Supplementary Information for

An endoplasmic reticulum-targeted fluorescence probe for ratiometric tracking of endogenous SO_2 derivatives

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1. Detection limit

Detection limit = 3**σ**/ **s**

σ represents the standard deviation of the detection of 10 probe solutions without the addition of HSO_3^-/SO_3^{2-}. S represents the slope of titration linear relationship.

2. Energy transfer efficiency

$\eta = 1 - F_{(donor\ in\ FRET\ system)} / F_{(donor)}$

In the equation, ηrepresents the energy transfer efficiency in FRET system. $F_{(donor\ in\ FRET\ system)}$ represents fluorescent intensity of the donor in probe JSS-1 (FRET system). $F_{(donor)}$ represents fluorescent intensity of the donor without any energy transferred.

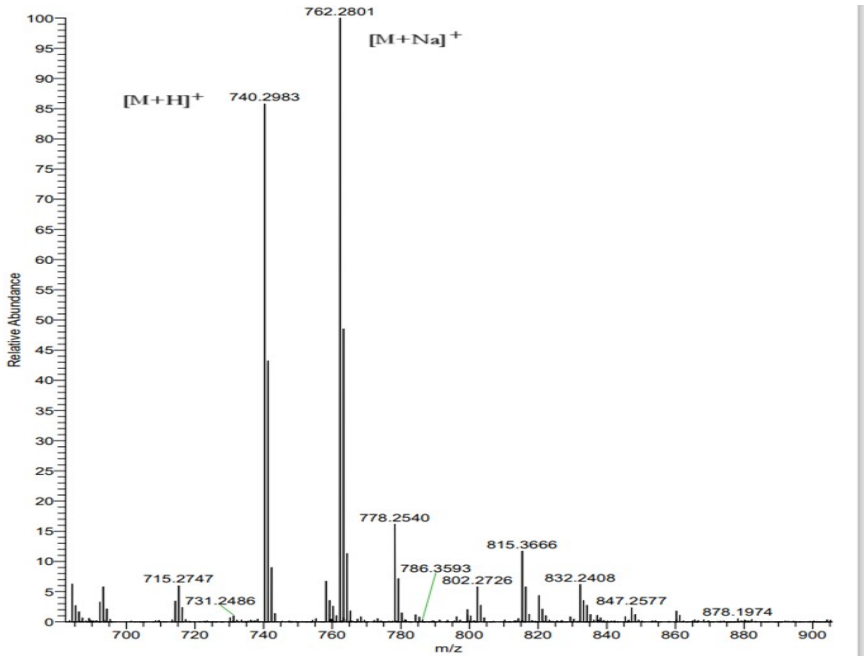


Fig. S1 The HRMS spectra of JSS-1.

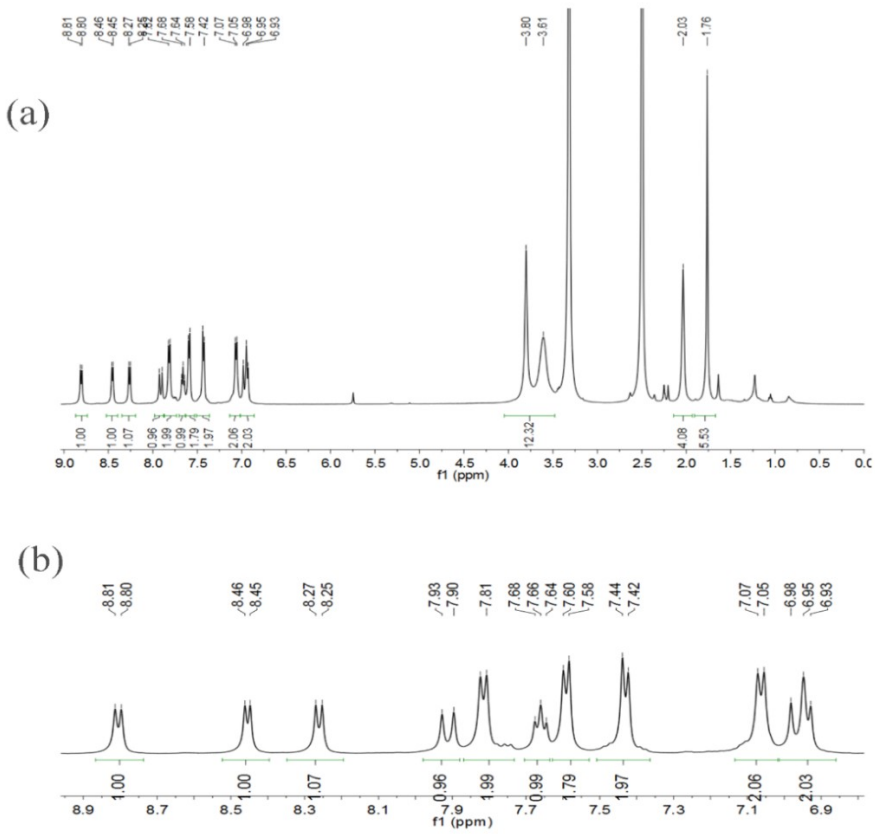


Fig. S2 The ^{1}H NMR spectra of JSS-1.

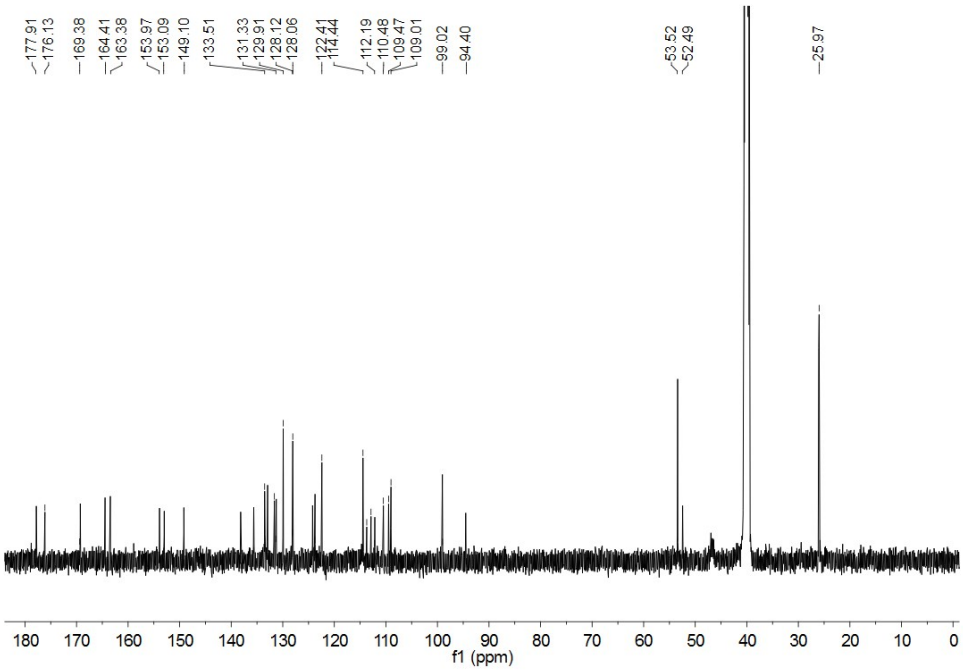


Fig. S3 The ^{13}C NMR spectra of JSS-1.

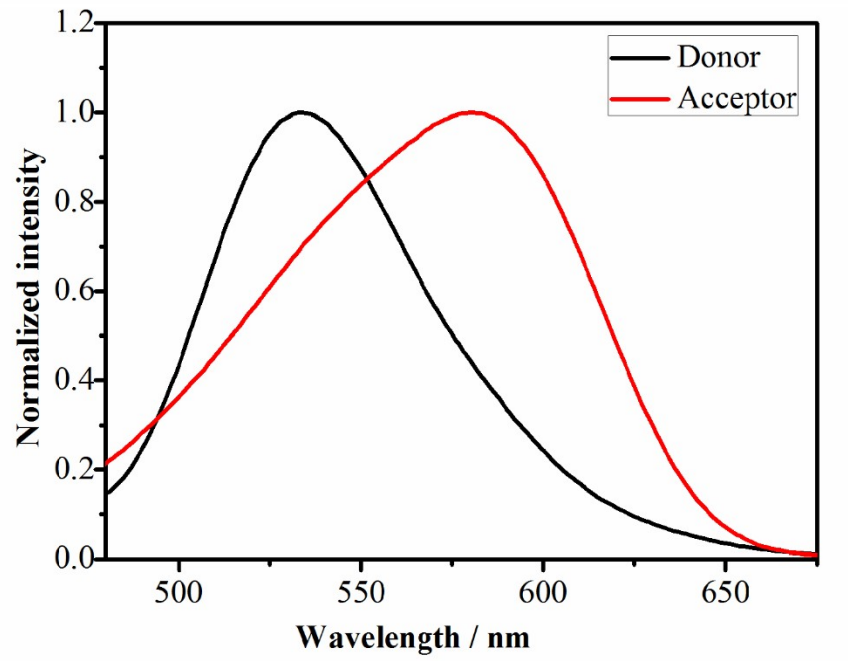


Fig. S4 The energy overlap of donor and acceptor.

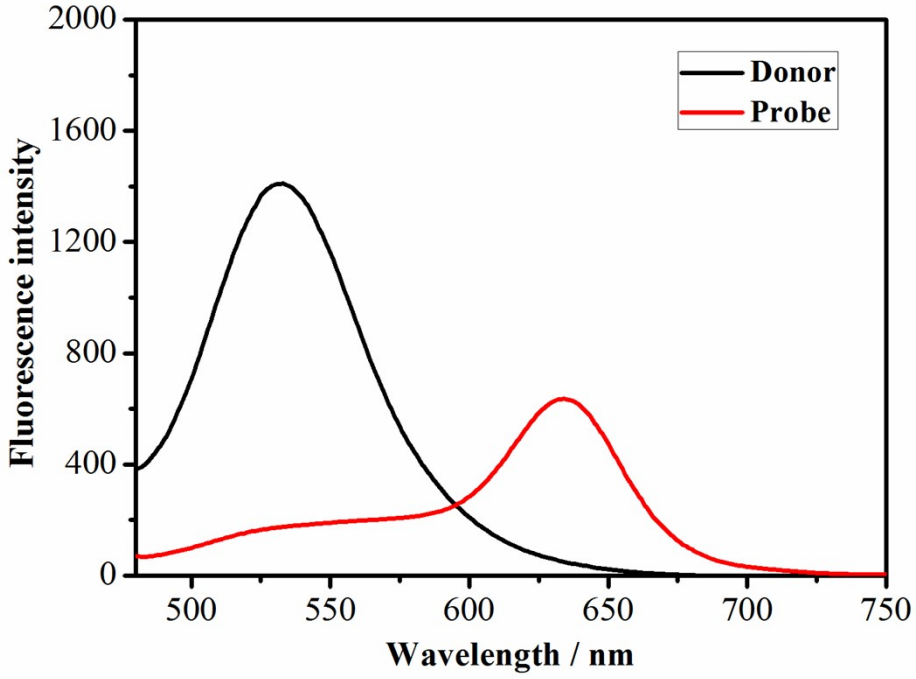


Fig. S5 The energy transfer efficiency.

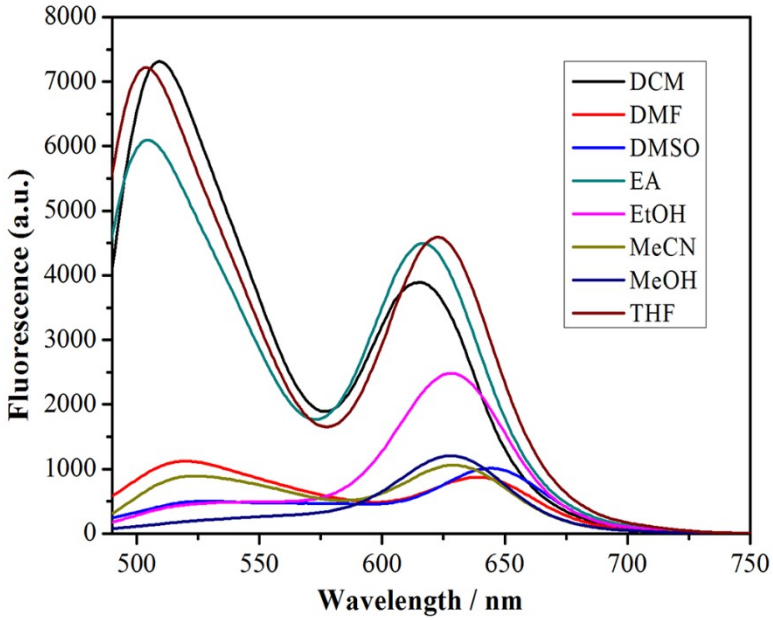


Fig. S6 The optical properties of the probe JSS-1 in different solvents.

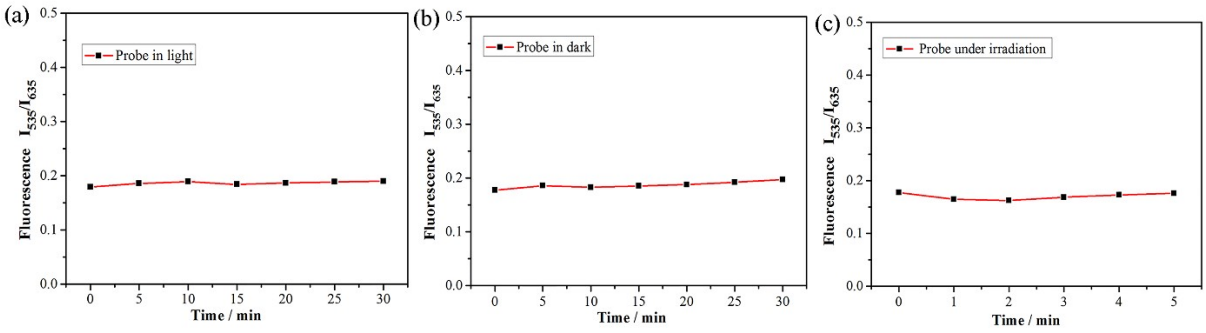


Fig. S7 light stability of the probe JSS-1 in vitro. (a) the fluorescence ratio () of probe JSS-1 under light

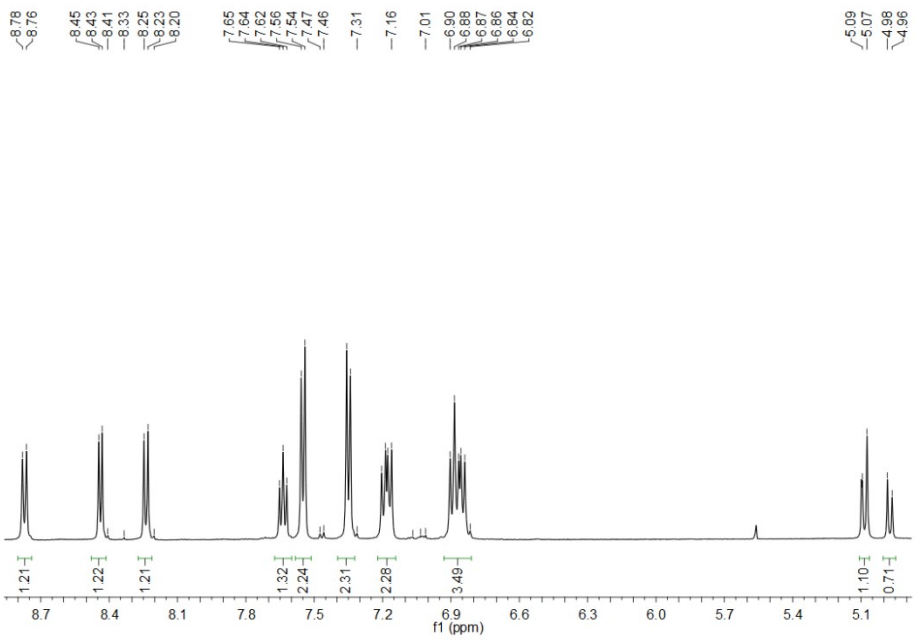


Fig. S8 ^{1}H NMR of the addition product.

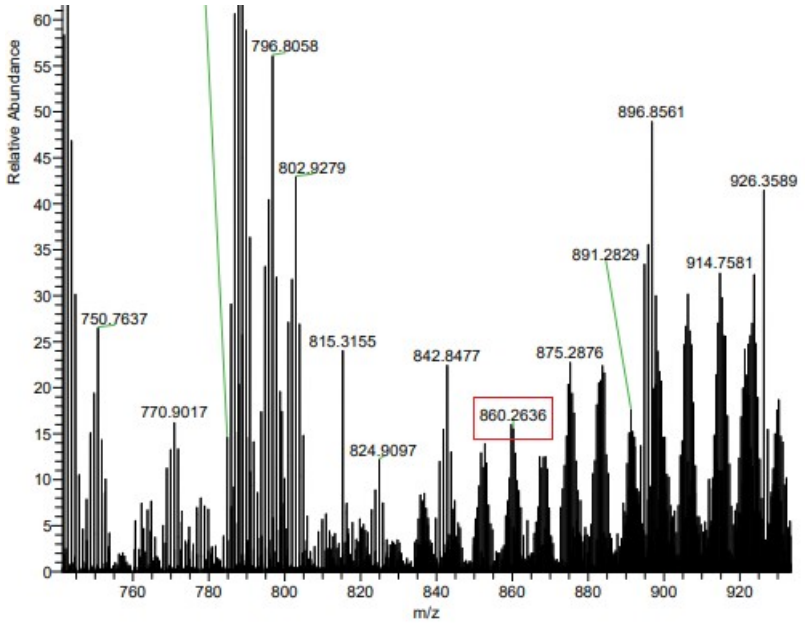


Fig. S9 HR-MS of the addition product.

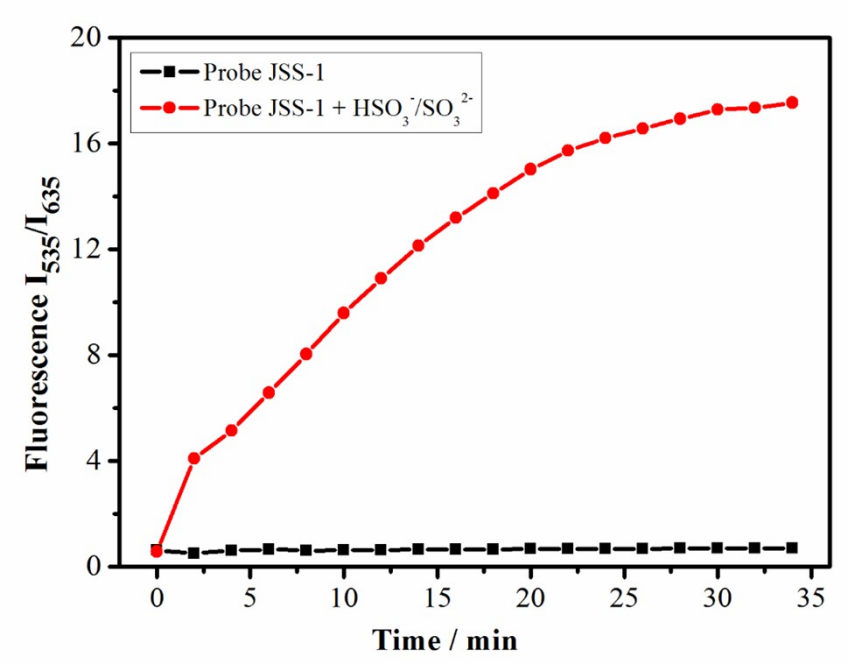


Fig. S10 The response time of JSS-1 toward HSO_3^-/SO_3^{2-}.

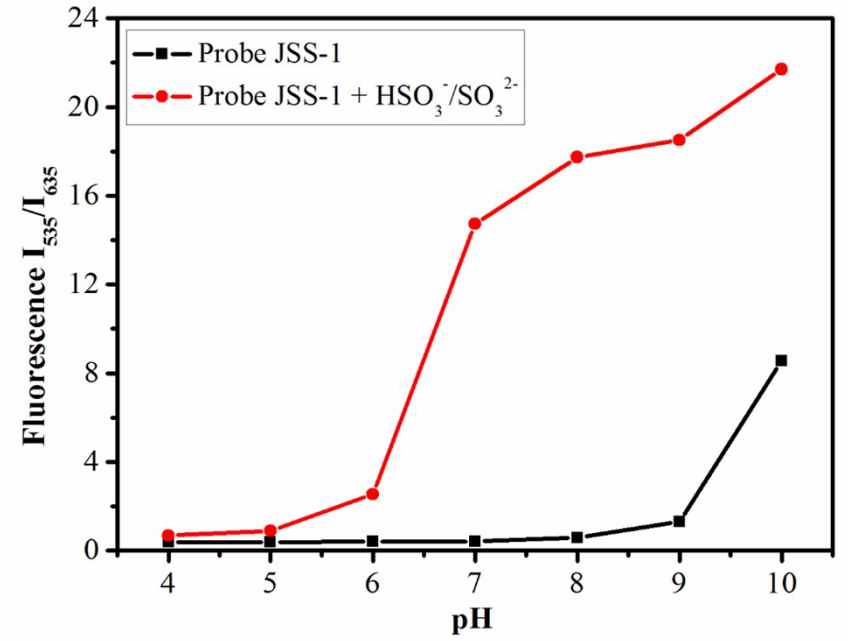


Fig. S11 Fluorescence spectra (I_{535}/I_{635}) of probe JSS-1 toward HSO_3^-/SO_3^{2-} in different pH condition.

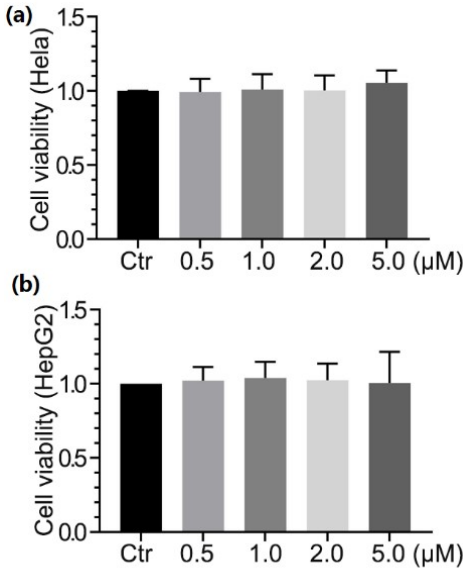


Fig. S12 The viability of JSS-1 in HeLa cells.

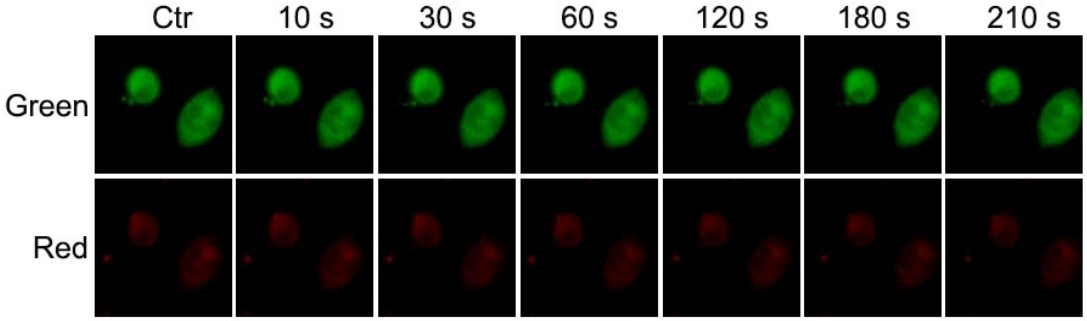
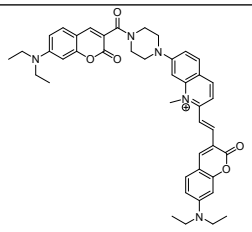
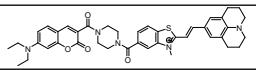
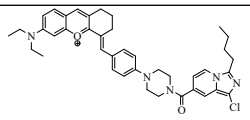
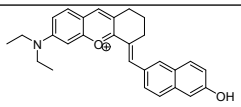
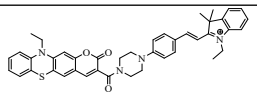
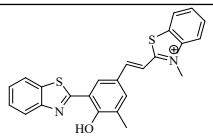
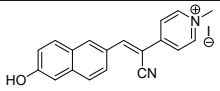
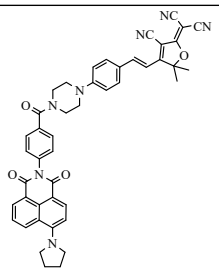


Fig. S13 The photo-stability of JSS-1 in living cells.

Table S1 The comparison of probe JSS-1 toward other detection works about HSO_3^- /SO_3^{2-}.

	Probe structure	Organelle targeting	Stokes Shift	Ratiometric	Detection limit	Ref.
1		no obvious targeting	260 nm	Yes	0.10 μM	S1
2		lysosome	215 nm	Yes	72.00 nM	S2

3		mitochondria	460 nm	Yes	0.98 μM	S3
4		mitochondria	100 nm	no	0.17 μM	S4
5		mitochondria	65 nm	Yes	0.17 μM	S5
6		mitochondria	202 nm	no	1.57 μM	S6
7		mitochondria	170 nm	Yes	10.20 μM	S7
8		endoplasmic reticulum	235 nm	Yes	86.77 nM	This work

Reference

[S1] F.T. Liu, N. Li, Y.S. Chen, H.Y. Yu, J.Y. Miao and B.X. Zhao, *Anal. Chim. Acta*, **2022**, 1211, 339908.

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[S6] Q. Yan, X. Yao, Y. Li, K. Zhong, L. Tang, X. Yan, *Spectrochim. Acta, Part A,* **2023**, 299, 122882.

[S7] Y. Du, C. Pan, C. Cao, *Spectrochim. Acta, Part A,* **2023**, 290, 122275.