Supporting Information

Water stable Eu(III)-organic framework as a recyclable multi-responsive luminescent sensor for efficient detections of *p*-aminophenol in simulated urine, Mn^{VII} and Cr^{VI} anions in aqueous solution

Jiao-Jiao Zhao, Peng-Yu Liu, Li-Jun Song, Lei Zhang, Zhi-Liang Liu and Yan-Qin Wang*

Table S1. The selected bond lengths (Å) and angles (◦) for Eu-MOF-**1**.

Parameter	Value	Parameter	Value
Eu1-O1	2.498(5)	Eu1-O2	2.483(5)
Eu1-O3B	2.379(5)	Eu1-O4C	2.335(5)
Eu1-O5D	2.392(5)	Eu1-O6E	2.366(4)
Eu1-O7	2.375(5)	Eu1-O8	2.404(5)
O2-Eu1-O1	52.22(16)	O3B-Eu1-O1	85.02(17)
O3B-Eu1-O2	130.06(18)	O3B-Eu1-O5C	73.52(17)
O3B-Eu1-O8	76.36(19)	O4D-Eu1-O1	134.58(16)
O4D-Eu1-O2	85.03(17)	O4D-Eu1-O3B	120.40(16)
O4D-Eu1-O5C	75.21(17)	O4D-Eu1-O6E	76.93(17)
O4D-Eu1-O7	79.28(18)	O4D-Eu1-O8	144.40(18)
O5C-Eu1-O1	77.87(18)	O5C-Eu1-O2	73.23(18)
O5C-Eu1-O8	139.7(2)	O6E-Eu1-O1	148.28(16)
O6E-Eu1-O2	151.18(17)	O6E-Eu1-O3B	78.74(18)
O6E-Eu1-O5C	122.08(17)	O6E-Eu1-O7	80.84(19)
O6E-Eu1-O8	76.30(19)	O7-Eu1-O1	99.45(19)
O7-Eu1-O2	73.77(19)	O7-Eu1-O3B	146.90(18)
O7-Eu1-O5C	139.56(18)	O7-Eu1-O8	73.7(2)
O8-Eu1-O1	73.46(18)	O8-Eu1-O2	108.5(2)

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

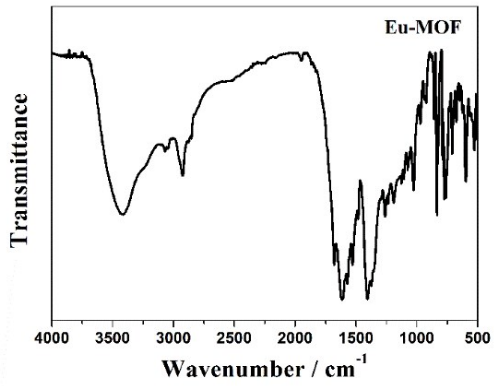

Fig. S1 The IR spectrum for Eu-MOF-**1**.

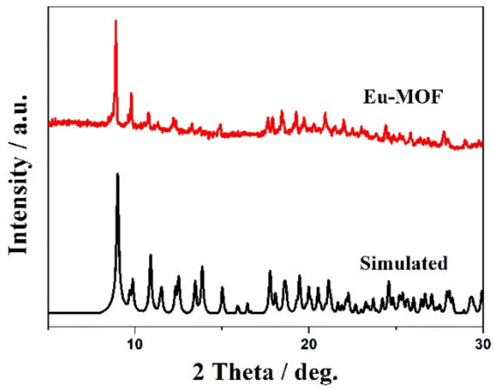

Fig. S2 The PXRD patterns for Eu-MOF-**1**.

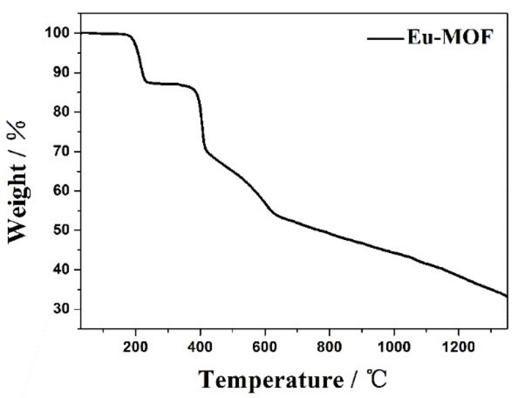

Fig. S3 The TGA curve for Eu-MOF-**1**.

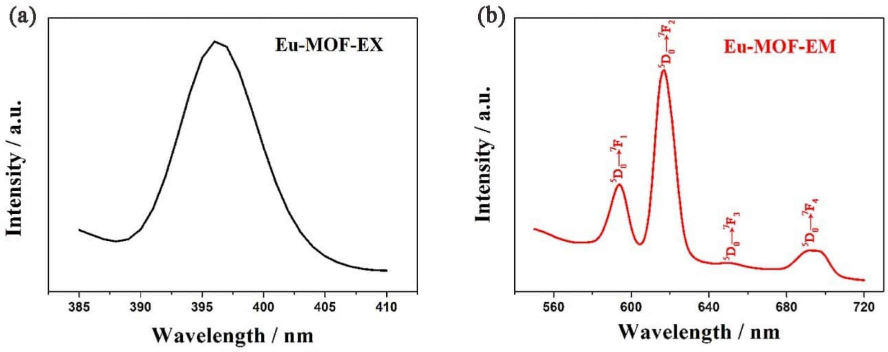

Fig. S4 The solid-state excitation and emission spectra of Eu-MOF-**1** at room temperature.

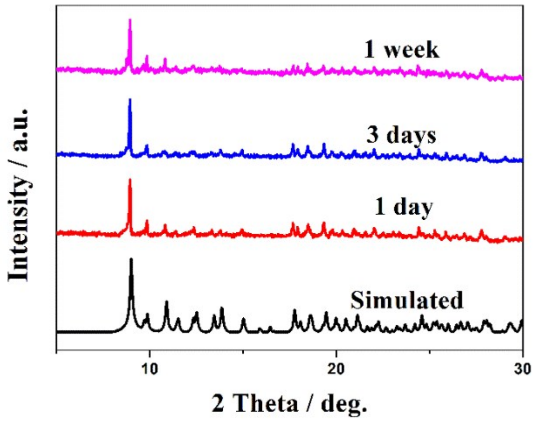

Fig. S5 PXRD patterns of Eu-MOF-**1** after immersing in water for one day, three days and one week.

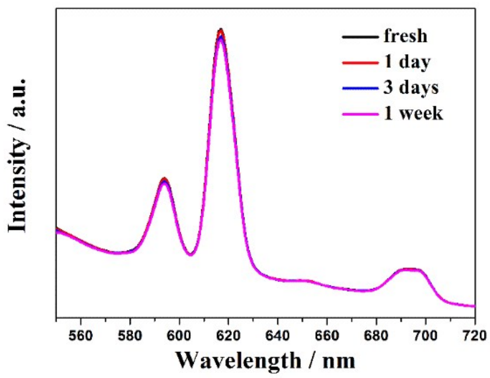

Fig. S6 Day-to-day fluorescence stability of Eu-MOF-**1**.

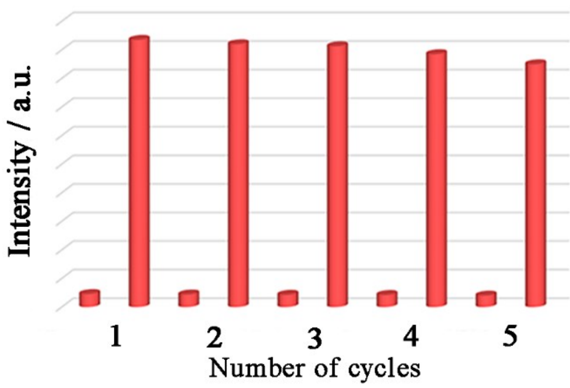

Fig. S7 Five cycles test of Eu-MOF-**1** toward sensing PAP.

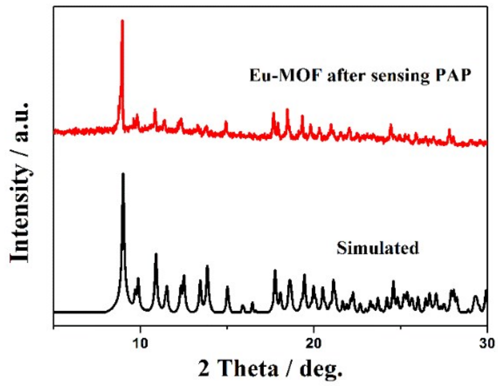

Fig. S8 PXRD patterns of Eu-MOF-**1** and Eu-MOF-**1** immersed in PAP aqueous solution.

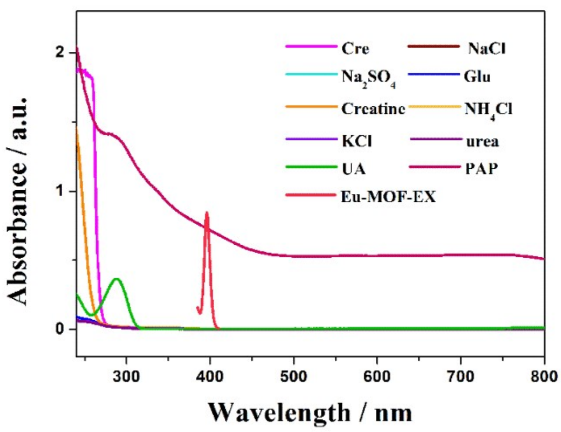

Fig. S9 UV-vis absorption spectra of urea, Glu, NaCl, Cre, Na_2SO_4, UA, KCl, creatine, NH_4Cl and PAP and the excitation spectrum of Eu-MOF-**1**.

Table S2. Comparison of the analytical parameters between the previously reported sensors and Eu-MOF-**1**.

Material	Analyte	K_{sv} (M^{-1})	LOD (mol/L)	Ref
$[Zn_3(L)(OH)(H_2O)_5]\cdot NMP\cdot 2H_2O$	MnO_4^-	1.1×10^4	3.38×10^{-4}	1
$[Cd(L)_2(H_2O)_2]$	MnO_4^-	2.2×10^4	1.73×10^{-4}	2
534-MOF-Tb	MnO_4^-	6.63×10^4	3.4×10^{-4}	3
$[Co(NPDC)(bpee)]\cdot DMF\cdot 2H_2O$	MnO_4^-	4.26×10^3	1.5×10^{-6}	4
CDs@MOF(Eu)	MnO_4^-	3.641×10^4	6.8×10^{-7}	5
Eu-MOF-**1**	MnO_4^-	4.828×10^4	8.08×10^{-6}	This work
$[Zn_3(L)(OH)(H_2O)_5]\cdot NMP\cdot 2H_2O$	CrO_4^{2-}	1.3×10^4	4.29×10^{-4}	1
$[Cd(L)_2(H_2O)_2]$	CrO_4^{2-}	1.1×10^4	1.75×10^{-4}	2
$[Zn_2(TPOM)(NDC)_2]\cdot 3.5H_2O$	CrO_4^{2-}	7.81×10^3	2.5×10^{-6}	6
$[Tb(L)(HCOO)(H_2O)]$	CrO_4^{2-}	1.3×10^3	1.8×10^{-6}	7
Eu-MOF-**1**	CrO_4^{2-}	5.339×10^4	7.30×10^{-6}	This work
$[Zn_3(L)(OH)(H_2O)_5]\cdot NMP\cdot 2H_2O$	$Cr_2O_7^{2-}$	6.6×10^4	6.05×10^{-5}	1
$[Cd(L)_2(H_2O)_2]$	$Cr_2O_7^{2-}$	5.1×10^4	3.41×10^{-5}	2
534-MOF-Tb	$Cr_2O_7^{2-}$	1.37×10^4	1.4×10^{-4}	3
$[Eu_2L_{1.5}(H_2O)_2EtOH]\cdot DMF$	$Cr_2O_7^{2-}$	1.526×10^3	1×10^{-5}	8
$[Eu(L)(H_2O)]\cdot 1.5H_2O$	$Cr_2O_7^{2-}$	5.18×10^4	1.25×10^{-6}	9
$[Tb(TATAB)(H_2O)_2]\cdot NMP\cdot H_2O$	$Cr_2O_7^{2-}$	1.11×10^4	5×10^{-6}	10
Eu-MOF-**1**	$Cr_2O_7^{2-}$	5.722×10^4	6.29×10^{-6}	This work

H_5L = 2,4-di(3',5'-dicarboxylphenyl)benzoic acid;[1] HL = 5-(triazol-1-yl)nicotinic acid;[2] H_3TBOT = (2,4,6-tris[1-(3-carboxylphenoxy)ylmethyl]mesitylene);[3] H_2NPDC = 2-nitro-1,4-phenylenedicarboxylate, bpee = 1,2-bis(4-bipyridyl)ethylene);[4] CDs = ethanediamine-modified carbon dots;[5] H_2L = 5-((2'-cyano-[1,1'-biphenyl]-4-yl)methoxy)isophthalic acid;[6] TPOM = tetrakis(4-pyridyloxymethylene)methane, H_2ndc = 2,6-naphthalenedicarboxylic acid;[7] L = 5,5'-(carbonylbis(azanediyl))diisophthalic acid;[8] H_3L = 3-(3,5-dicarboxylatobenzyloxy)benzoic acid;[9] H_3TATAB = 4,4',4''-*s*-triazine-1,3,5-triyltri-*m*-aminobenzoic acid.[10]

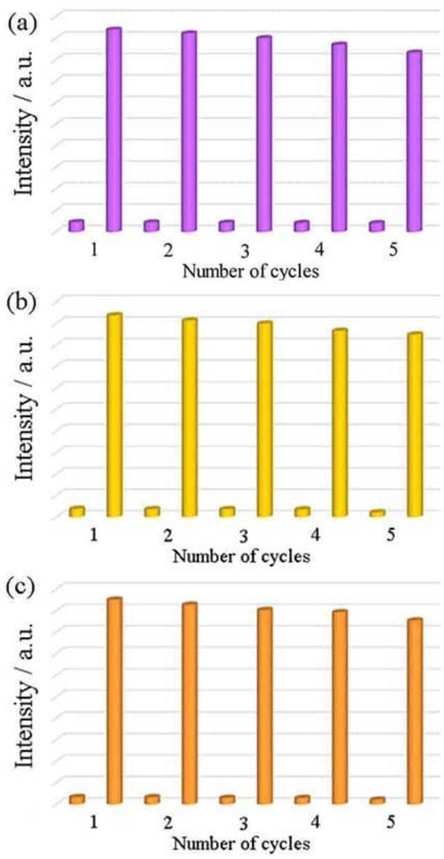

Fig. S10 Five cycles test of Eu-MOF-**1** toward sensing MnO_4^- (a), CrO_4^{2-} (b) and $Cr_2O_7^{2-}$ (c).

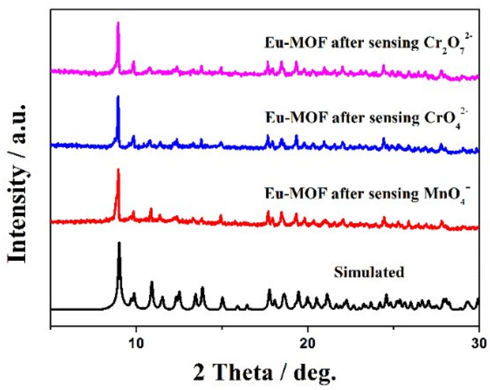

Fig. S11 PXRD patterns of Eu-MOF-**1** and Eu-MOF-**1** immersed in MnO_4^-, CrO_4^{2-} and $Cr_2O_7^{2-}$ aqueous solutions.

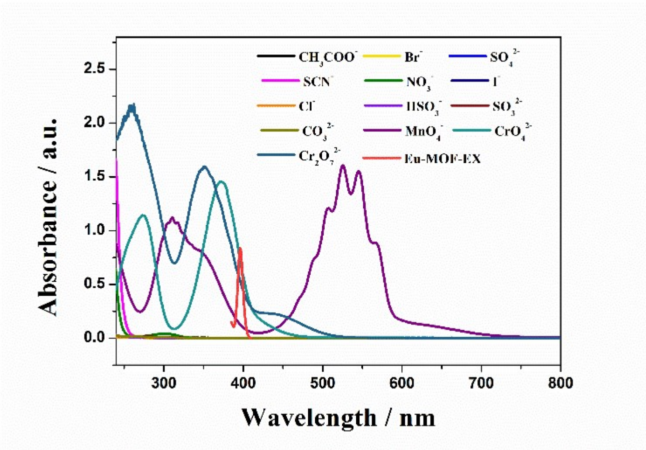

Fig. S12 The UV-vis spectra of different anions in aqueous solutions and excitation spectrum of Eu-MOF-**1**.

1 Y. T. Yan, W. Y. Zhang, F. Zhang, F. Cao, R. F. Yang, Y. Y. Wang and L. Hou, *Dalton Trans.,* 2018, **47**, 1682.

2 Y. T. Yan, F. Cao, W. Y. Zhang, S. S. Zhang, F. Zhang and Y. Y. Wang, *New J. Chem.,* 2018, **42**, 9865.

3 M. Chen, W. M. Xu, J. Y. Tian, H. Cui, J. X. Zhang, C. S. Liu and M. Du, *J. Mater. Chem. C,* 2017, **5**, 2015.

4 F. Li, Y. S. Hong, K. X. Zuo, Q. Sun and E. Q. Gao, *J. Solid State Chem.,* 2019, **270**, 509.

5 X. Fu, R. Lv, J. Su, H. Li, B. Yang, W. Gu and X. Liu, *RSC. Adv.,* 2018, **8**, 4766.

6 R. Lv, H. Li, J. Su, X. Fu, B. Y. Yang, W. Gu and X. Liu, *Inorg. Chem.,* 2017, **56**, 12348.

7 Z. Sun, M. Yang, Y. Ma, and L. C. Li, *Cryst. Growth Des.,* 2017, **17**, 4326.

8 W. Liu, X. Huang, C. Xu, C. Chen, L. Yang, W. Dou, W. Chen, H. Yang and W. Liu, *Chem. Eur. J.,* 2016, **22**, 18769.

9 Y. Tao, P. Zhang, J. Liu, X. Chen, X. Guo, H. Jin, J. Chai, L. Wang and Y. Fan, *New. J. Chem.*, 2018, **42**, 19485.

10 G. X. Wen, M. L. Han, X. Q. Wu, Y. P. Wu, W. W. Dong, J. Zhao, D. S. Li and L. F. Ma, *Dalton. Trans.*, 2016, **45**, 15492.