Supporting information for

FRET-based colorimetric and ratiometric fluorescent probe for Cu^{2+} with a new trimethylindolin fluorophore

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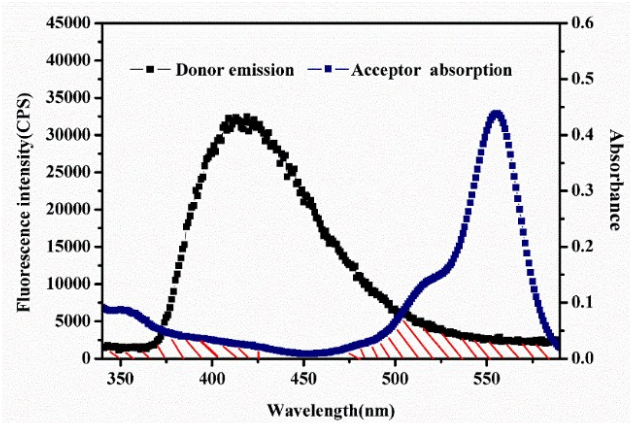


Fig. S1 The overlap (shown with oblique stripes) between emission of the donor and absorption spectra of the acceptor, respectively.

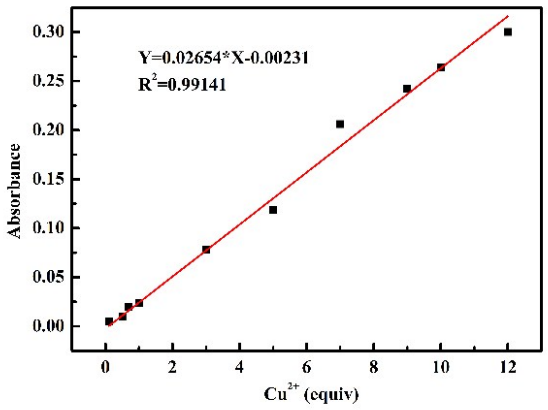


Fig. S2 Absorbance plot of **RhF** against Cu^{2+} concentration from 0 to 120 μM.

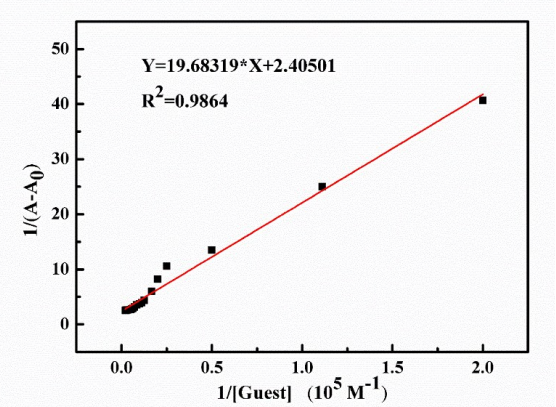


Fig. S3 Bensei-Hildebrand plot of **RhF-Cu^{2+}** complex obtained from the UV-Vis absorption (absorbance calculated from 555 nm) studies.

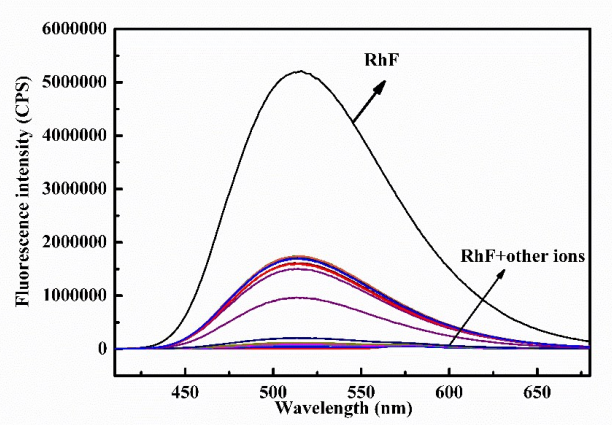


Fig. S4 Changes of the fluorescence spectra of **RhF** (10 μM) observed upon addition of various metal ions in a CH_3CN/aqueous HEPES buffer (10 mM, pH 7.3; 4:1, v/v).

Fig. S5 Calculations for FRET efficiency:

Energy transfer efficiency (Φ_{ET}) was evaluated through the following equation: [1-4]

$$\Phi_{ET}=1-(F'_D/F)$$

where F'_D and F_D denote the donor fluorescence intensity with and without an acceptor respectively in the presence of Cu^{2+} ions.

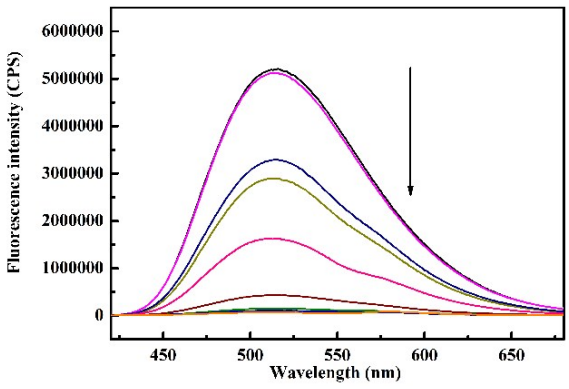


Fig. S6 Fluorescence titration spectra of **RhF** (10 μM) in the presence of different concentrations of Cu^{2+} (0-50μM). λex = 345 nm.

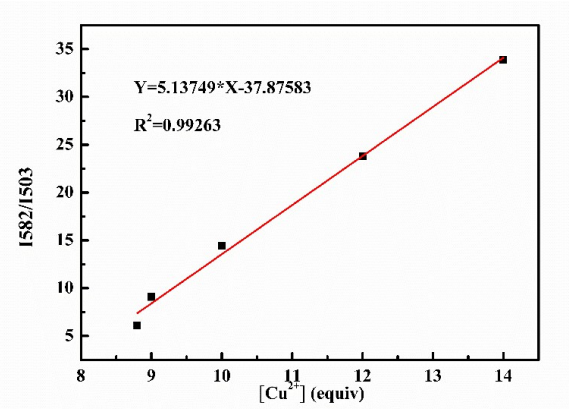


Fig. S7 The plot of the emission intensity ratios of **RhF** at I582/I503 against Cu^{2+} (88-140μM).

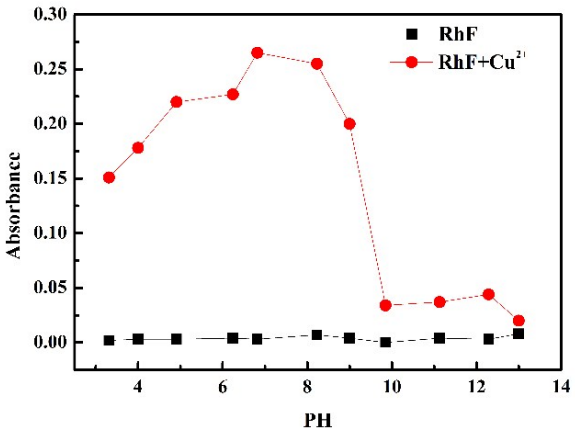


Fig. S8 Effect of pH on probe for the detection of Cu^{2+} (based on absorbance data).

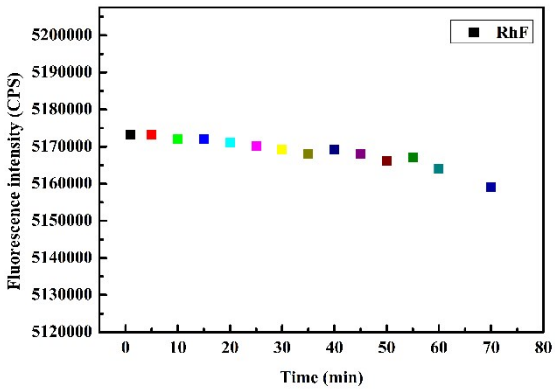


Fig. S9 The changes of fluorescence intensity at 503 nm of probe **RhF** exposed to light for a long time.

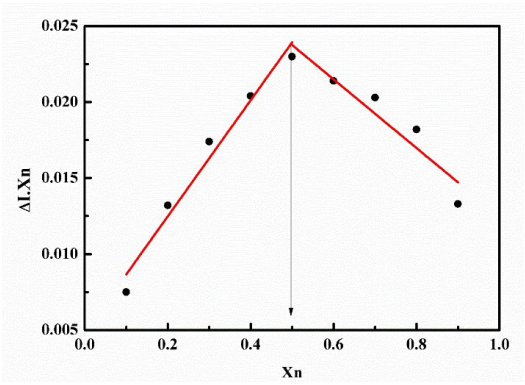


Fig. S10 Job's plot of probe **RhF** with Cu^{2+} in a CH_3CN/aqueous HEPES buffer (10 mM, pH=7.3; 4:1 v/v). Where Xn is the mole fraction of **RhF** and ΔI is the change ($I-I_0$) in the absorbance in presence of Cu^{2+}. The total concentration of RhF and Cu^{2+} was 20μM.

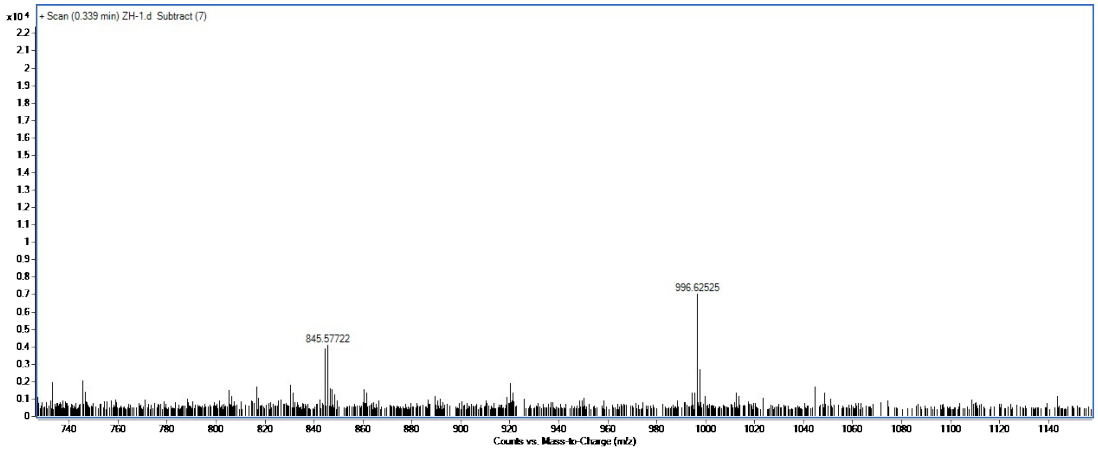


Fig. S11 ESI-MS spectrum of probe **RhF-Cu^{2+}** complex.

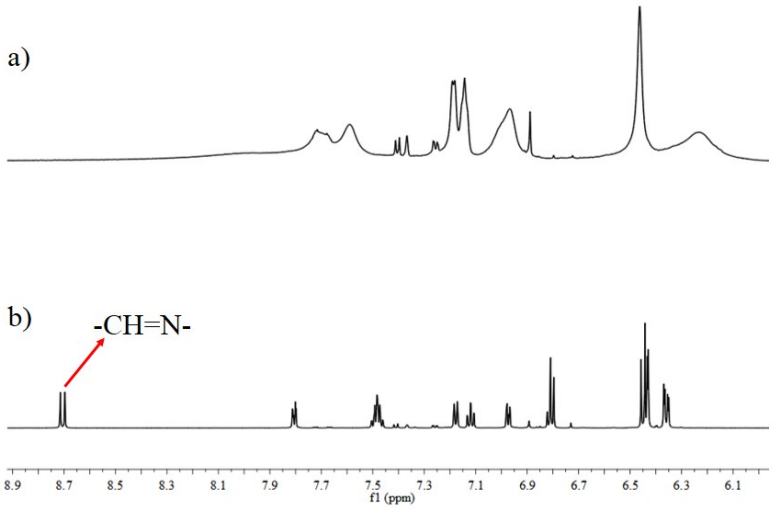


Fig.S12 ^1H NMR spectra of **RhF-Cu^{2+}** (a) in DMSO-d_6 with D_2O and **RhF** (b) in DMSO-d_6.

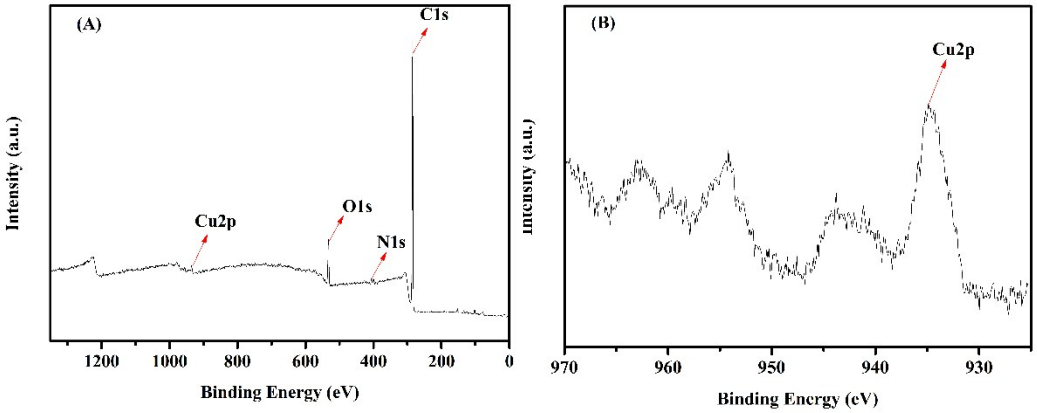


Fig. S13. XPS of as prepared samples: (A) survey spectra of **RhF-Cu^{2+}** complex; (B) Cu 2p of **RhF-Cu^{2+}** complex.

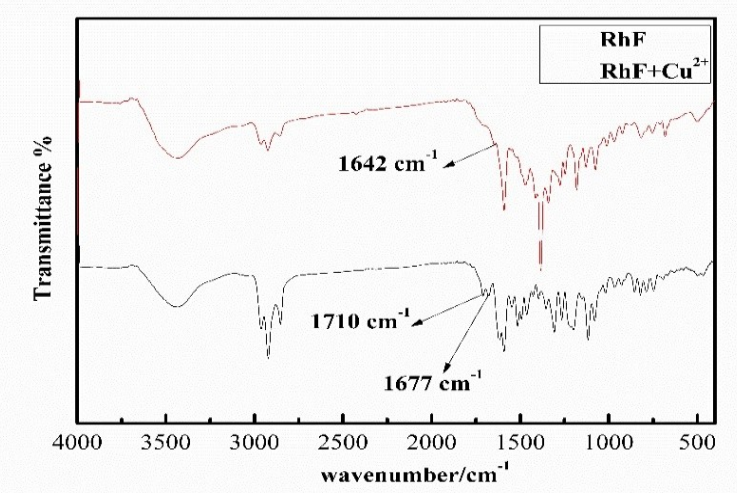


Fig.S14 IR spectral data of **RhF** and **RhF-Cu^{2+}** complex.

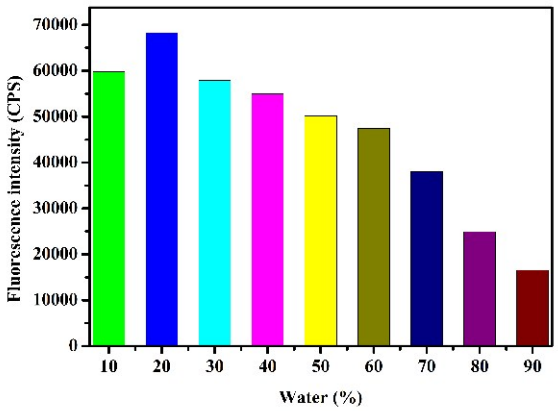


Fig. S15 Effect of water content on probe for the detection of Cu^{2+}.

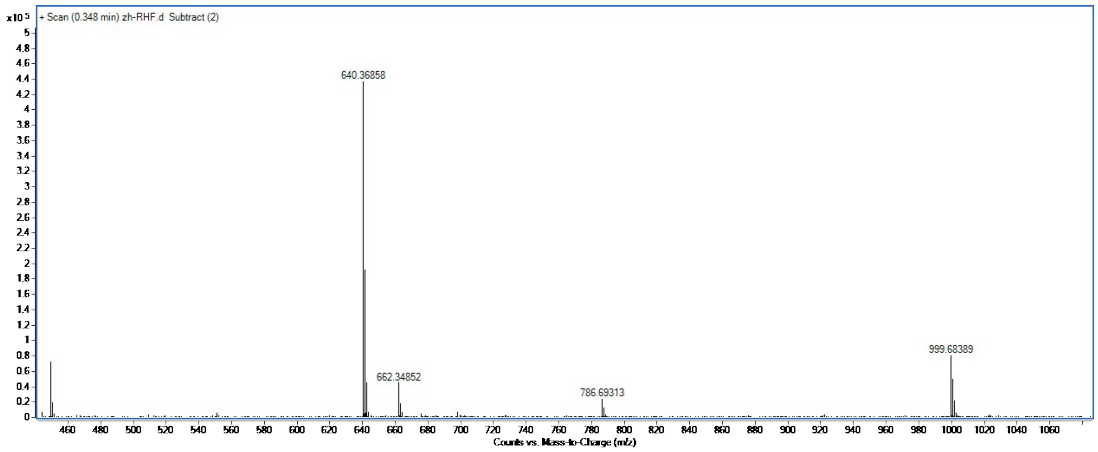


Fig. S16 ESI-MS spectrum of probe **RhF**.

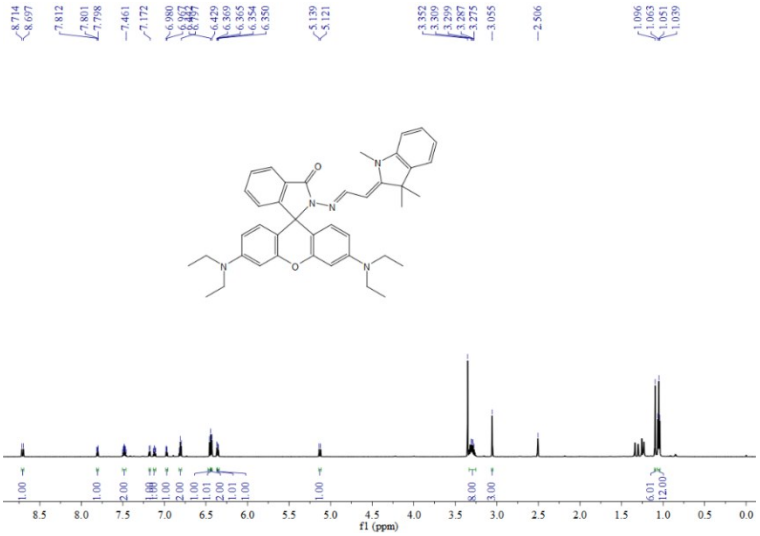


Fig. S17 ^{1}H NMR Spectrum of probe **RhF**.

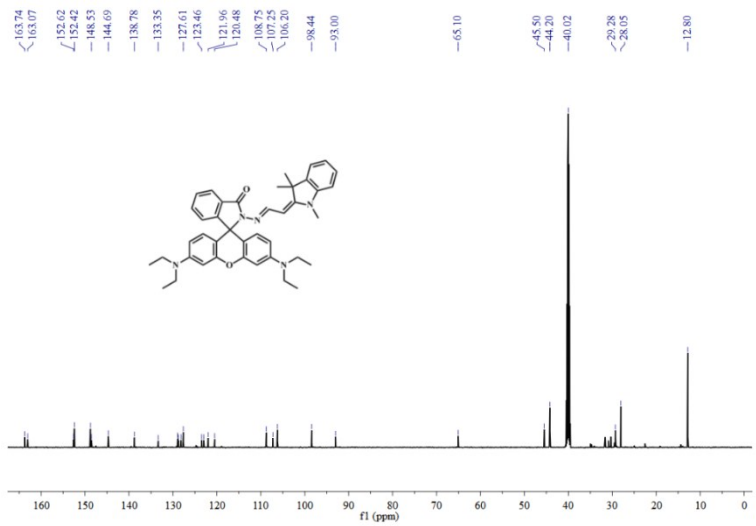
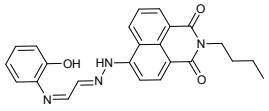
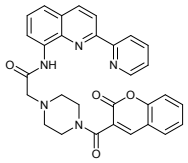
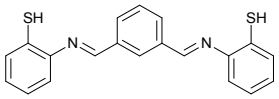
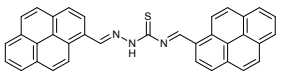
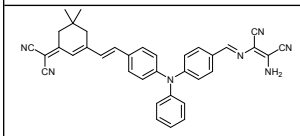
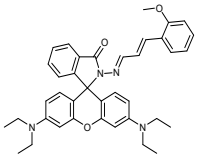
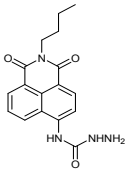
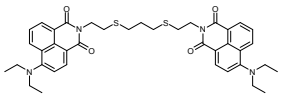
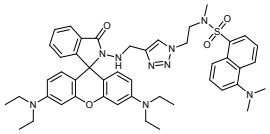
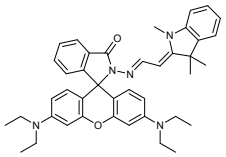


Fig. S18 ^{13}C NMR Spectrum of probe **RhF**.

Table S1 Comparison of the recently reported probes for the detection of Cu^{2+}.

Probes	λex/λem (nm)	Detection Limit (μM)	Working system	Operation mode	Analytical application: test strips	Ref.
	455/519	0.15	CH_3CN-H_2O (70:30, v/v, MOPS, 10 mM, pH = 7.0)	Turn-ON	NO	[5]
	290/ 355、 470	0.46	CH_3CN-H_2O(3:2, v/v,10 mM Tris-HCl)	Turn-OFF	NO	[6]
	295/365	0.2	CH_3CN-H_2O (2:3,v/v)	Turn-ON	NO	[7]
	376/439	14.5	CH_3CN	Turn-ON	NO	[8]
	437/637	1.568	CH_3CN	Turn-ON	NO	[9]
	None	0.29	CH_3CN	Turn-ON	NO	[10]
	435/532	0.052	CH_3CN-H_2O (20:80, v/v, pH=7.4)	Turn-ON	NO	[11]
	419/524	13.05	CH_3CN-H_2O (99:1, v/v)	Turn-ON	NO	[12]
	420/ 540、 568	0.12	CH_3CN–HEPES (1 : 1, v/v, 20 mM, pH= 7.4)	Turn-ON	No	[13]
	345/ 503、 582	0.01168	CH_3CN-aqueous HEPES buffer (4:1, v/v, 10 mM, PH=7.3)	Turn-ON	YES	This work

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