Supporting Information

Dual functional fluorescent sensor for selectively detecting acetone and Fe^{3+} based on $\{Cu_2N_4\}$ substructure bridged Cu(I) coordination polymer

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Table S1 Selected luminescent compound materials for sensing acetone.

No.	luminescent materials	solution	detection limit	ref
1	$\{[Cd_3(L)_2(H_2O)_6]\cdot1.5DMF\}$ (H_3L=4,4',4''-(methylsilanetriyl) tribenzoic acid)	aqueous solutions	3 vol%	*Chin. Chem. Lett.* 2016, 27, 497
2	$[Cd(Tipb)(pta)_{0.5}(H_2O)\text{-}(NO_3)]\cdot(DMF)_x(H_2O)_y$ (Tipb=2,4,6-tris[4-(1Himidazole-1-yl)]-benzene, pta = para-phthalate)	acetonitrile	0.084vol% decreased by 83%	*J. Mater. Chem. A*, 2014, **2**, 9469
3	$[Cd(Tipb)(mta)]\cdot(DMF)_x(H_2O)_y$ (Tipb=2,4,6-tris[4-(1Himidazole-1-yl)]-benzene, mta= meta-phthalate)	acetonitrile	0.075vol% decreased by 94%	*J. Mater. Chem. A*, 2014, **2**, 9469
4	$\{[Tb_4(\mu_3\text{-}OH)_4(BPDC)_3(BPDCA)_{0.5}(H_2O)_6]ClO_4\cdot5H_2O$ ($BPDC^{2-}$ = 3,3'-dicarboxylate-2,2'-dipyridine anion and $BPDCA^{2-}$ = biphenyl-4,4'-dicarboxylate anion)	EtOH	21vol%	*J. Phys. Chem. C.* 2014, **118**, 416
5	$Ln(FBPT)(H_2O)(DMF)$ (Ln = Eu or Tb, FBPT = 2′-fluoro-biphenyl-3,4′,5-tricarboxylate	DMF	5%	*J. Mater. Chem. A* 2013, **1**, 11043
6	$Tb(BTC)(H_2O)_6$ (BTC = benzenetricarboxylate)	aqueous suspension	0.3vol%	*J. Mater. Chem.*, 2012, **22**, 6819.
7	$Cd_3(L)(H_2O)_2(DMF)2\cdot5DMF$ (H_6L=hexa[4-(carboxyphenyl)oxamethyl]-3-oxapentane acid)	1-propanol	0.1vol%	*J. Mater. Chem.*, 2012, **22**, 23201.
8	$Cd_3(L)(dib)\cdot3H_2O\cdot5DMA$ (H_6L=hexa[4-(carboxyphenyl)oxamethyl]-3-oxapentane acid, dib = 1,4-bis(1-imidazolyl)benzene)	1-propanol	0.1vol%	*J. Mater. Chem.*, 2012, **22**, 23201.
9	$Yb(BPT)(H_2O)\cdot(DMF)_{1.5}(H_2O)_{1.25}$ (BPT = biphenyl-3,4',5-tricarboxylate)	2-propanol	0.5vol%	*Chem. Commun.* 2011, **47**, 5551
10	$Eu_2(pzdc)(pzdc)(ox)(H_2O)_4\cdot8H_2O$	methanol	0.5vol%	*CrystEngComm*, 2010, **12**,

	(pzdc = 2,5-pyrazinedicarboxylate, ox =oxalate)			4372.
11	Eu(BTC) (BTC = benzenetricarboxylate)	DMF	0.3 vol %	*Adv. Mater.* 2007, **19**, 1693
12	$[Cu(tpp)•H_2O]_{2n}$ [Htpp = 1-(4-tetrazol-5''-yl)benzyl-3 - (pyraziny-l)pyrazole]	aqueous suspension	0.0842vol%	This work

Table S2 Selected luminescent compound materials for sensing Fe^{3+}.

No.	luminescent materials	solution	K_{sv}/ detection limit	ref
1	$Ba_5(ADDA)_5(EtOH)_2(H_2O)_3·5DMF$ H_2ADDA = 3,3'-(anthracene-9,10-diyl) diacrylic acid	methanol (turn-off) acetone (turn-off) THF (turn-on)	1.68×10^4 / 10^{-6} M None/2.1×10^{-7}M -9.09×10^3/ 10^{-6} M	*Inorg. Chem.* 2016, **55**, 1782
2	$\{[Eu(L)(H_2O)_2]$ • NMP • $H_2O\}_n$ (NMP = Nmethyl-2-pyrrolidone)	DMF HEPES	3.83×10^4 / none 2.55×10^4 / none	*Inorg. Chem.* 2016, **55**, 10114
3	$\{[Cd_3(L)_2(H_2O)_6]$ • 1.5DMF} (H_3L=4,4',4''-(methylsilanetriyl) tribenzoic acid)	aqueous solutions	None / 1×10^{-2} M	*Chin. Chem. Lett.* 2016, **27**, 497
4	$\{[Tb_4(OH)_4(DSOA)_2(H_2O)_8]·(H_2O)_8\}_n$ Na_2H_2DSOA=disodium-2,20-disulfonate-4,4'-oxydibenzoic acid	aqueous solutions	3543 / none	*J. Mater. Chem. A.* 2015, **3**, 641
5	[Tb(BTB)(DMF)]·1.5DMF·2.5H2O (H_3BTB = benzene-1,3,5-tribenzoate)	ethanol	None / 10^{-5} M	*Inorg. Chem.* 2015, **54**, 4585
6	EuL (L=2-aminoterephthalic acid)	DMF	2.88×10^4 / none	*J. Mater. Chem. C*, 2014, **2**, 6758
7	$[H_2N(CH_3)_2][Eu(H_2O)_2(BTMIPA)]·2H_2O$ {$H_4BTMIPA$ = 5,5'-methylenebis-(2,4,6-trimethylisophthalic acid)}	DMF	None / 10^{-3}	*Chem. Commun.* 2013, **49**, 11557
8	EuL_3 (L = 4'-(4-carboxyphenyl)-2,2': 6',2''-terpyridine)	aqueous solution	4.1×10^3 /10^{-4} M	*ACS Appl. Mater. Interfaces* 2013, **5**, 1078
9	$[Eu(BTPCA)(H_2O)]·2DMF·3H_2O$ (H_3BTPCA = 1,1',1''-(benzene-1,3,5-	DMF	None / 10^{-5} M	*Inorg. Chem.* 2013, **52**, 2799

	triyl)tripiperidine-4-carboxylic acid			
10	MIL-53(Al) (BDC =1,4-benzenedicarboxylic acid)	aqueous solution	None / 0.9×10^{-6} M	*Anal. Chem*. 2013, **85**, 7441
11	$Eu(C_{33}H_{24}O_{12})(H_2NMe)(H_2O)$	HEPES aqueous	None / 10^{-4} M	*J. Mater. Chem.* 2012, **22**, 16920
12	$Eu(acac)_3\subset Zn(C_{15}H_{12}NO_2)_2$	CH_2Cl_2/ MeOH	None / 5×10^{-3} M	*Chem. Commun*. 2011, **47**, 10731
13	$[Cu(tpp)\bullet H_2O]_{2n}$ [Htpp = 1-(4-tetrazol-5''-yl)benzyl-3 -(pyraziny-l)pyrazole]	aqueous suspension	4.6 × 10^4 /10^{-5} M	This work

Table S3 Selected bond lengths [Å] and angles [°] for **1**.

Bond length	(Å)	Bond angle	(°)
Cu(1)-N(3)	1.976(4)	N(3)-Cu(1)-N(8)	111.62(14)
Cu(1)-N(8)	2.028(4)	N(3)-Cu(1)-N(6)	124.47(15)
Cu(1)-N(6)	2.076(4)	N(8)-Cu(1)-N(6)	107.32(15)
Cu(1)-N(4)	2.130(4)	N(3)-Cu(1)-N(4)	120.93(15)
Cu(2)-N(10)	2.005(4)	N(8)-Cu(1)-N(4)	109.28(14)
Cu(2)-N(16)	2.009(4)	N(6)-Cu(1)-N(4)	78.90(14)
Cu(2)-N(12)	2.088(4)	N(10)-Cu(2)-N(16)	110.79(15)
Cu(2)-N(14)	2.116(3)	N(10)-Cu(2)-N(12)	115.89(15)
		N(16)-Cu(2)-N(12)	113.66(16)
		N(10)-Cu(2)-N(14)	117.27(15)
		N(16)-Cu(2)-N(14)	117.16(15)
		N(12)-Cu(2)-N(14)	78.81(14)

Table S4 Standard deviation calculation and detection limit calculation.

Text 1 Fluorescence intensity	5842.45 a.u.
Text 2 Fluorescence intensity	5842.02 a.u.
Text 3 Fluorescence intensity	5841.25 a.u.
Text 4 Fluorescence intensity	5841.88 a.u.
Text 5 Fluorescence intensity	5842.11 a.u.
Standard Deviation (σ)	0.4402
Slope (m)	1568.14

Detection limit (3σ/m)	0.0842 vol%

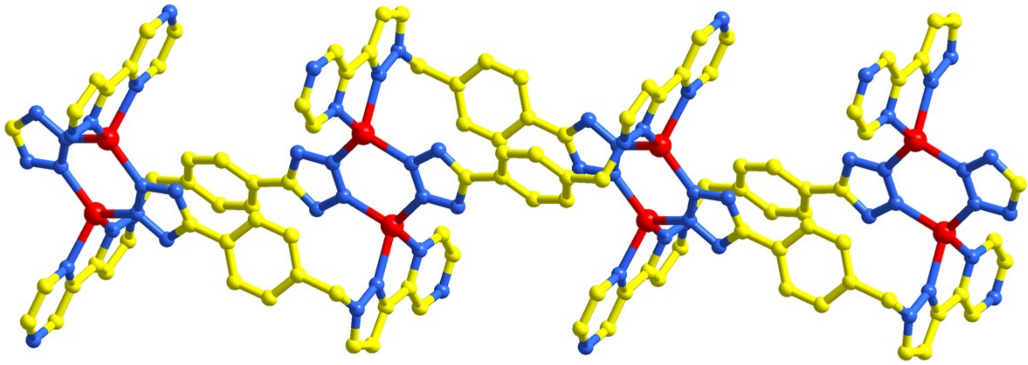

Fig. S1 The 1D chain structure of **1**.

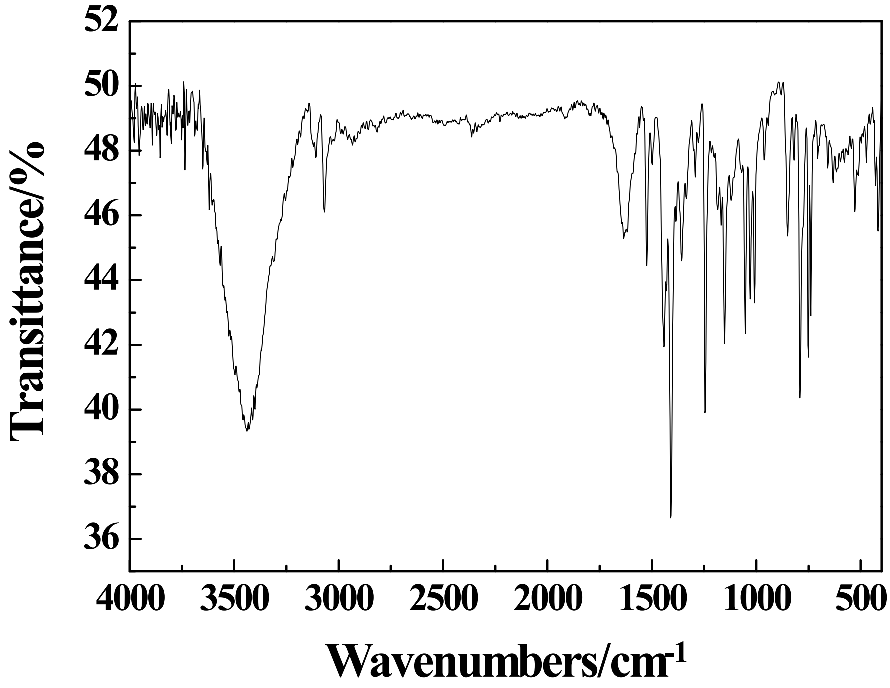

Fig.S2 The IR spectra of **1**.

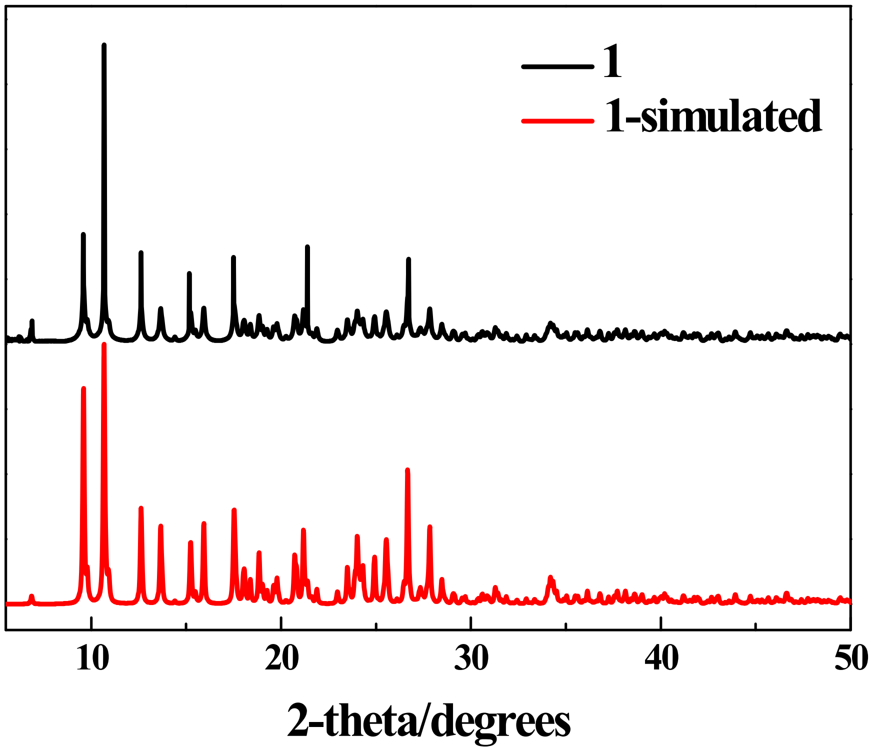

Fig.S3 The PXRD patterns of **1**.

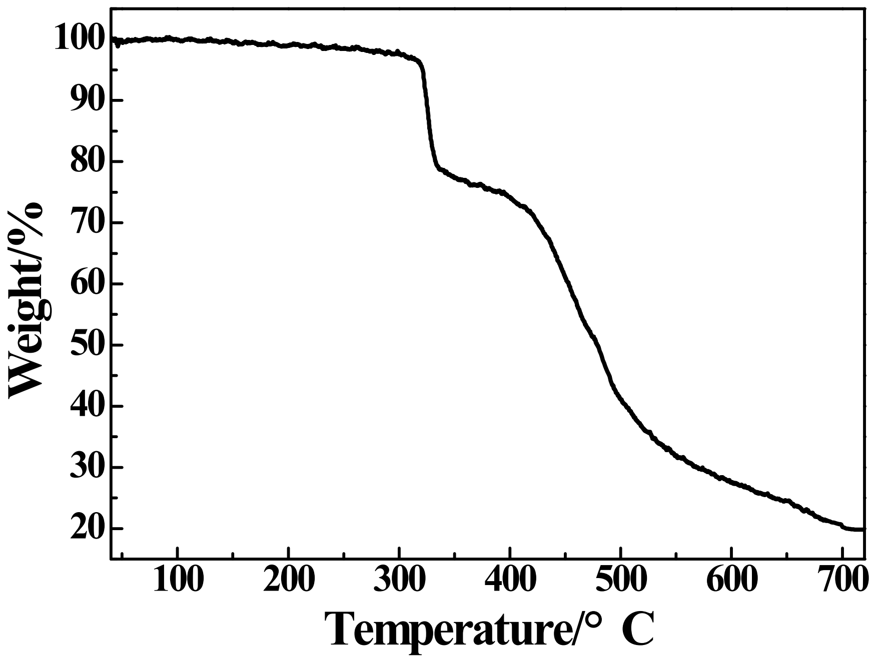

Fig.S4 The TGA curves of compounds **1**.

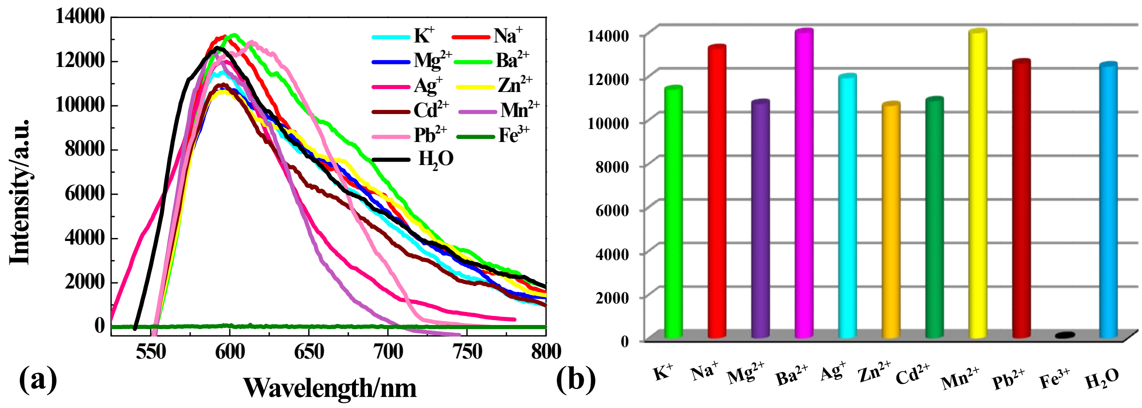

Fig.S5 (a) Fluorescence intensity of compound **1** in different metal ion; (b) Results of the competition experiments between Fe^{3+} and selected other metal ions.

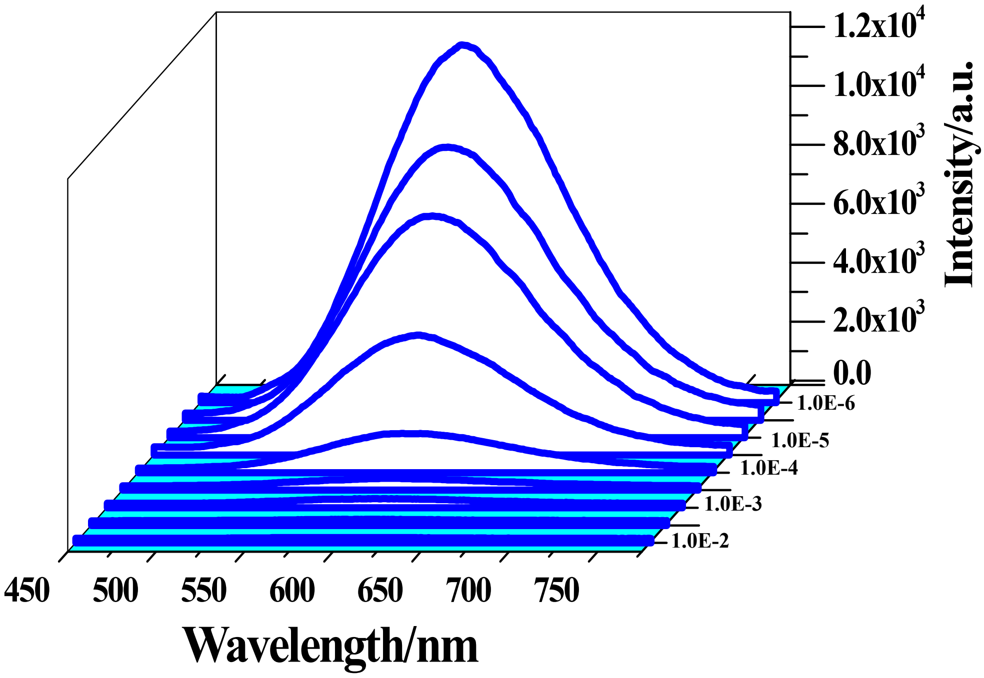

Fig.S6 Fluorescence intensity of compound **1** at 597 nm in different concentrations aqueous solutions of Fe^{3+} (in the range of approximately 10^{-6}–10^{-2} mol/L).