Supporting Information

A novel "on-off" peptide fluorescent probe for the detection of copper and sulfur ions in living cells

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Tab. S1. Comparison of probes for Cu^{2+} assays reported in recent literature.

Probe	Detection condition	Detection limit	Detection method	cell imaging	Refs.
2′,7′-dichlorofluorescein	DMSO/HEPES = 1/99 (v/v), and PH 7.4	5 nM	Turn on	Yes	1
Nitrogen and Fluorine Co-Doped Carbon Dots	deionized water	347 nM	Turn off	No	2
Nitrogen and sulfur doped carbon dots	aqueous solutions	23.4 nM	Turn off	No	3
The hybrid of phenanthraquinone and imidazole dye	DMSO，PBS buffer (PH 7.4)	—	Turn off	Yes	4
Chromone-3-aldehyde	THF	4.93×10^{-6} M	Turn off	No	5
Naphthaldehyde	EtOH: H_2O (8:2 v/v)	9.342×10^{-7} M	UV–Vis	No	6
Diarylethene	Acetonitrile	1.76×10^{-9} M	Turn on	No	7
FITC-Ahx-Ser-Ser-His-Thr-Glu-Phe-NH_2	PBS solution (10.0 mM, PH 7.4)	38.2 nM	Turn off	Yes	This work

Tab. S2. Comparison of probes for S^{2-} assays reported in recent literature.

Probe	Detection condition	Detection limit	Detection method	cell imaging	Refs.
Naphthylamine derivatives	30% DMF and 0.1 M PBS buffer	3.1×10^{-7} M	Turn on	Yes	8
Salamo-based	EtOH/H_2O (10 ： 1)	3.27×10^{-8} M	Trun on	NO	9
Phenyl 2-(benzoylthio) benzoate-based	50 mM PBS buffer (pH 7.4) with 100 μM cetrimonium bromide	100 nm	Turn on	Yes	10
(Dansyl-Glu-Glu)2-Lys-NH_2	10 mM HEPES buffer solution at PH 7.4	87 nM	Turn on	Yes	11
ZnO nanoparticles	Methanol/water (1: 99, v/v)	6.4 nM	Turn on	No	12
Phen-anthro[9,10-d]imidazole platform	DMF/H_2O solution	12.3 nM	Turn on	Yes	13
Cu (II)-dependent DNAzyme	Tris-HCl buffer	0.2 μM	Turn on	No	14
FITC-Ahx-Ser-Ser-His-Thr-Glu-Phe-NH_2	PBS solution (10.0 mM, pH 7.4)	37.9 nM	Turn on	Yes	This work

Tab. S3. Materials

	Reagent name	Abbreviated name
1	rink amide resin	AM
2	Fmoc-Phe -OH	/
3	Fmoc- Thr (Trt)-OH	/
4	Fmoc- His (Trt) - OH	/
5	Fmoc-Ser(tBu)-OH	/
6	6-Fmoc-Ahx	/
7	Fluorescein isothiocyanate isomer	FITC
8	1-hydroxybenzotriazole	HOBT
9	diisopropylethylamine	DIEA
10	trifluoroacetic acid	TFA
11	triisopropylsilane	TIS
12	Piperidine	/
13	dichloromethane	DCM

14	N, N-dimethylformamide	DMF
15	anisole	/
16	ethyl ether	Et_2O

Tab. S4. Instruments

	Experimental project	Instrument
1	Absorption spectra	UV-2550 UV-Visible Spectrophotometer
2	Fluorescence spectra	F7000 fluorescence spectrometer
3	Electrospray ionization MS	Waters micromass ZQ2000
4	High performance liquid chromatography separation	Waters ailiance 2695 liquid chromatograph
5	Cytotoxicity	Infinite M200 PRO
6	cell images	Zeiss LSM 880 confocal microscope

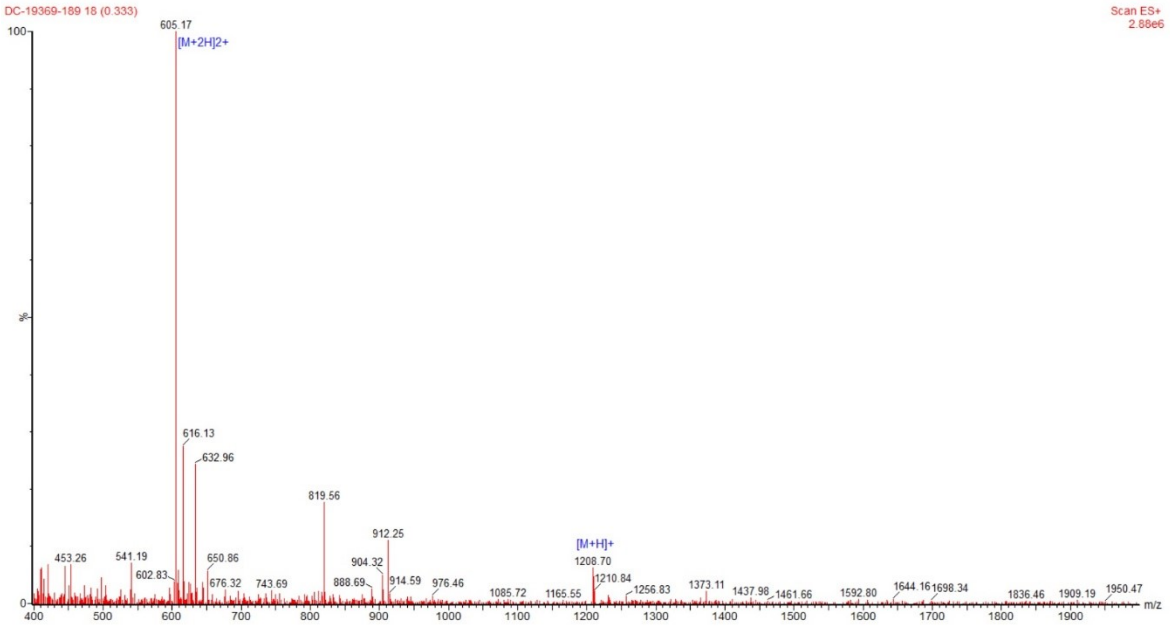


Fig. S1. ESI-MS spectrum of **FGP1**

HPLC chromatogram of FGP1

Sample ID: FGP1
Sequence: FITC-Ahx-SSHTEF-NH2
Column: 4.6*150 mm, kromasil C18-5
Solvent A: 0.1% Trifluoroacetic in 100% Acetonirile
Solvent B: 0.1% Trifluoroacetic in 100% Water

Gradient:	A	B
0.01 min	5%	95%
25.0 min	95%	5%

30.0 min 90% 10%

Flow rate: 1.0 mL/min

Wavelength: 214 nm

Volume: 20 μL

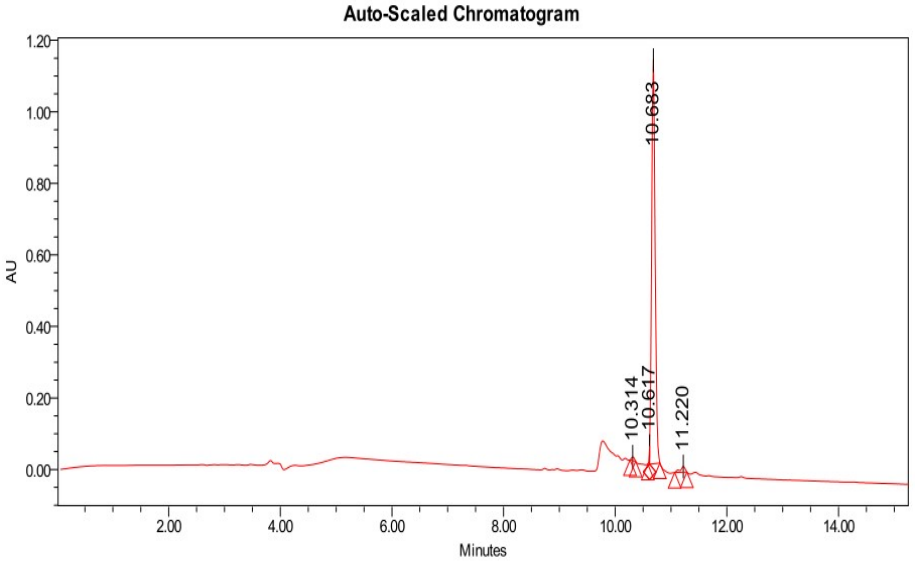


Fig.S2 HPLC Chromatogram of **FGP1**

Tab. S5. HPLC chromatogram data of FGP1

Rank	RT	Area	Height	Area%
1	10.314	36807	10506	0.73
2	10.617	31020	49604	0.61
3	10.683	4895227	1104382	96.78
4	11.220	95253	15536	1.88

MS Analysis Report

Sample ID: FGP1

Expected MS:1208.1

Flow rate: 0.2 mL/min

Run Time: 1 min

Buffer A: 0.1% HCOOH in water

Buffer B: 0.1% HCOOH in Acetonirile

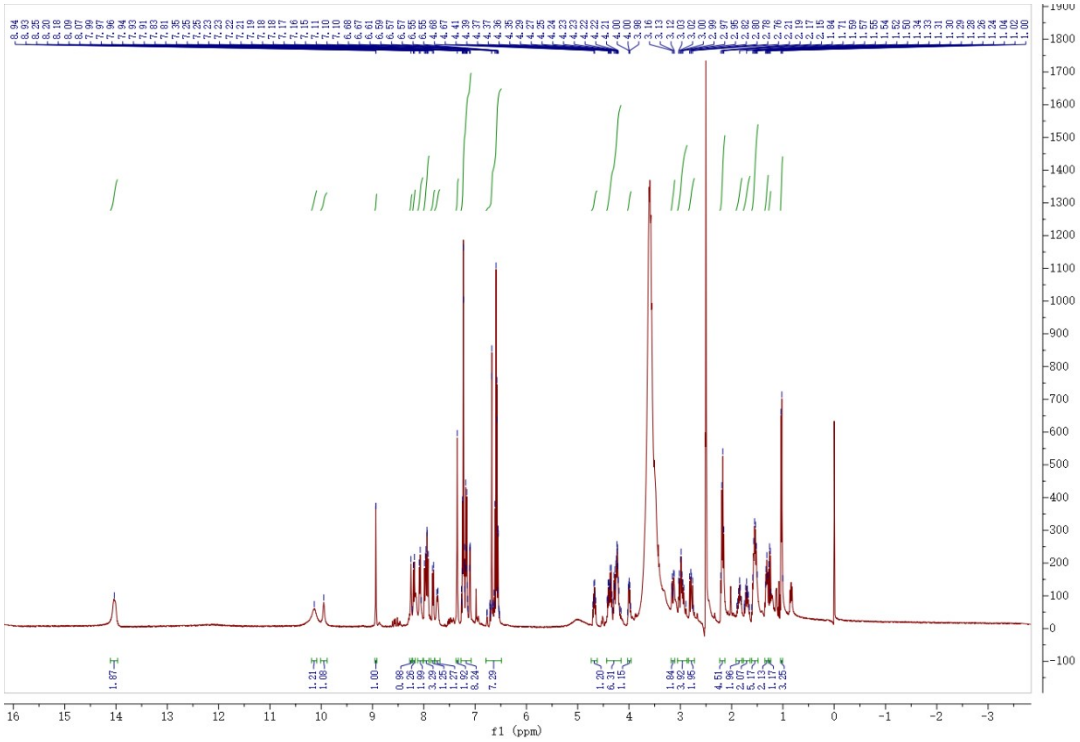


Fig. S3. [1]H NMR spectrum of **FGP1** in DMSO-d_6.

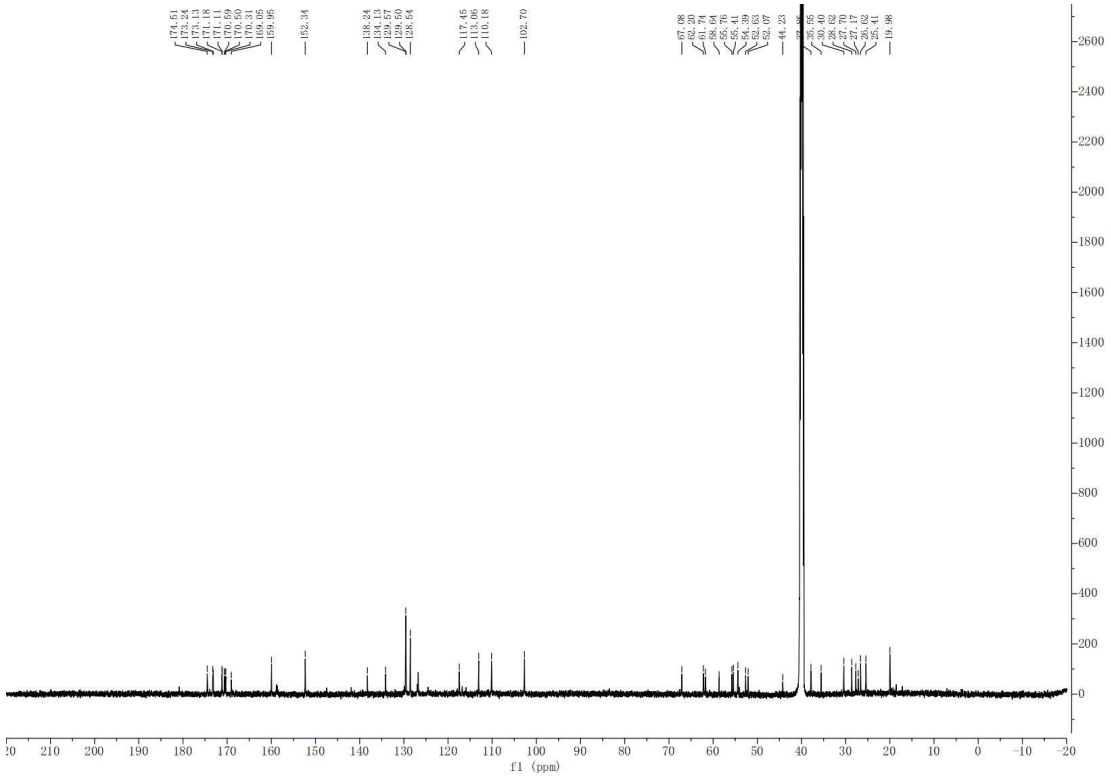


Fig. S4 [13]C NMR spectrum of **FGP1** in DMSO-d_6.

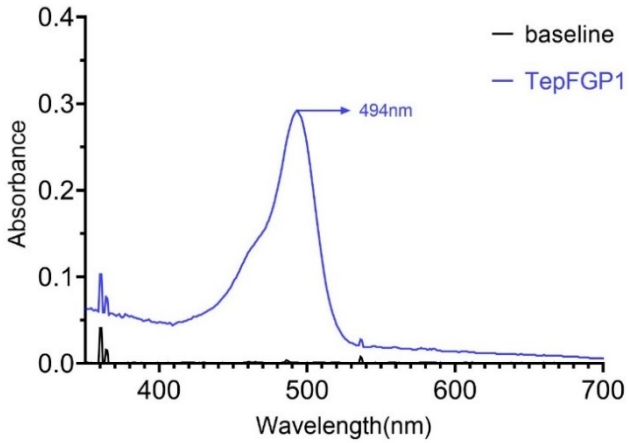


Fig. S5. UV absorption spectrum of **FGP1**

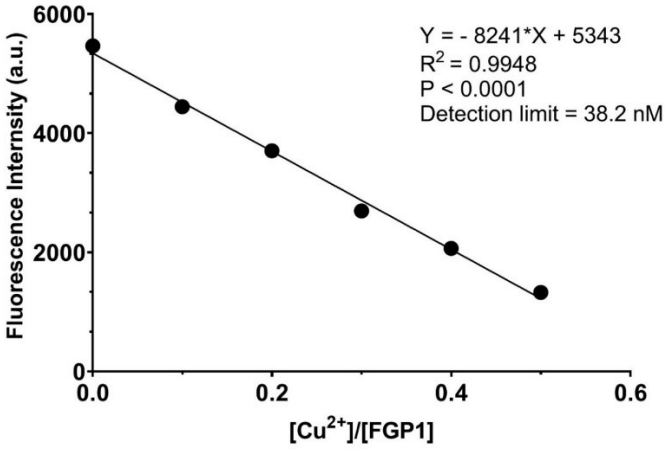


Fig. S6. Fluorescence intensity of **FGP1** (10.0 μM) with gradient concentration of Cu^{2+} (0-15.0 μM) were added in PBS buffer solutions (10.0 mM, pH 7.4). The lowest detection limit of Cu^{2+} was 38.2 nM.

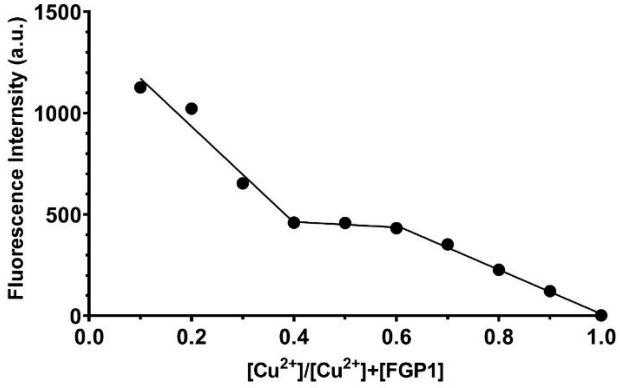


Fig. S7. Job's plot for determining the stoichiometry of **FGP1** and Cu^{2+} ions.

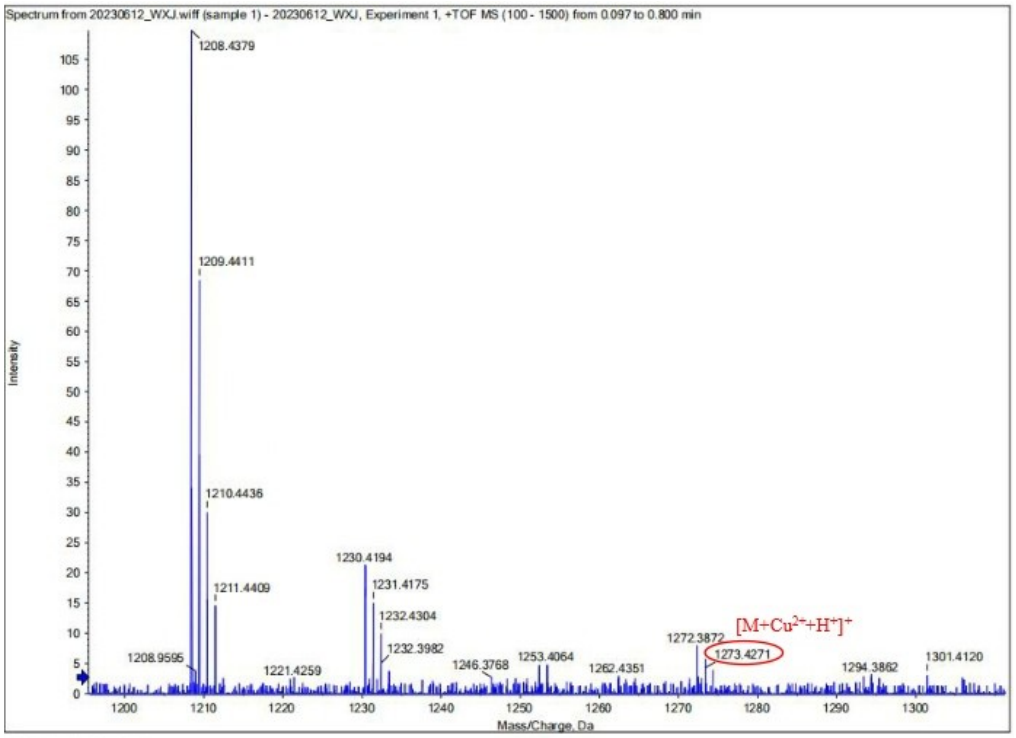


Fig. S8. TOF-MS of **FGP1** (100.0 μM) with Cu^{2+} ions (100.0μM) in PBS buffer solutions (10.0 mM, pH 7.4).

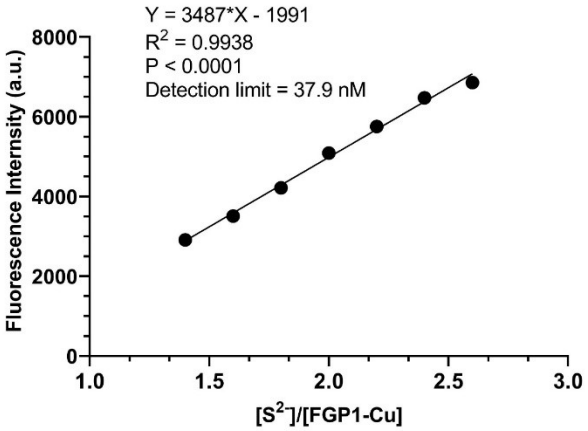
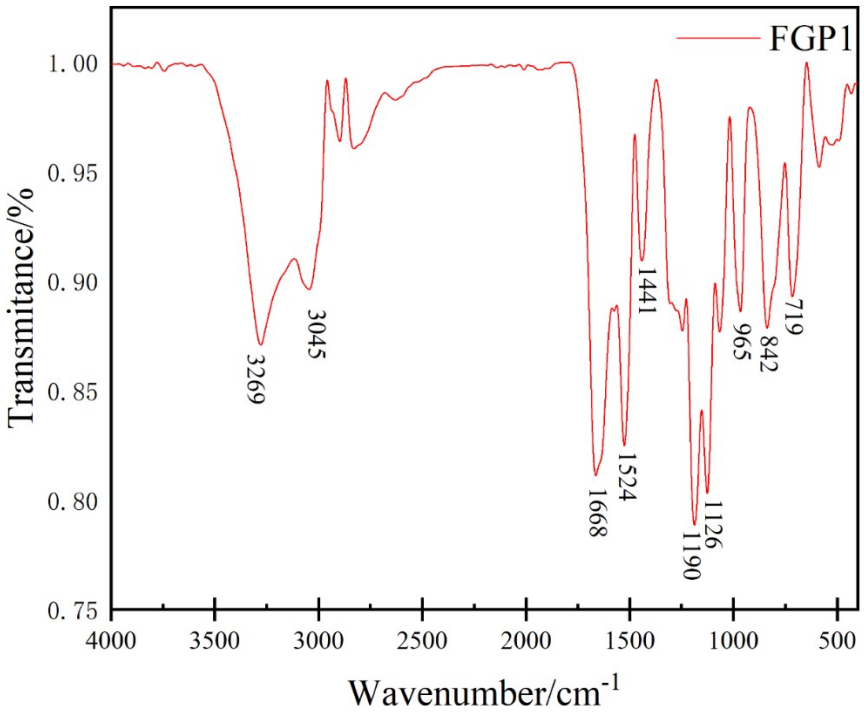


Fig. S9. Fluorescence intensity of **FGP1-Cu** (10.0 μM) with gradient concentration of S^{2-} (0-40.0 μM) were added in PBS buffer solutions (10.0 mM, pH 7.4). The lowest detection limit of S^{2-} was 37.9 nM.

Fig. S10. The FTIR spectra of FGP1.



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