF	$5.25 \times 10^4$	$1.37 \times 10^{-9}$	S7
$\{\text{Cd}_3(\text{L}^7)_2(\text{NH}_2\text{-bdc})_6(\text{DMF})_2\}_n$	DMF	$3.23 \times 10^4$	$2.23 \times 10^{-9}$	S7
$\{\text{Cd}_3(\text{L}^7)_2(\text{bdc})_6(\text{DMF})_2\}_n$	DMF	$4.04 \times 10^4$	$1.62 \times 10^{-9}$	S7
$\{[\text{CoL}^8_2\text{Cl}_2] \cdot 4\text{CH}_3\text{OH}\}_n$	EtOH	$1.07 \times 10^4$	$2.75 \times 10^{-3}$	S8
$\{[\text{NiL}^8_2\text{Cl}_2] \cdot 4\text{CH}_3\text{OH}\}_n$	EtOH	$1.67 \times 10^4$	$1.2 \times 10^{-4}$	S8
$\{[\text{CoL}^8_2\text{Br}_2] \cdot 4\text{CH}_3\text{OH}\}_n$	EtOH	$3.33 \times 10^4$	$8.7 \times 10^{-4}$	S8
$[\text{Zr}_6\text{O}_6(\text{OH})_2(\text{CF}_3\text{COO})_2(\text{C}_{11}\text{H}_5\text{NO}_4)_4(\text{H}_2\text{O})_4]$	H <sub>2</sub> O	$2.25 \times 10^7$	$1.7 \times 10^{-9}$	S9
$[\text{Zn}_2\text{Na}_2(\text{TPHC})(4,4\text{-bipy})(\text{DMF})] \cdot 8\text{H}_2\text{O}$	DMF	$5.77 \times 10^4$	$6.4 \times 10^{-6}$	S10
$[\text{CH}_3\text{-dpb}]_2[\text{Mg}_3(1,4\text{-ndc})_4(\mu\text{-H}_2\text{O})_2(\text{CH}_3\text{OH})(\text{H}_2\text{O})] \cdot 1.5\text{H}_2\text{O}$	CH <sub>2</sub> Cl <sub>2</sub>	$1.6 \times 10^4$	$4.70 \times 10^{-4}$	S11
FJI-C8·(Zn)	H <sub>2</sub> O	$8.245 \times 10^3$	$2.33 \times 10^{-5}$	S12
$[\text{Cd}(5\text{-asba})(\text{bimb})]_n$	H <sub>2</sub> O	$1.78 \times 10^4$	$1.875 \times 10^{-5}$	S13
$[\text{Zn}_5(\text{hfipbb})_4(\text{trz})_2(\text{H}_2\text{O})_2]$	H <sub>2</sub> O	-	$2.00 \times 10^{-4}$	S14
$\{[\text{Cd}(\text{L}^9)(\text{HIP})] \cdot 2\text{H}_2\text{O}\}_n$	DMF	$5.57 \times 10^4$	$2.5 \times 10^{-6}$	S15

$\{(\text{Me}_2\text{NH}_2)[\text{Zn}_2(\text{L}^{10})(\text{H}_2\text{O})] \cdot 0.5\text{DMF}\}_n$	DMF	$7.83 \times 10^3$	$1.45 \times 10^{-8}$	S16
$\{[\text{Cd}(\text{L}^{11})(\text{BPDC})] \cdot 2\text{H}_2\text{O}\}_n$	H <sub>2</sub> O	$3.63 \times 10^4$	$2.21 \times 10^{-6}$	S17
$\{[\text{Cd}(\text{L}^{11})(\text{SDBA})(\text{H}_2\text{O})] \cdot 0.5\text{H}_2\text{O}\}_n$	H <sub>2</sub> O	$3.59 \times 10^4$	$7.14 \times 10^{-6}$	S17
$\{[\text{Zn}_3(\text{mtrb})_3(\text{btc})_2] \cdot 3\text{H}_2\text{O}\}$	H <sub>2</sub> O	$6.50 \times 10^3$	$1.78 \times 10^{-6}$	S18
$\{[\text{Zn}(\text{L}^{12})(\text{H}_2\text{O})_2] \cdot \text{H}_2\text{O}\}_n$	H <sub>2</sub> O	$1.09 \times 10^5$	$5.6 \times 10^{-7}$	S19
$\{[\text{Cd}(\text{L}^{12})(\text{H}_2\text{O})_2] \cdot 4\text{H}_2\text{O}\}_n$	H <sub>2</sub> O	$7.2 \times 10^4$	$7.8 \times 10^{-7}$	S19
$\{[\text{Zn}_2(\text{trz})_2(\text{DBTDC}-\text{O}_2)] \cdot \text{DMAc}\}_n$	H <sub>2</sub> O	$1.0 \times 10^4$	$4.61 \times 10^{-6}$	S20
$[\text{Zn}(\text{L}^{13})_2] \cdot 2\text{DMF}$	H <sub>2</sub> O	$9.85 \times 10^3$	$1.91 \times 10^{-6}$	S21
$[\text{Zn}_2(\text{NO}_3)_2(4,4'\text{-bpy})_2(\text{TBA})]_n$	H <sub>2</sub> O	$7.48 \times 10^3$	$7.18 \times 10^{-6}$	S22
$[\text{Zn}_2(\text{cptpy})(\text{btc})(\text{H}_2\text{O})]_n$	H <sub>2</sub> O	$5.46 \times 10^3$	$4.33 \times 10^{-6}$	S23
$\{[\text{Zn}_3(\text{HL}^{14})2\text{H}_2\text{O}] \cdot 4\text{H}_2\text{O}\}_n$	H <sub>2</sub> O	$5.00 \times 10^3$	$2.20 \times 10^{-4}$	S24
$\{[\text{Me}_2\text{NH}_2][\text{Zn}_2(\text{HEDP})(\text{BPDC})_{0.5}(\text{H}_2\text{O})_2] \cdot \text{H}_2\text{O}\}_n$	H <sub>2</sub> O	$7.31 \times 10^3$	-	S25
$\{[\text{Zn}_3(\text{L}^{15})(\text{OH})(\text{H}_2\text{O})_5] \cdot \text{NMP} \cdot 2\text{H}_2\text{O}\}_n$	H <sub>2</sub> O	$4.7 \times 10^4$	$7.7 \times 10^{-5}$	S26
$\{[\text{Zn}_2(\text{L}^{16})(5\text{-AIP})_2] \cdot 3\text{H}_2\text{O}\}_n$	H <sub>2</sub> O	$4.475 \times 10^3$	$1.29 \times 10^{-6}$	S27



$\{[\text{Zn}(\text{ATA})(\text{L}^{17})] \cdot 2\text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$5.57 \times 10^{-4}$	$3.76 \times 10^{-6}$	S28
$\{[\text{Cd}(\text{ATA})(\text{L}^{17})] \cdot 2\text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$3.838 \times 10^{-3}$	$1.77 \times 10^{-6}$	S28
$\{[\text{Cd}_2(\text{bptc})(2,2'\text{-bipy})_2(\text{H}_2\text{O})_2]\}_n$	$\text{H}_2\text{O}$	$8.61 \times 10^3$	$1.02 \times 10^{-5}$	S29
$\{[\text{Cd}_2(\text{bptc})(\text{phen})_2] \cdot 4\text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$3.07 \times 10^3$	$2.17 \times 10^{-5}$	S29
$\{[\text{Cd}_2(\text{bptc})(4,4'\text{-bipy})(\text{H}_2\text{O})_2] \cdot 4\text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$6.21 \times 10^3$	$2.03 \times 10^{-5}$	S29
$[\text{Zn}_2(\text{L}^{18})_2(\text{bpe})_2(\text{H}_2\text{O})_2]_n$	$\text{H}_2\text{O}$	$2.395 \times 10^3$	$2.50 \times 10^{-5}$	S30
$[\text{Zr}_6\text{O}_4(\text{OH})_8(\text{H}_2\text{O})_4(\text{L}^{19})_2]$	$\text{H}_2\text{O}$	$2.17 \times 10^3$	$3.79 \times 10^{-9}$	S31
$[\text{Zr}_6\text{O}_4(\text{OH})_8(\text{H}_2\text{O})_4(\text{L}^{20})_2]$	$\text{H}_2\text{O}$	$1.66 \times 10^4$	$2.86 \times 10^{-10}$	S31
$[\text{H}_2\text{N}(\text{CH}_3)_2]_2[\text{Zn}_2\text{L}^{21}(\text{HPO}_3)_2]$	$\text{H}_2\text{O}$	$3.96 \times 10^5$	$1.16 \times 10^{-7}$	S32
$\{[\text{Cd}_3(\mu_6\text{-cpta})_2(\text{py})_2] \cdot 5\text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$3.096 \times 10^3$	$2.1 \times 10^{-7}$	S33
$\{[\text{Zn}(\text{BIMB})(\text{HL}^{22})] \cdot \text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$2.21 \times 10^4$	$2.29 \times 10^{-5}$	S34
$\{[\text{Zn}_2(\text{BIBP})_2(\text{HL}^{22})_2] \cdot 2\text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$1.47 \times 10^4$	$3.32 \times 10^{-5}$	S34
$[\text{Zn}(\text{DHT})(\text{BPP})]_n$	$\text{H}_2\text{O}$	$1.77 \times 10^4$	$4.46 \times 10^{-7}$	S35
$[\text{Zn}_2(\text{OH})(1,4\text{-ndc})_{1.5}(\text{Cz-3,6-bpy})] \cdot 2\text{H}_2\text{O}$	$\text{H}_2\text{O}$	$7.176 \times 10^3$	$4.60 \times 10^{-6}$	S36

[Zn(4-tpvb)(BB) <sub>2</sub> ]	H <sub>2</sub> O	705	$7.66 \times 10^{-9}$	S37
[Zn( $\mu_3$ -L <sup>23</sup> )(H <sub>2</sub> O) <sub>2</sub> ]	H <sub>2</sub> O	$8.88 \times 10^3$	$1.311 \times 10^{-6}$	S38
{Ni(1,4-bib) <sub>1.5</sub> (TPA-Cl <sub>2</sub> )·H <sub>2</sub> O} <sub>n</sub>	H <sub>2</sub> O	70	$1.0 \times 10^{-7}$	S39
{[Cd <sub>3</sub> (HL <sup>24</sup> ) <sub>2</sub> (H <sub>2</sub> O) <sub>3</sub> ]·3H <sub>2</sub> O·2CH <sub>3</sub> CN} <sub>n</sub>	H <sub>2</sub> O	$1.04 \times 10^4$	$9.06 \times 10^{-5}$	S40
PCN-604(Al)	H <sub>2</sub> O	$8.53 \times 10^3$	$6.2 \times 10^{-6}$	S41
[Zn <sub>2</sub> (3-bpah)(bpta)(H <sub>2</sub> O)]·3H <sub>2</sub> O	H <sub>2</sub> O	$9.8 \times 10^{11}$	$1.0 \times 10^{-6}$	S42
[Zn <sub>4</sub> (bptc) <sub>2</sub> (NMP) <sub>3</sub> (DMF)(H <sub>2</sub> O) <sub>2</sub> ] <sub>n</sub>	EtOH/H <sub>2</sub> O	$4.12 \times 10^3$	-	S43
[Cd <sub>4</sub> (bptc) <sub>2</sub> (NMP) <sub>3</sub> (DMF) <sub>2</sub> (H <sub>2</sub> O)] <sub>n</sub>	EtOH/H <sub>2</sub> O	$6.57 \times 10^3$	-	S43
{[Zn <sub>2</sub> (bptc)(DMA)(H <sub>2</sub> O) <sub>2</sub> ]·(DMA) <sub>2</sub> ·H <sub>2</sub> O} <sub>n</sub>	EtOH/H <sub>2</sub> O	$3.76 \times 10^3$	-	S43
[Cd(Hcip)(bpea) <sub>0.5</sub> (H <sub>2</sub> O)] <sub>n</sub>	DMF	$4.10 \times 10^4$	$3.24 \times 10^{-6}$	S44
[Zn <sub>1.5</sub> (dttz)(Hdpa)] <sub>n</sub>	DMF	$1.79 \times 10^4$	$1.45 \times 10^{-6}$	S45
[Ag( $\mu$ -aca)( $\mu_4$ -bztpy) <sub>1/2</sub> ]	H <sub>2</sub> O	$1.25 \times 10^4$	$6.85 \times 10^{-6}$	S46
[Ag( $\mu$ -bza)( $\mu$ -bpa)]	H <sub>2</sub> O	$3.93 \times 10^3$	$5.17 \times 10^{-5}$	S46

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**Table S5.** A comparison of selected MOFs-based luminescent sensors for the detection of  $\text{Cr}_2\text{O}_7^{2-}$  ion.

Coordination Polymers	Media	$K_{sv} / (\text{mol}^{-1})$	LOD / $(\text{mol}\cdot\text{L}^{-1})$	Ref.
$\{[\text{Cd}_3(\text{HBDPO})_2(\text{H}_2\text{O})_7]\cdot 4\text{H}_2\text{O}\}_n$ ( <b>1</b> )	$\text{H}_2\text{O}$	$2.691 \times 10^4$ $5.635 \times 10^3$ (low concentration)	$4.26 \times 10^{-6}$	This work
$\{\text{Zn}(\text{L}^1)(\text{dcdps})\}_n$	$\text{H}_2\text{O}$	$4.456 \times 10^4$	$1.03 \times 10^{-5}$	S1
$\{\text{Zn}(\text{L}^1)(\text{bdc})\}_n$	$\text{H}_2\text{O}$	$7.716 \times 10^4$	$5.55 \times 10^{-6}$	S1
$\{[\text{Cd}(\text{L}^1)(\text{oba})]\cdot 0.5\text{DMF}\}_n$	$\text{H}_2\text{O}$	$6.145 \times 10^4$	$7.36 \times 10^{-6}$	S1
$\{[\text{Cd}(\text{L}^1)(\text{bdc})\cdot 2\text{H}_2\text{O}]\cdot 2\text{DMF}\}_n$	$\text{H}_2\text{O}$	$4.248 \times 10^4$	$1.05 \times 10^{-5}$	S1
$\{[\text{Co}_3(\text{L}^2)_3(\text{phen})_2]\cdot 4\text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$5.62 \times 10^3$	$1.66 \times 10^{-5}$	S2
$\{[\text{Co}_3(\text{L}^2)_3(2,2'\text{-bipy})_2]\cdot 8\text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$4.13 \times 10^3$	$2.12 \times 10^{-5}$	S2
$\{\text{Cd}_3\cdot \text{L}^6\cdot (\text{BTB})_2\cdot 2\text{DMF}\}_n$	DMF	$2.06 \times 10^4$	$1.4 \times 10^{-6}$	S6
$\{(\text{Cd}_3\text{O}_2)\cdot \text{L}^6\cdot \text{btc}\}_n$	DMF	$2.44 \times 10^4$	$1.2 \times 10^{-6}$	S6
$\{[\text{Cd}(\text{L}^1)(\text{BPDC})]\cdot 2\text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$6.4 \times 10^3$	$3.76 \times 10^{-5}$	S17
$\{[\text{Cd}(\text{L}^1)(\text{SDBA})(\text{H}_2\text{O})]\cdot 0.5\text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$4.97 \times 10^3$	$4.86 \times 10^{-5}$	S17
$\{[\text{Zn}_3(\text{mtrb})_3(\text{btc})_2]\cdot 3\text{H}_2\text{O}\}$	$\text{H}_2\text{O}$	$4.62 \times 10^3$	$2.83 \times 10^{-6}$	S18

$\{[\text{Zn}(\text{L}^{12})(\text{H}_2\text{O})_2] \cdot \text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$9.1 \times 10^4$	$7.3 \times 10^{-6}$	S19
$\{[\text{Cd}(\text{L}^{12})(\text{H}_2\text{O})_2] \cdot 4\text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$3.58 \times 10^4$	$8.2 \times 10^{-6}$	S19
$\{[\text{Zn}_2(\text{trz})_2(\text{DBTDC-O}_2)] \cdot \text{DMAc}\}_n$	$\text{H}_2\text{O}$	$1.24 \times 10^4$	$2.55 \times 10^{-6}$	S20
$[\text{Zn}(\text{L}^{13})_2] \cdot 2\text{DMF}$	$\text{H}_2\text{O}$	$1.25 \times 10^4$	$1.45 \times 10^{-6}$	S21
$\{[\text{Me}_2\text{NH}_2][\text{Zn}_2(\text{HEDP})(\text{BPDC})_{0.5}(\text{H}_2\text{O})_2] \cdot \text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$2.09 \times 10^5$	-	S25
$\{[\text{Zn}_3(\text{L}^{15})(\text{OH})(\text{H}_2\text{O})_5] \cdot \text{NMP} \cdot 2\text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$6.6 \times 10^4$	$6.05 \times 10^{-5}$	S26
$\{[\text{Zn}(\text{ATA})(\text{L}^{17})] \cdot 2\text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$2.623 \times 10^{-3}$	$4.3 \times 10^{-7}$	S28
$\{[\text{Cd}(\text{ATA})(\text{L}^{17})] \cdot 2\text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$3.119 \times 10^{-3}$	$1.9 \times 10^{-7}$	S28
$\{[\text{Cd}_2(\text{bptc})(2,2'\text{-bipy})_2(\text{H}_2\text{O})_2]\}_n$	$\text{H}_2\text{O}$	$1.17 \times 10^4$	$7.38 \times 10^{-6}$	S29
$\{[\text{Cd}_2(\text{bptc})(\text{phen})_2] \cdot 4\text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$2.09 \times 10^3$	$5.89 \times 10^{-5}$	S29
$\{[\text{Cd}_2(\text{bptc})(4,4'\text{-bipy})(\text{H}_2\text{O})_2] \cdot 4\text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$9.34 \times 10^3$	$1.36 \times 10^{-5}$	S29
$[\text{H}_2\text{N}(\text{CH}_3)_2]_2[\text{Zn}_2\text{L}^{21}(\text{HPO}_3)_2]$	$\text{H}_2\text{O}$	$4.44 \times 10^4$	$1.09 \times 10^{-6}$	S32
$\{[\text{Zn}(\text{BIMB})(\text{HL}^{22})] \cdot \text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$2.08 \times 10^4$	$2.51 \times 10^{-5}$	S34
$\{[\text{Zn}_2(\text{BIBP})_2(\text{HL}^{22})_2] \cdot 2\text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$1.34 \times 10^4$	$3.34 \times 10^{-5}$	S34

$[\text{Zn}_2(\text{OH})(1,4\text{-ndc})_{1.5}(\text{Cz-3,6-bpy})] \cdot 2\text{H}_2\text{O}$	$\text{H}_2\text{O}$	$1.17 \times 10^4$	$1.77 \times 10^{-6}$	S36
$\{[\text{Cd}_3(\text{HL}^{24})_2(\text{H}_2\text{O})_3] \cdot 3\text{H}_2\text{O} \cdot 2\text{CH}_3\text{CN}\}_n$	$\text{H}_2\text{O}$	$6.99 \times 10^3$	$1.17 \times 10^{-4}$	S40
$[\text{Zn}_2(3\text{-bpah})(\text{bpta})(\text{H}_2\text{O})] \cdot 3\text{H}_2\text{O}$	$\text{H}_2\text{O}$	$9.3 \times 10^6$	$10^{-15}$	S42
$[\text{Ag}(\mu\text{-aca})(\mu_4\text{-bztpy})_{1/2}]$	$\text{H}_2\text{O}$	$7.33 \times 10^3$	$3.68 \times 10^{-5}$	S46
$[\text{Ag}(\mu\text{-bza})(\mu\text{-bpa})]$	$\text{H}_2\text{O}$	$4.37 \times 10^4$	$1.03 \times 10^{-5}$	S46
$\{\text{Co}(\text{TBTA})(\text{L}^{25})_2\}_n$	$\text{H}_2\text{O}$	$1.6286 \times 10^4$	$9.0 \times 10^{-4}$	S47
$\{\text{Co}(\text{TBTA})(\text{L}^{26})_2\}_n$	$\text{H}_2\text{O}$	$1.2435 \times 10^4$	$1.51 \times 10^{-3}$	S47
$\{\text{Co}(\text{TBTA})(\text{L}^{27})_{1.5}\}_n$	$\text{H}_2\text{O}$	$1.5997 \times 10^4$	$6.7 \times 10^{-4}$	S47
USTS-7	$\text{H}_2\text{O}$	$1.31 \times 10^4$	$2.2 \times 10^{-6}$	S48
$[\text{Zn}(\text{tpbpc})_2] \cdot \text{solvent}$	$\text{H}_2\text{O}$	$1.13 \times 10^4$	$6.76 \times 10^{-7}$	S49
$\{[\text{Co}_{1.5}(\text{TBIP})_{1.5}(\text{L}^{28})] \cdot 0.5\text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$2.09 \times 10^4$	$9.9 \times 10^{-5}$	S50
$\{[\text{Cd}_{10}(\text{DDB})_4(\text{bpz})_8(\text{DMA})(\text{H}_2\text{O})_{8.2}] \cdot 2\text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$2.27 \times 10^4$	$3.77 \times 10^{-7}$	S51
$[\text{Zn}(\text{IPA})(\text{L}^{29})]_n$	$\text{H}_2\text{O}$	$1.37 \times 10^3$	$1.202 \times 10^{-5}$	S52
$[\text{Cd}(\text{IPA})(\text{L}^{29})]_n$	$\text{H}_2\text{O}$	$2.91 \times 10^3$	$2.26 \times 10^{-6}$	S52

$\{[\text{Cd}_2\text{L}^{30}(\text{H}_2\text{O})_4] \cdot \text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$1.25 \times 10^4$	$3.7 \times 10^{-6}$	S53
$\{[\text{Zn}_2\text{L}^{30}(\text{H}_2\text{O})_4] \cdot \text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$1.77 \times 10^4$	$2.6 \times 10^{-6}$	S53
$[\text{Cd}(4\text{-tkpvb})(5\text{-tert-BIPA})]_n$	$\text{H}_2\text{O}$	$2.50 \times 10^4$	$1.2 \times 10^{-7}$	S54
$[\text{Zn}(\text{L}^{31})(\text{BBI}) \cdot (\text{H}_2\text{O})_2]_n$	$\text{H}_2\text{O}$	$1.17 \times 10^4$	-	S55
$[\text{Cd}(\text{L}^{31})(\text{TPOM})_{0.75}] \cdot \text{xS}$	$\text{H}_2\text{O}$	$1.345 \times 10^4$	-	S55
$\{[\text{Zn}_2(\text{TPOM})(\text{NH}_2\text{-bdc})_2] \cdot 4\text{H}_2\text{O}\}_n$	DMF	$7.59 \times 10^3$	$3.9 \times 10^{-6}$	S56
$[\text{Zn}(\text{btz})]_n$	$\text{H}_2\text{O}$	$4.23 \times 10^3$	$2.0 \times 10^{-6}$	S57
$\{[\text{Zn}_2(\text{tz})\text{H}_2\text{O}]_n\}$	$\text{H}_2\text{O}$	$2.19 \times 10^3$	$1.00 \times 10^{-5}$	S57
$[\text{Cd}_3(\text{cpota})_2(\text{phen})_3]_n \cdot 5\text{H}_2\text{O}$	$\text{H}_2\text{O}$	$1.21 \times 10^4$	$3.70 \times 10^{-7}$	S58
$[\text{Zn}(\text{NH}_2\text{-bdc})(4,4'\text{-bipy})]_n$	$\text{H}_2\text{O}$	$7.62 \times 10^3$	$1.30 \times 10^{-6}$	S59
$\{[\text{Cd}_2(\text{HDDB})(\text{bib})_{1.5}(\text{H}_2\text{O})] \cdot 2.5\text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$2.7 \times 10^4$	-	S60
$[\text{Cd}_2(\text{HDDB})(\text{m-bimb})] \cdot \text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$1.8 \times 10^4$	-	S60
$\{[\text{Cd}_2(\text{DDB})(\text{p-bimb})] \cdot 2.5\text{H}_2\text{O} \cdot 0.5(\text{p-H}_2\text{bimb})\}_n$	$\text{H}_2\text{O}$	$2.8 \times 10^4$	-	S60
$[\text{Cd}_2(\text{dpa})_2(\text{cda})\text{Cl}_2]_n$	$\text{H}_2\text{O}$	-	$4.0 \times 10^{-7}$	S61

[Cd(dpa)<sub>2</sub>(cda)]<sub>n</sub>

H<sub>2</sub>O

-

$2.0 \times 10^{-7}$

S61

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**Table S6.** A comparison of selected MOFs-based luminescent sensors for the detection of CrO<sub>4</sub><sup>2-</sup> ion.

Coordination Polymers	Media	K <sub>sv</sub> / (mol <sup>-1</sup> )	LOD / (mol·L <sup>-1</sup> )	Ref.
{[Cd <sub>3</sub> (HBDPO) <sub>2</sub> (H <sub>2</sub> O) <sub>7</sub> ]·4H <sub>2</sub> O} <sub>n</sub> (1)	H <sub>2</sub> O	1.614 × 10 <sup>3</sup> 1.400 × 10 <sup>3</sup> (low concentration)	1.71 × 10 <sup>-5</sup>	This work
{Cd <sub>2</sub> (L <sup>3</sup> )(2,2'-bipy)} <sub>n</sub>	H <sub>2</sub> O	4.51 × 10 <sup>5</sup>	1.12 × 10 <sup>-8</sup>	S3
{Cd <sub>2</sub> (L <sup>3</sup> )(H <sub>2</sub> O) <sub>4</sub> } <sub>n</sub>	H <sub>2</sub> O	3.61 × 10 <sup>5</sup>	2.23 × 10 <sup>-8</sup>	S3
{[Zn <sub>3</sub> (mtrb) <sub>3</sub> (btc) <sub>2</sub> ]·3H <sub>2</sub> O}	H <sub>2</sub> O	2.77 × 10 <sup>3</sup>	4.52 × 10 <sup>-6</sup>	S18
{[Zn(L <sup>12</sup> )(H <sub>2</sub> O) <sub>2</sub> ]·H <sub>2</sub> O} <sub>n</sub>	H <sub>2</sub> O	4.1 × 10 <sup>4</sup>	5.7 × 10 <sup>-6</sup>	S19
{[Cd(L <sup>12</sup> )(H <sub>2</sub> O) <sub>2</sub> ]·4H <sub>2</sub> O} <sub>n</sub>	H <sub>2</sub> O	3.03 × 10 <sup>4</sup>	6.8 × 10 <sup>-6</sup>	S19
[Zn(L <sup>13</sup> ) <sub>2</sub> ]·2DMF	H <sub>2</sub> O	1.34 × 10 <sup>4</sup>	1.14 × 10 <sup>-6</sup>	S21
{[Zn <sub>3</sub> (L <sup>15</sup> )(OH)(H <sub>2</sub> O) <sub>5</sub> ]·NMP·2H <sub>2</sub> O} <sub>n</sub>	H <sub>2</sub> O	1.30 × 10 <sup>4</sup>	4.29 × 10 <sup>-4</sup>	S26
{[Zn(ATA)(L <sup>17</sup> )]·2H <sub>2</sub> O} <sub>n</sub>	H <sub>2</sub> O	1.485 × 10 <sup>-3</sup>	2.5 × 10 <sup>-7</sup>	S28
{[Cd(ATA)(L <sup>17</sup> )]·2H <sub>2</sub> O} <sub>n</sub>	H <sub>2</sub> O	9.7 × 10 <sup>-4</sup>	1.8 × 10 <sup>-7</sup>	S28
{[Cd <sub>2</sub> (bptc)(2,2'-bipy) <sub>2</sub> (H <sub>2</sub> O) <sub>2</sub> ]} <sub>n</sub>	H <sub>2</sub> O	7.95 × 10 <sup>3</sup>	7.79 × 10 <sup>-6</sup>	S29
{[Cd <sub>2</sub> (bptc)(phen) <sub>2</sub> ]·4H <sub>2</sub> O} <sub>n</sub>	H <sub>2</sub> O	1.09 × 10 <sup>3</sup>	1.06 × 10 <sup>-4</sup>	S29



$\{[\text{Cd}_2(\text{bptc})(4,4'\text{-bipy})(\text{H}_2\text{O})_2] \cdot 4\text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$5.38 \times 10^3$	$1.60 \times 10^{-5}$	S29
$\{[\text{Zn}(\text{BIMB})(\text{HL}^{22})] \cdot \text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$1.70 \times 10^4$	$2.67 \times 10^{-5}$	S34
$\{[\text{Zn}_2(\text{BIBP})_2(\text{HL}^{22})_2] \cdot 2\text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$1.20 \times 10^4$	$4.16 \times 10^{-5}$	S34
$[\text{Zn}_2(\text{OH})(1,4\text{-ndc})_{1.5}(\text{Cz-3,6-bpy})] \cdot 2\text{H}_2\text{O}$	$\text{H}_2\text{O}$	$9.08 \times 10^3$	$1.10 \times 10^{-6}$	S36
$[\text{Zn}(4\text{-tkpvb})(\text{BB})_2]$	$\text{H}_2\text{O}$	923	$1.21 \times 10^{-8}$	S37
$\{[\text{Cd}_3(\text{HL}^{24})_2(\text{H}_2\text{O})_3] \cdot 3\text{H}_2\text{O} \cdot 2\text{CH}_3\text{CN}\}_n$	$\text{H}_2\text{O}$	$1.41 \times 10^4$	$8.65 \times 10^{-5}$	S40
$[\text{Zn}(\text{tpbpc})_2] \cdot \text{solvent}$	$\text{H}_2\text{O}$	$1.65 \times 10^5$	$4.66 \times 10^{-8}$	S49
$\{[\text{Cd}_{10}(\text{DDB})_4(\text{bpz})_8(\text{DMA})(\text{H}_2\text{O})_{8.2}] \cdot 2\text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$2.59 \times 10^4$	$3.31 \times 10^{-7}$	S51
$[\text{Zn}(\text{IPA})(\text{L}^{29})]_n$	$\text{H}_2\text{O}$	$1.00 \times 10^3$	$1.833 \times 10^{-5}$	S52
$[\text{Cd}(\text{IPA})(\text{L}^{29})]_n$	$\text{H}_2\text{O}$	$1.30 \times 10^3$	$2.52 \times 10^{-6}$	S52
$\{[\text{Cd}_2\text{L}^{30}_2(\text{H}_2\text{O})_4] \cdot \text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$1.21 \times 10^4$	$3.8 \times 10^{-6}$	S53
$\{[\text{Zn}_2\text{L}^{30}_2(\text{H}_2\text{O})_4] \cdot \text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$1.95 \times 10^4$	$2.3 \times 10^{-6}$	S53
$[\text{Cd}(4\text{-tkpvb})(5\text{-tert-BIPA})]_n$	$\text{H}_2\text{O}$	$4.68 \times 10^4$	$8 \times 10^{-8}$	S54
$\{[\text{Zn}_2(\text{TPOM})(\text{NH}_2\text{-bdc})_2] \cdot 4\text{H}_2\text{O}\}_n$	DMF	$4.45 \times 10^3$	$4.8 \times 10^{-6}$	S56

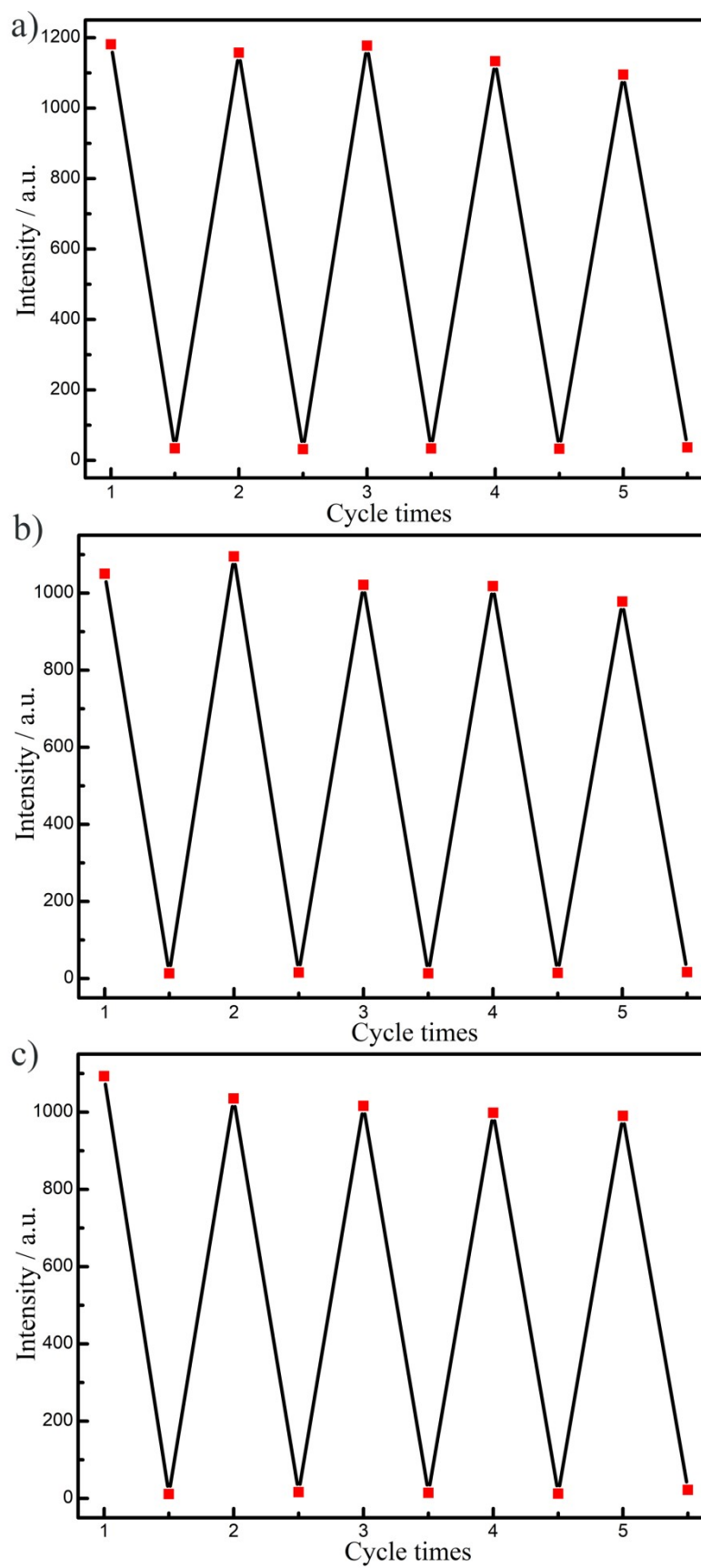
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$[\text{Zn}(\text{btz})]_n$	$\text{H}_2\text{O}$	$3.19 \times 10^3$	$1.0 \times 10^{-5}$	S57
$\{[\text{Zn}_2(\text{ttz})\text{H}_2\text{O}]_n\}$	$\text{H}_2\text{O}$	$2.35 \times 10^3$	$1.00 \times 10^{-5}$	S57
$[\text{Cd}_3(\text{cpota})_2(\text{phen})_3]_n \cdot 5\text{H}_2\text{O}$	$\text{H}_2\text{O}$	$6.9 \times 10^3$	$4.18 \times 10^{-7}$	S58
$[\text{Zn}(\text{NH}_2\text{-bdc})(4,4'\text{-bipy})]_n$	$\text{H}_2\text{O}$	$4.56 \times 10^3$	$2.21 \times 10^{-6}$	S59
$\{[\text{Cd}_2(\text{HDDDB})(\text{bib})_{1.5}(\text{H}_2\text{O})] \cdot 2.5\text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$4.7 \times 10^3$	-	S60
$[\text{Cd}_2(\text{HDDDB})(\text{m-bimb})] \cdot \text{H}_2\text{O}\}_n$	$\text{H}_2\text{O}$	$2.5 \times 10^3$	-	S60
$\{[\text{Cd}_2(\text{DDB})(\text{p-bimb})] \cdot 2.5\text{H}_2\text{O} \cdot 0.5(\text{p-H}_2\text{bimb})\}_n$	$\text{H}_2\text{O}$	$6.0 \times 10^3$	-	S60

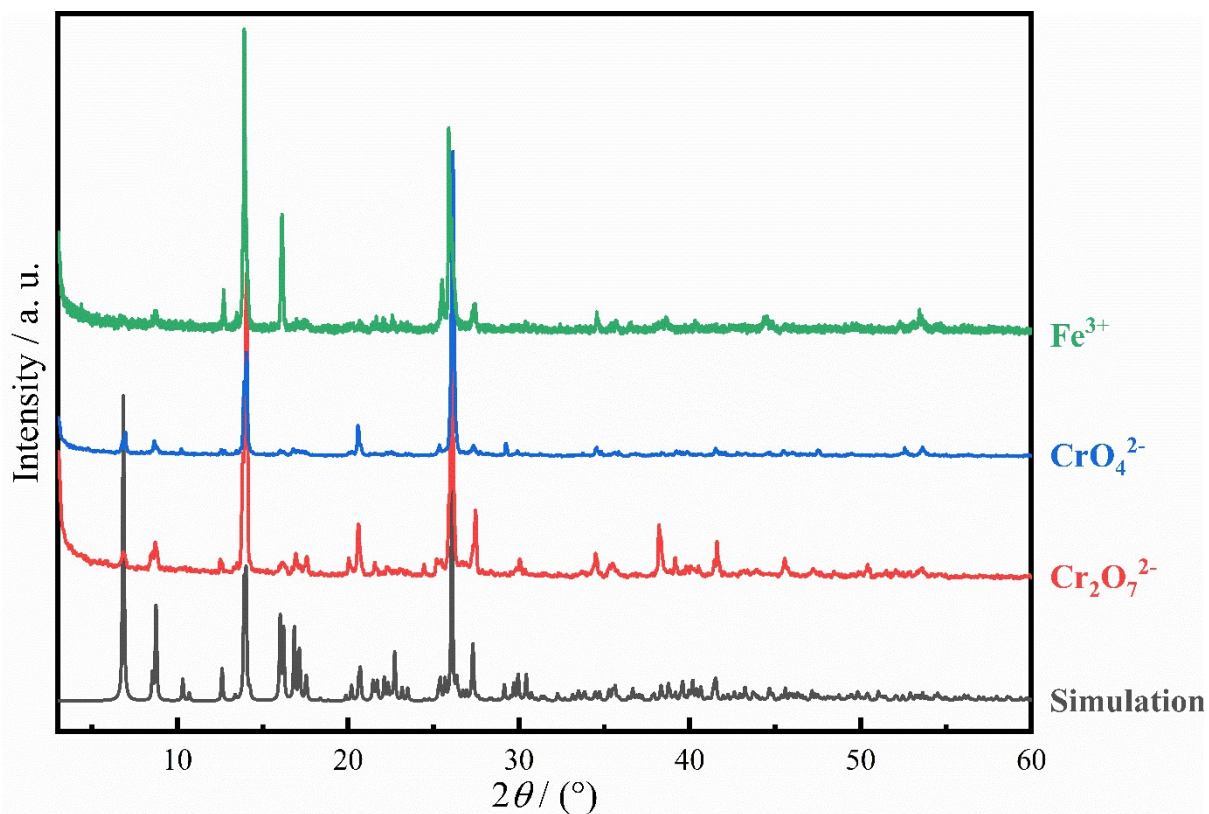
Abbreviations:

$\text{L}^1 = 4,4'-(2,5\text{-Bis(methylthio)-1,4-phenylene})\text{-dipyridine}$ ;  $\text{H}_2\text{dcdps} = 4,4'\text{-sulfon-yl}dibenzoic\ acid$ ;  $\text{H}_2\text{bdc} = 1,4\text{-dicarboxybenzene}$ ;  $\text{H}_2\text{oba} = 4,4'\text{-oxy-bisbenzoic acid}$ ;  $\text{phen} = 1,10\text{-phenanthroline}$ ;  $\text{H}_2\text{L}^2 = 6\text{-methoxy-2,2'-sulfone-4,4'-dicarboxylic acid}$ ;  $2,2'\text{-bipy} = 2,2'\text{-bipyridine}$ ;  $\text{H}_4\text{L}^3 = 1,1'\text{-biphenyl-2,3,3',5'-tetracarboxylic acid}$ ;  $\text{H}_2\text{L}^4 = 9\text{H-carbazolyl-3,6-dicarboxylic acid}$ ;  $4,4'\text{-bipy} = 4,4'\text{-bipyridine}$ ;  $\text{bbibp} = 4,4'\text{-bis(benzoimidaz-1-yl)biphenyl}$ ;  $\text{H}_2\text{L}^5 = 4,4'\text{-(4,4'-bipyridine-2,6-diyl)dibenzoic acid}$ ;  $\text{L}^6 = 9,10\text{-bis(N-benzimidazolyl)-anthracene}$ ;  $\text{L}^7 = (9,10\text{-bis(N-benzimidazolyl)-anthracene}$ ;  $\text{H}_2\text{bdc} = \text{terephthalic acid}$ ;  $\text{H}_3\text{BTB} = 1,3,5\text{-tris(4-carboxyphenyl)benzene}$ ;  $\text{H}_3\text{btc} = 1,3,5\text{-benzenetricarboxylic acid}$ ;  $\text{H}_2\text{-Br-bdc} = \text{bromo-terephthalic acid}$ ;  $\text{L}^8 = 1,3,4\text{-trikisisoniacyl-2-deoxy-}\beta\text{-D-ribose}$ ;  $\text{H}_2\text{NH}_2\text{-bdc} = \text{amino-terephthalic acid}$ ;  $\text{TPHC} = [1,1':2',1''\text{-terphenyl-3,3'',4,4',4'',5'-hexacarboxylic acid}$ ;  $1,4\text{-H}_2\text{ndc} = 1,4\text{-naphthalenedicarboxylic acid}$ ;  $\text{dpb} = 1,4\text{-bis(pyrid-4-yl)benzene}$ ;  $\text{H}_25\text{-asba} = 2\text{-amino-5-sulfobenzoic acid}$ ;  $\text{bimb} = 1,4\text{-bis(1H-imidazol-1-yl)butane}$ ;  $\text{Htrz} = 1\text{H-1,2,3-triazole}$ ;  $\text{H}_2\text{HIP} = 5\text{-hydroxyisophthalic acid}$ ;  $\text{H}_2\text{hfipbb} = 4,4'\text{-(hexafluoroisopropylidene)bis(benzoic acid)}$ ;  $\text{L}^9 = 5,8\text{-di(1H-imidazol-1-yl)quinoxaline}$ ;  $\text{H}_5\text{L}^{10} = 2,5\text{-bis(3',5'-dicarboxylphenyl)-benzoic acid}$ ;  $\text{L}^{11} = 4,4'\text{-(2,5-bis(methylthio)-1,4-phenylene)dipyridine}$ ;  $\text{H}_2\text{BPDC} = 4,4'\text{-biphenyldicarboxylic acid}$ ;  $\text{H}_2\text{SDBA} = 4,4'\text{-sulfonyldibenzoic acid}$ ;  $\text{mtrb} = 1,3\text{-bis(1,2,4-triazole-4-ylmethyl)benzene}$ ;  $\text{H}_2\text{L}^{12} = 5\text{-(4-pyridylamino)isophthalic acid}$ ;  $\text{H}_2\text{DBTDC-O}_2 = \text{S,S-dioxodibenzothiophen-3,7-dicarboxylic acid}$ ;  $\text{HL}^{13} = 4\text{-(4-(2-chloroimidazo[1,2-a]pyridin-3-yl)-[2,30-bipyridin]-6-yl)benzoic acid}$ ;  $\text{H}_2\text{TBA} = 4\text{-(1H-tetrazol-5-yl)-benzoic acid}$ ;  $\text{Hcptpy} = 4\text{-(4-carboxyphenyl)-2,2':4',4''-terpyridine}$ ;  $\text{H}_4\text{L}^{14} = 1\text{-(3,5-dicarboxylatobenzyl)-3,5-pyrazole dicarboxylic acid}$ ;  $\text{HEDP} = 1\text{-hydroxyethylidene diphosphonate}$ ;  $\text{H}_5\text{L}^{15} = 2,4\text{-di(3',5'-dicarboxylphenyl)benzoic acid}$ ;  $5\text{-H}_2\text{AIP} = 5\text{-aminoisophthalic acid}$ ;  $\text{H}_2\text{ATA} = 2\text{-aminoterephthalic acid}$ ;  $\text{L}^{16} = 3\text{-pyridin-3-yl-N-[5-(3-pyridin-3-yl-acryloylamino)-naphthalen-1-yl]-acrylamide}$ ;  $\text{L}^{17} = (\text{E})\text{-N'-(pyridin-4-ylmethylene)isonicotinohydrazide}$ ;  $\text{H}_4\text{bptc} = 3,3',5,5'\text{-biphenyltetracarboxylic acid}$ ;  $\text{bpe} = (\text{E})\text{-1,2-di(pyridin-4-yl)ethene}$ ;  $\text{L}^{18} = 4,4'\text{-(1,2-phenylenebis(methylene))bis(oxy)dibenzoic acid}$ ;  $\text{L}^{19} = 5',5'''\text{-bis(4-carboxyphenyl)-[1,1':3',1'':4'',1''':3''',1''''-quinquephenyl]-4,4'''\text{-dicarboxylate}$ ;  $\text{L}^{20} = 4,4',4'',4'''\text{-(4,4'-(1,4-phenylene)bis(pyridine-6,4,2-triyl))-tetrabenzoate}$ ;  $\text{H}_2\text{L}^{21} = 2',3',5',6'\text{-tetramethyl-[1,1':4',1''-terphenyl]-4,4''-dicarboxylic acid}$ ;  $\text{BIMB} = 4,4\text{-bis(imidazol-1-ylmethyl)biphenyl}$ ;  $\text{BIBP} = 4,4\text{-bis(imidazol-1-yl)diphenyl}$ ;  $\text{H}_3\text{cpta} = 2\text{-(2-carboxyphenoxy)terephthalic acid}$ ;  $\text{H}_3\text{L}^{22} = 5\text{-(6-carboxypyridin-2-yl)benzene-1,3-dicarboxylic acid}$ ;  $\text{H}_2\text{DHT} = 2,5\text{-dihydroxyterephthalic acid}$ ;  $\text{BPP} = 1,3\text{-di(4-pyridyl)propane}$ ;  $\text{Cz-3,6-bpy} = 3,6\text{-bis(pyridin-4-yl)-9H-carbazole}$ ;  $4\text{-tkpvb} = 1,2,4,5\text{-}$

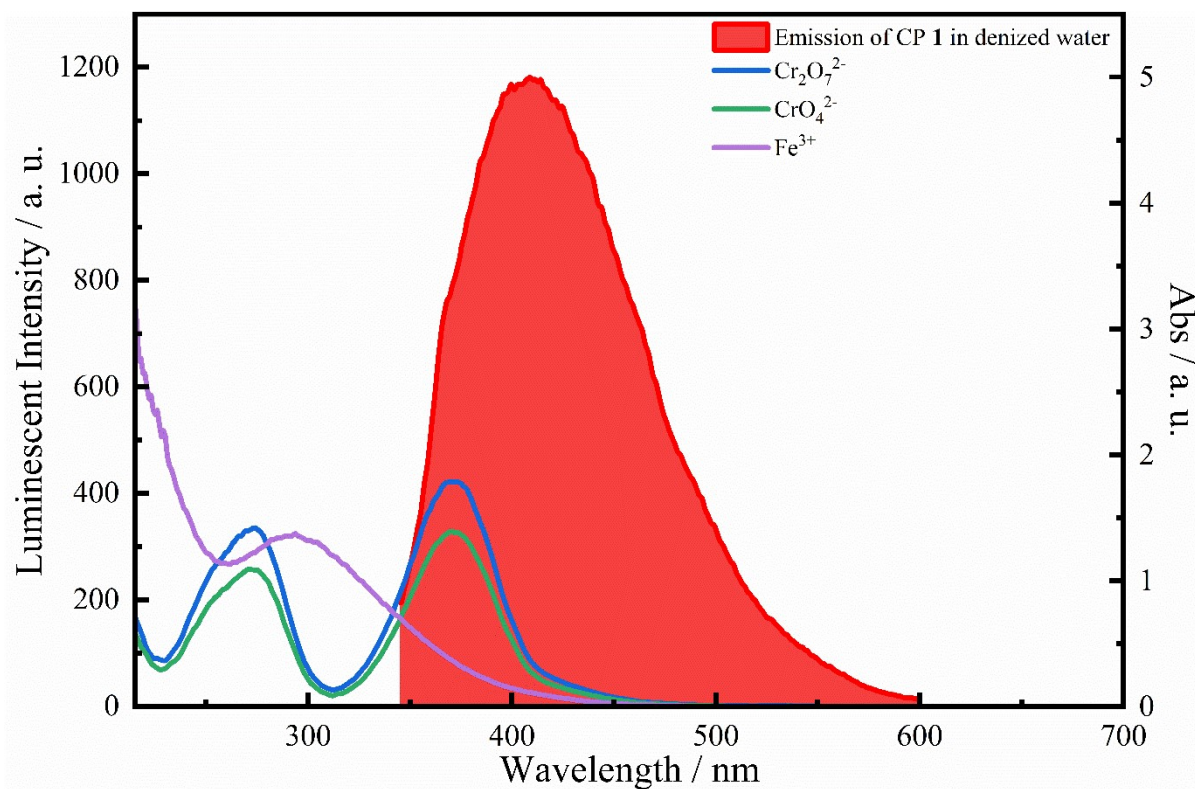
tetrakis((E)-2-(pyridin-4-yl)vinyl)benzene; HBB = 3-bromobenzoic acid; H<sub>2</sub>L<sup>23</sup> = 3-carboxy-1-(3'-carboxybenzyl)-2-oxidopyridinium; 1,4-bib = 1,4-bis(1H-imidazol-1-yl)benzene; H<sub>2</sub>TPA-Cl<sub>2</sub> = 2,5-dichloro-terephthalic acid; H<sub>4</sub>L<sup>24</sup> = 1-(3,5-dicarboxylatobenzyl)-3,5-pyrazole dicarboxylic acid; H<sub>4</sub>bpta = 2,2',4,4'-biphenyltetracarboxylic acid; bpea = 1,2-bis(4-pyridyl)ethane; 3-bpah = N,N'-bis(3-pyridinecarboxamide)-1,2-cyclohexane; H<sub>3</sub>cip = 5-(3-carboxybenzylamino)-isophthalic acid; H<sub>3</sub>dttz = 4,5-di(1H-tetrazol-5-yl)-2H-1,2,3-triazole; Hdpa = 4,4'-dipyridylamine; bpa = 9,10-bis(4-pyridyl)anthracene; bztpy = 1,2,4,5-tetrakis(4-pyridyl)benzene; H<sub>2</sub>TBTA = tetrabromoterephthalic acid; L<sup>25</sup> = 1,2-bis(benzimidazole-1-ylmethyl)benzene; L<sup>26</sup> = 1,3-bis(benzimidazole-1-ylmethyl)-benzene; L<sup>27</sup> = 1,4-bis(benzimidazole-1-ylmethyl)-benzene; Htpbpc = 4'-[4,2';6',4'']-terpyrindin-4'-biphenyl-4-carboxylic acid; H<sub>2</sub>TBIP = 5-tert-butylisophthalic acid; L<sup>28</sup> = 1,3-bis(5,6-dimethylbenzimidazol-1-yl)propane; bpz = 2-(1H-pyrazol-3-yl)pyridine; H<sub>5</sub>DDB = 3,5-di(2',4'-dicarboxylphenyl)benzoic acid; H<sub>2</sub>IPA = isophthalic acid; L<sup>29</sup> = 3-pyridylcarboxaldehyde nicotinoylhydrazone; H<sub>2</sub>L<sup>30</sup> = 5-(1H-1,2,4-triazol-1-yl)isophthalic acid; 4-tkpvb = 1,2,4,5-tetrakis(4-pyridylvinyl)benzene; 5-tert-H<sub>2</sub>-BIPA = 5-tert-butylisophthalic acid; BBI = 1,1'-(1,4-butanediyl)bis(imidazole); H<sub>2</sub>L<sup>31</sup> = benzo-(1,2;4,5)-bis(thiophene-2'-carboxylic acid; TPOM = tetrakis(4-pyridyloxymethylene)methane; H<sub>2</sub>btz = 1,5-bis(5-tetrazolo)-3-oxapentane; H<sub>3</sub>ttz = 1,2,3-tris-[2-(5-tetrazolo)-ethoxy]propane; H<sub>3</sub>cpota = 2-(4-carboxyphenoxy)terephthalic acid; bib = 1,4-bis(imidazol-1-yl)benzene; H<sub>5</sub>DDB = 3,5-di(2',4'-dicarboxylphenyl)benzoic acid; m-bimb = 1,3-bis(imidazol-1-ylmethyl)benzene; p-bimb = 1,4-bis(imidazol-1-ylmethyl)benzene; dpa = 9,10-di(4-pyridyl)anthracene; H<sub>2</sub>cda = cyclohexane-1,4-dicarboxylic acid.



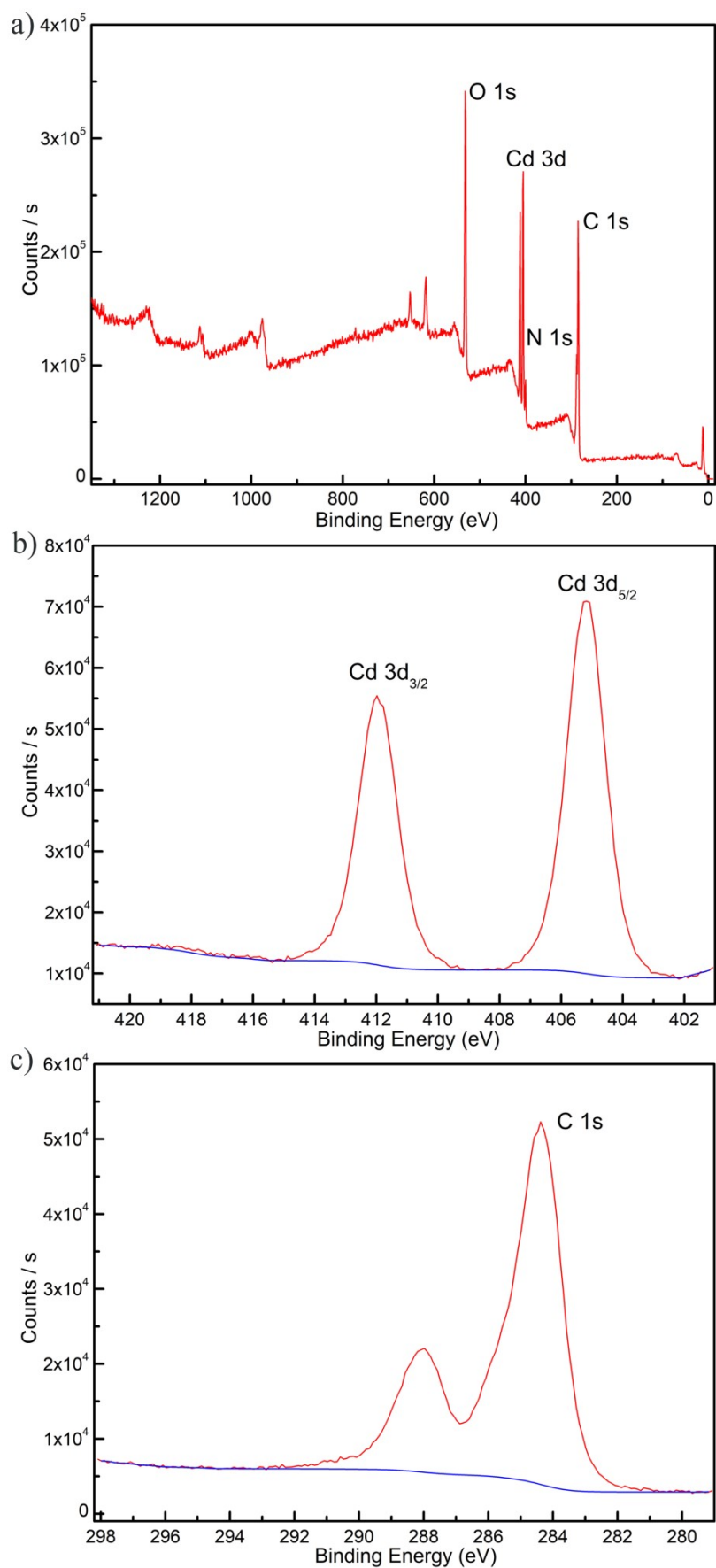
**Fig. S7** The recyclable luminescence experiments of **1** towards sensing  $\text{Fe}^{3+}$  (a),  $\text{Cr}_2\text{O}_7^{2-}$  (b), and  $\text{CrO}_4^{2-}$  (c), respectively.



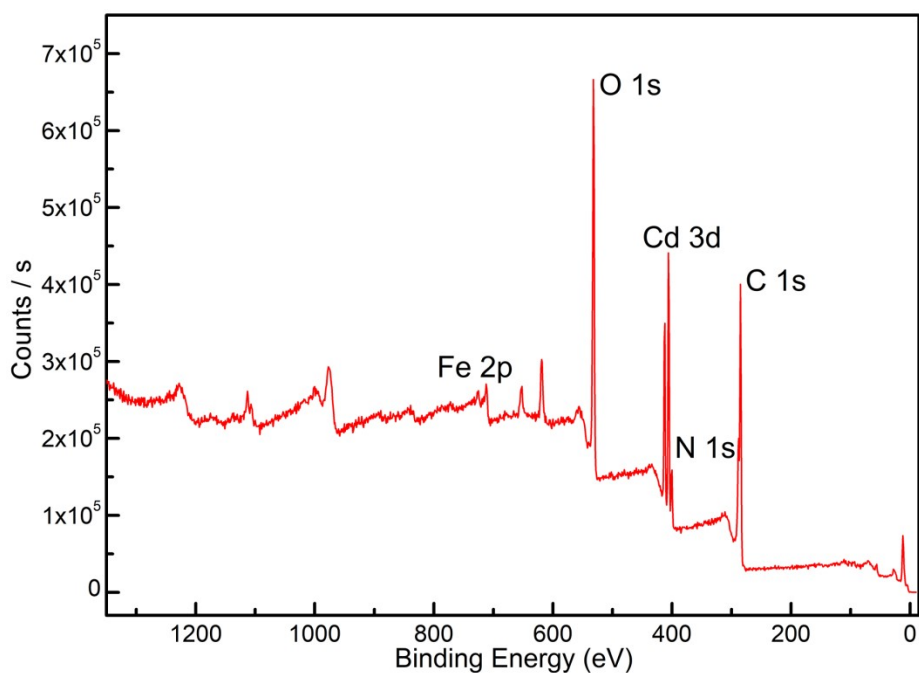
**Fig. S8** The PXR D spectra for the simulation and sample of **1** immersed into the aqueous of  $\text{Fe}^{3+}$ ,  $\text{Cr}_2\text{O}_7^{2-}$  and  $\text{CrO}_4^{2-}$  for one week.



**Fig. S9** The emission spectra of **1** in deionized water and the UV-vis spectra of the aqueous of  $\text{Fe}^{3+}$ ,  $\text{Cr}_2\text{O}_7^{2-}$  and  $\text{CrO}_4^{2-}$ .



**Fig. S10** The XPS spectrum of **1** (a), XPS spectra of **1** for Cd 3d (b) and C 1s (c).



**Fig. S11** The XPS spectrum of **1** after detection of Fe<sup>3+</sup> ion.

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