Electronic Supplementary Material (ESI) for RSC Advances.

Supporting information

Novel rhodamine dye with large stokes shifts by fusing the 1,4-diethylpiperazine moiety and its applications in fast detection of Cu^{2+}

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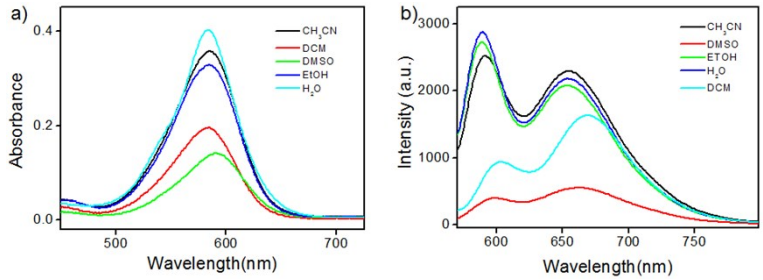

Fig. S1 Absorption a) and fluorescence b) spectra of **JRQ** in different solvents.

Table S1. Photophysical properties of **JRQ** in different solvents.

Solvent	λ_{Abs} (nm)	λ_{em} (nm)	λ_{ex} (nm)	ε_b (M^{-1} cm^{-1})	Stocks Shift (nm)	Φ [a]
DCM	585	668	613	19500	55	0.54
CH_3CN	585	654	593	35700	61	0.05
H_2O	583	654	585	42000	69	0.18
DMSO	590	662	600	14200	62	0.20
EtOH	585	655	592	32800	63	0.09

[a] Relative fluorescence quantum yield estimated by using Nile Blue (Φ_B = 0.27 in ethanol) as a fluorescence standard.

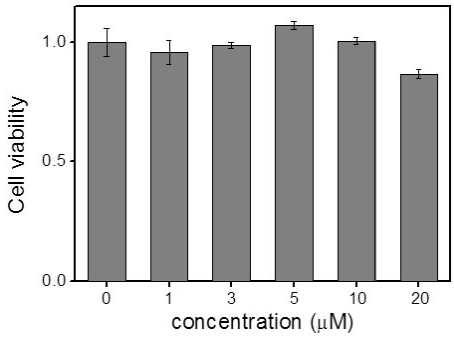

Fig. S2 MTT assay of **JRQ.**

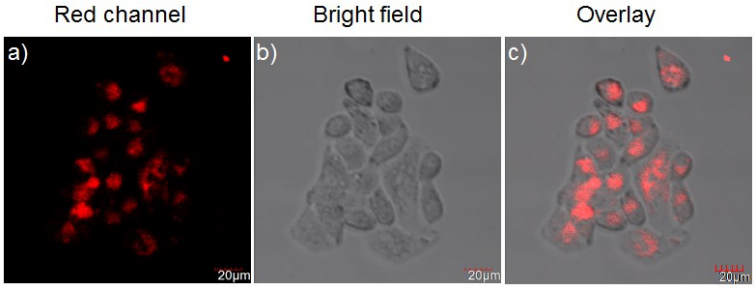

Fig. S3 Fluorescent images of HeLa cells incubated with **JRQ** (1 μM) for 30 min. λ_{ex}= 559 nm, λ_{em} = 618−718 nm.

Table. S2 Overlap coefficients and Pearson's coefficients of commercial targeting regents and **JRQ**

Regents	Overlap	Pearson's
Mito-Tracker Green	0.92	0.91
Lyso-Tracker Green	0.80	0.78
ER-Tracker Green	0.73	0.72
Golgi-Tracker Green	0.80	0.79

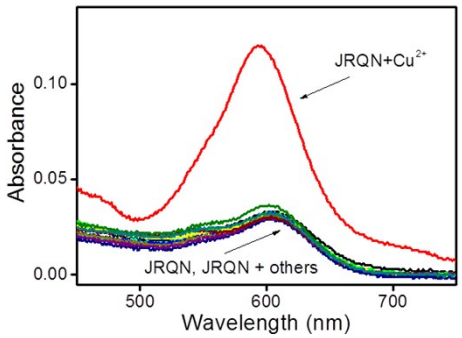

Fig. S4 Absorption spectra response of **JRQN** (10 μM) upon addition of different species (100 μM). 1) Ag^{+}; 2) Al^{3+}; 3) Ca^{2+} (10 mM); 4) Cd^{2+}; 5) Co^{2+}; 6) Cr^{3+}; 7) Cu^{2+}; 8) Fe^{2+}; 9) Fe^{3+}; 10) Pd^{2+}; 11) K^{+} (10 mM); 12) Li^{+} (10 mM); 13) Mg^{2+} (10 mM); 14) Mn^{2+}; 15) Na^{+}; 16) Ni^{2+}; 17) Zn^{2+}.

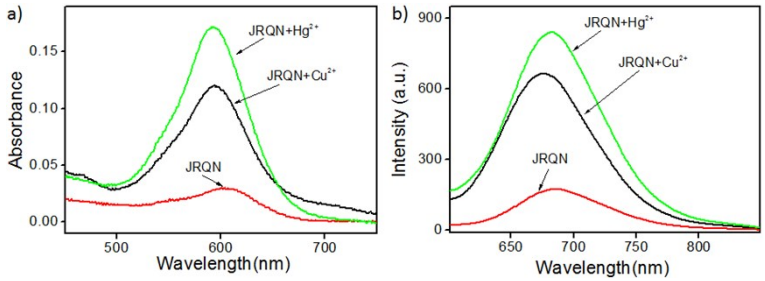

Fig. S5 Absorption and emission spectra response of **JRQN** (10 μM) upon addition of Hg^{2+} (100 μM).

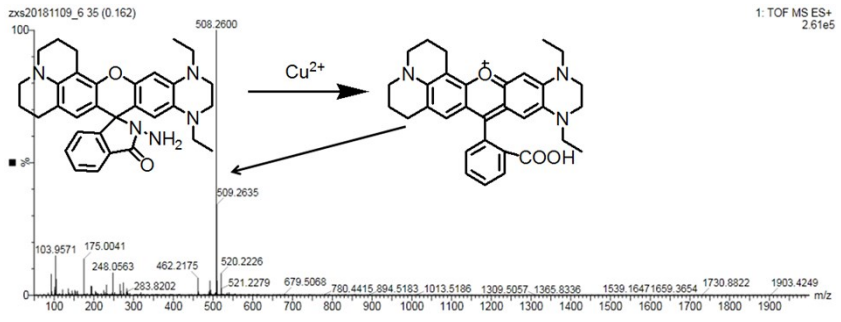

Fig. S6 HRMS of **JRQN** in the presence of Cu^{2+}.

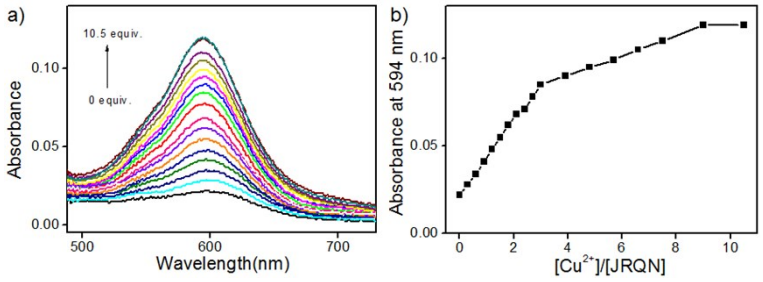

Fig. S7 a) The absorption spectra changes of **JRQN** (10 μM) treated with increasing concentrations of Cu^{2+} (0–105 μM); b) The plot of the absorption intensities at 594 nm versus the equiv. of Cu^{2+}.

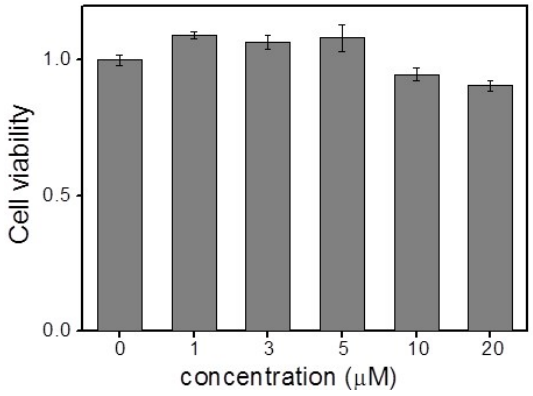

Fig. S8 MTT assay of **JRQN**.

Table. S3 Overlap coefficients and Pearson's coefficients of commercial targeting regents and **JRQN**

Regents	Overlap	Pearson's
Mito-Tracker Green	0.93	0.92
Lyso-Tracker Green	0.84	0.83
ER-Tracker Green	0.65	0.64
Golgi-Tracker Green	0.60	0.59

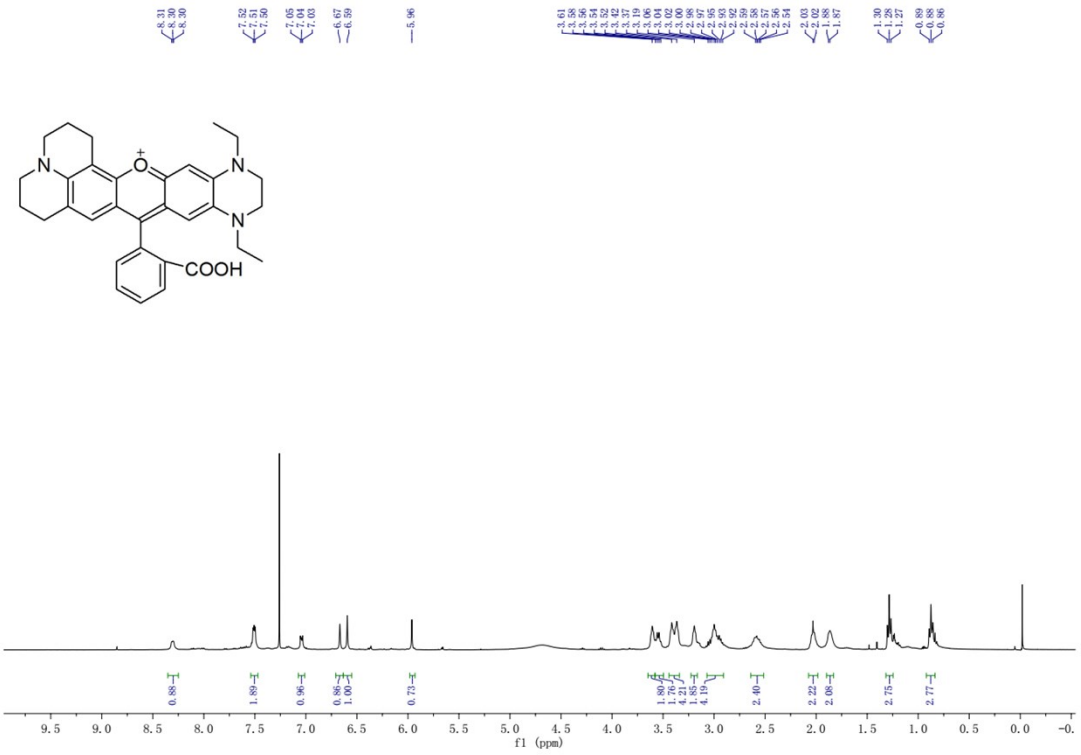

Fig. S9 ^{1}H NMR spectra of **JRQ** in $CDCl_3$

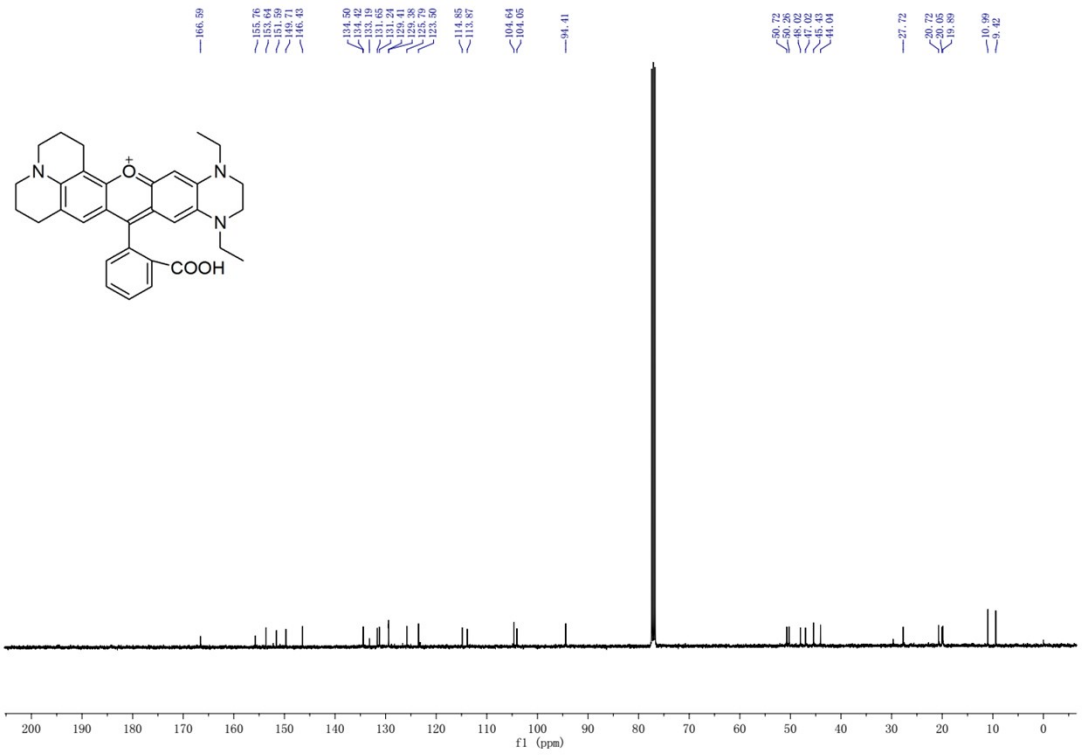

Fig. S10 ^{13}C NMR spectra of **JRQ** in $CDCl_3$

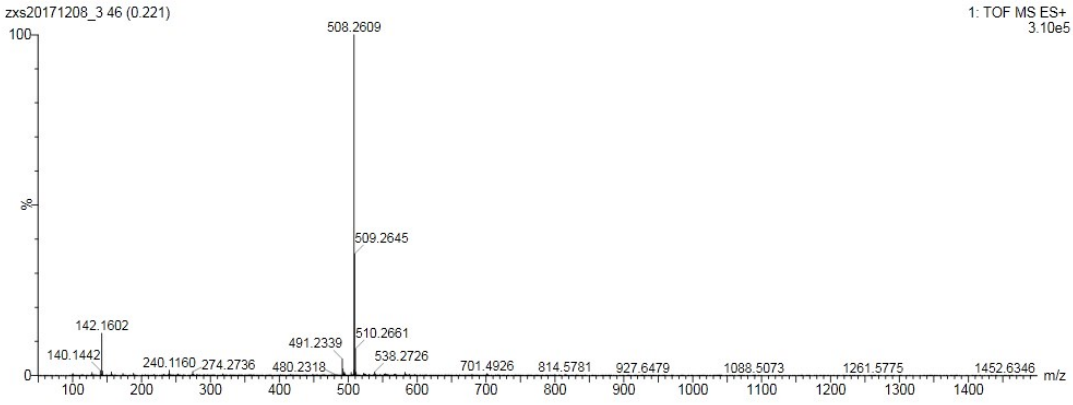

Fig. S11 HRMS spectra of **JRQ**

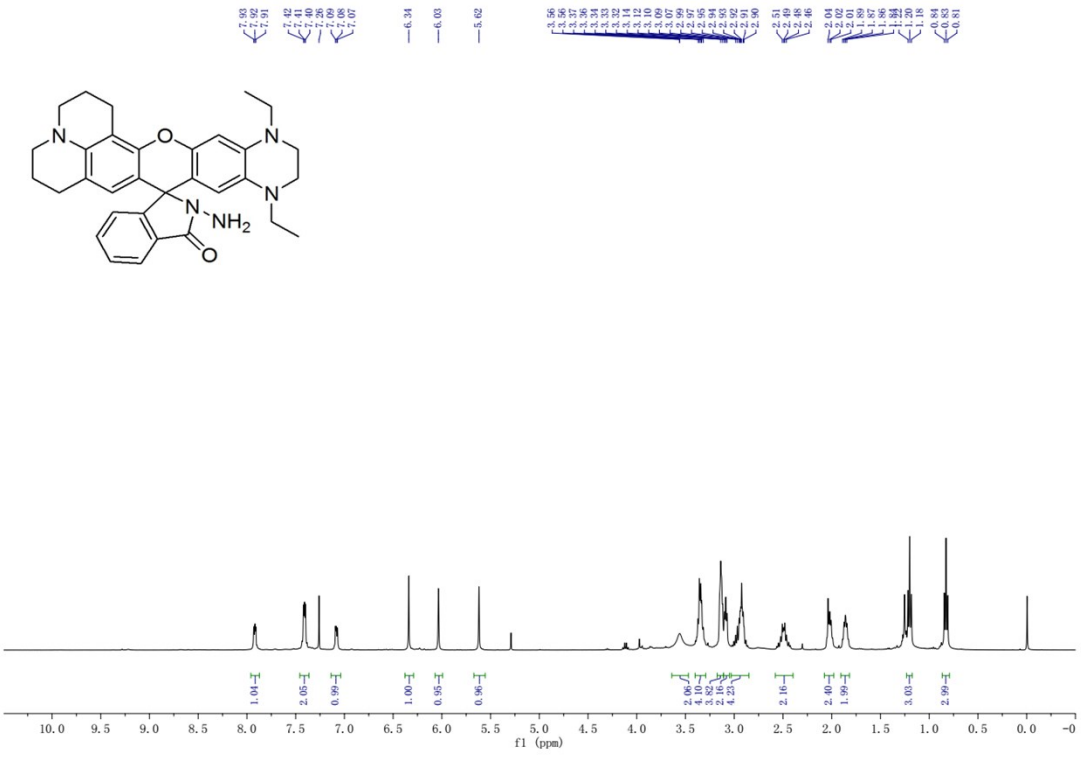

Fig. S12 ^{1}H NMR spectra of **JRQN** in $CDCl_3$

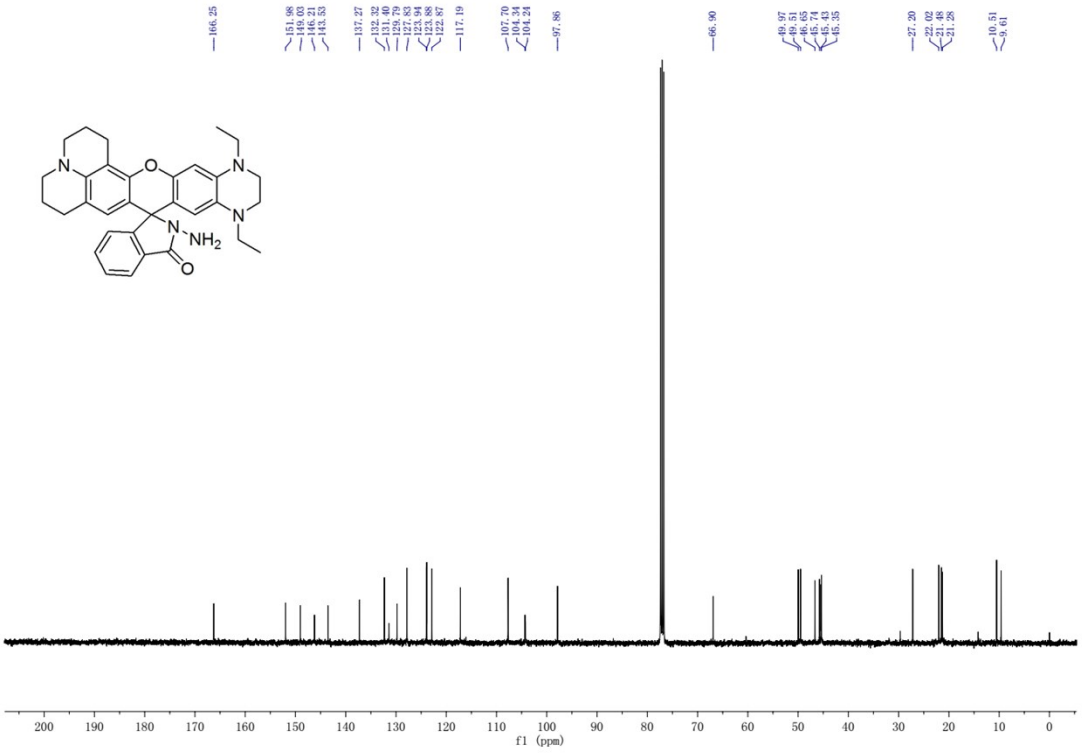

Fig. S13 ^{13}C NMR spectra of **JRQN** in $CDCl_3$

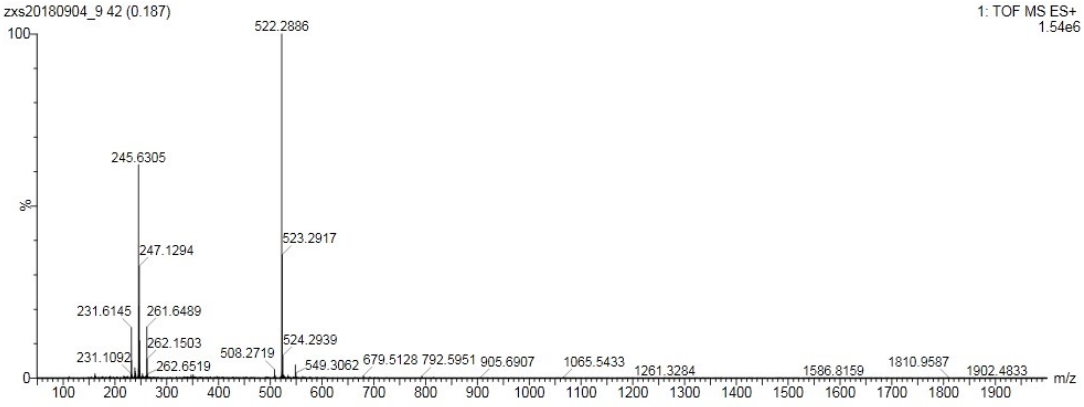

Fig. S14 HRMS spectra of **JRQN**