Electronic Supplementary Material (ESI) for RSC Advances.


# A simple sensor based on 1,8-naphthalimide with large Stokes shift for detection of hypochlorous acid in living cells

1. $^{1}H$ NMR spectrum of compound 2

2. $^{13}C$ NMR spectrum of compound 2

3. $^{1}H$ NMR spectrum of Probe 1

4. $^{13}C$ NMR spectrum of Probe 1

5. HRMS spectra characterizations of Probe 1

6. Fluorescence spectra of Probe 1 to various relevant species

7. Comparision of the fluorescence intensity with various reducing materials

8. Mass spectrum of Probe 1 after oxidation by HOCl

9. FT-IR Spectra of Probe 1 and product after reaction with HOCl

10. MTT assay of HeLa cells treated in the presence of Probe 1

Table S1 Comparison of highly specific fluorescent probes for HOCl

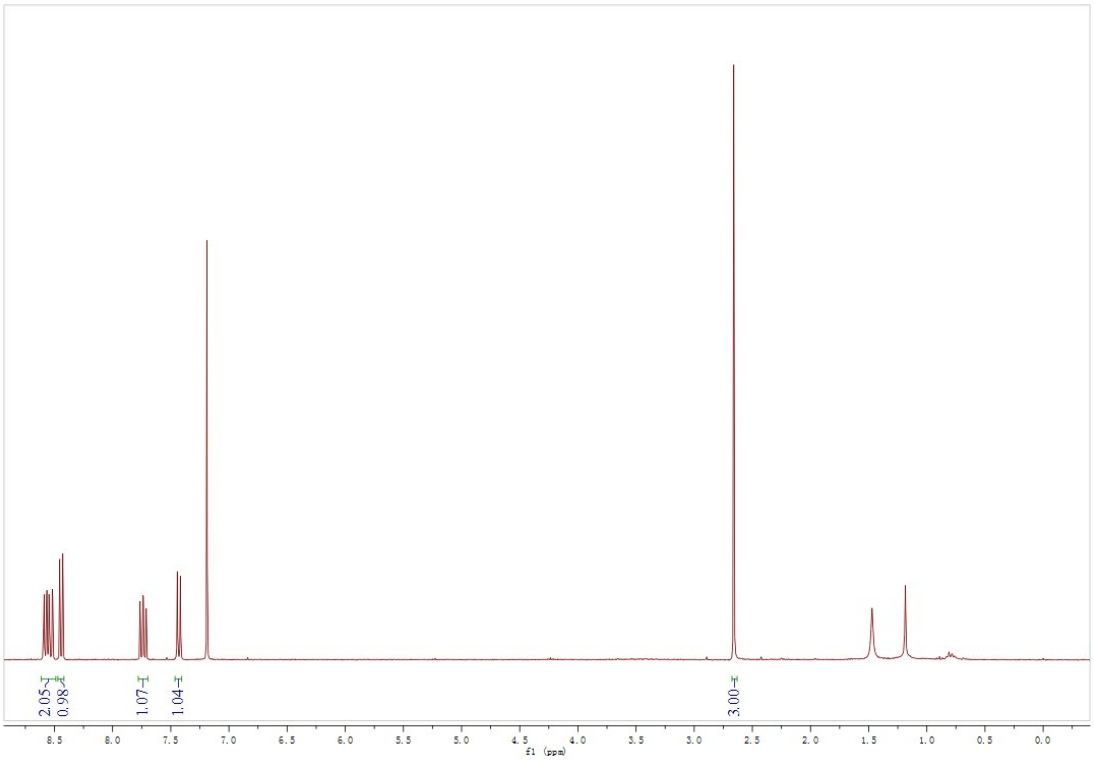



Fig. S1 $^{1}H$ NMR spectrum of compound 2 ($CDCl_3$)

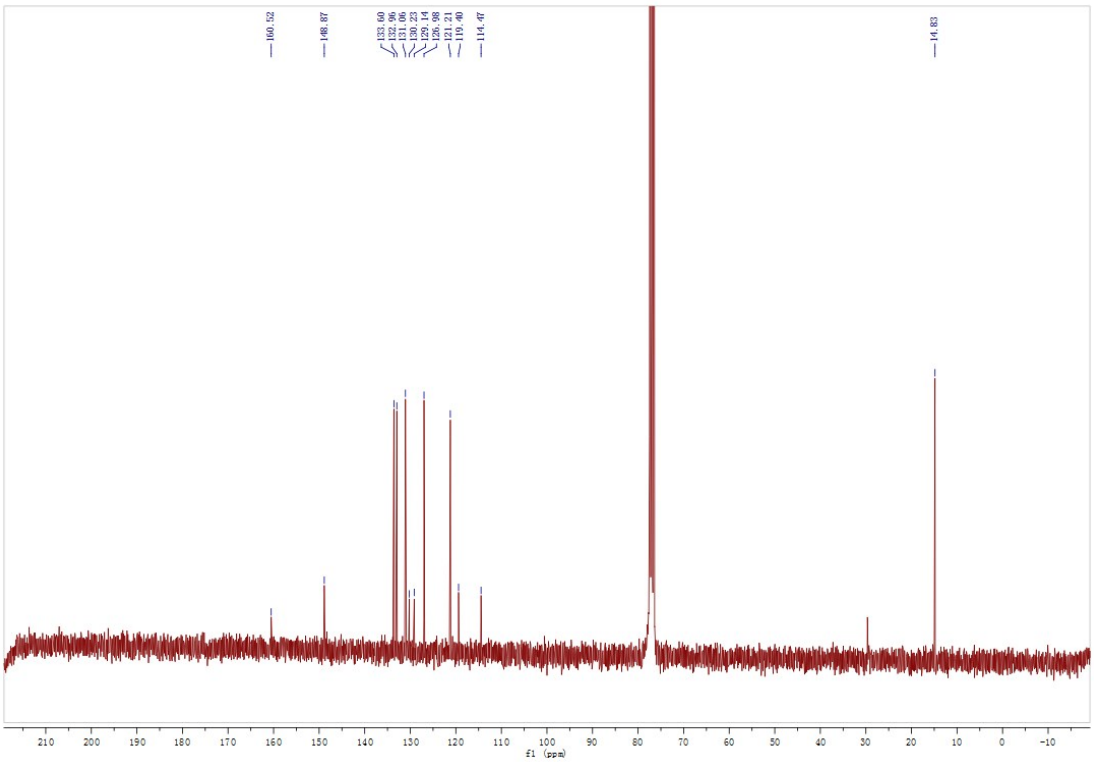



Fig. S2 $^{13}C$ NMR spectrum of compound 2 ($CDCl_3$)

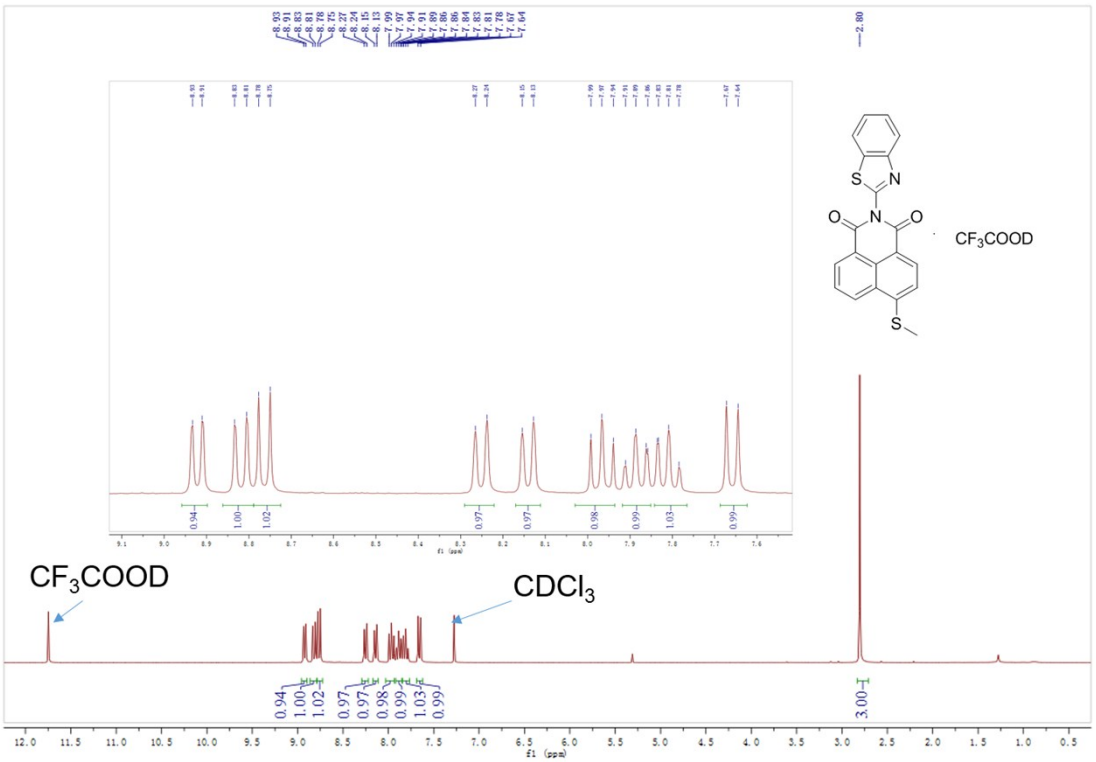



Fig. S3 $^{1}H$ NMR spectrum of Probe 1 ($CDCl_3$ + $CF_3COOD$)

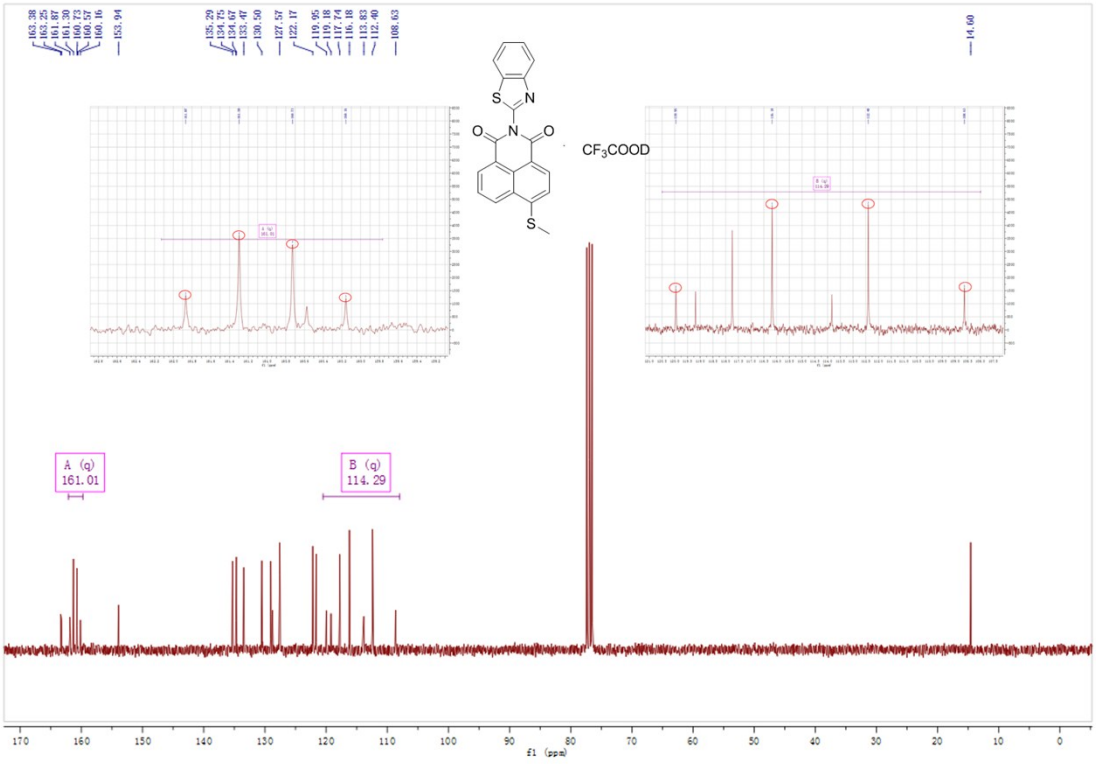



Fig. S4 $^{13}C$ NMR spectrum of Probe 1 ($CDCl_3$ + $CF_3COOD$)

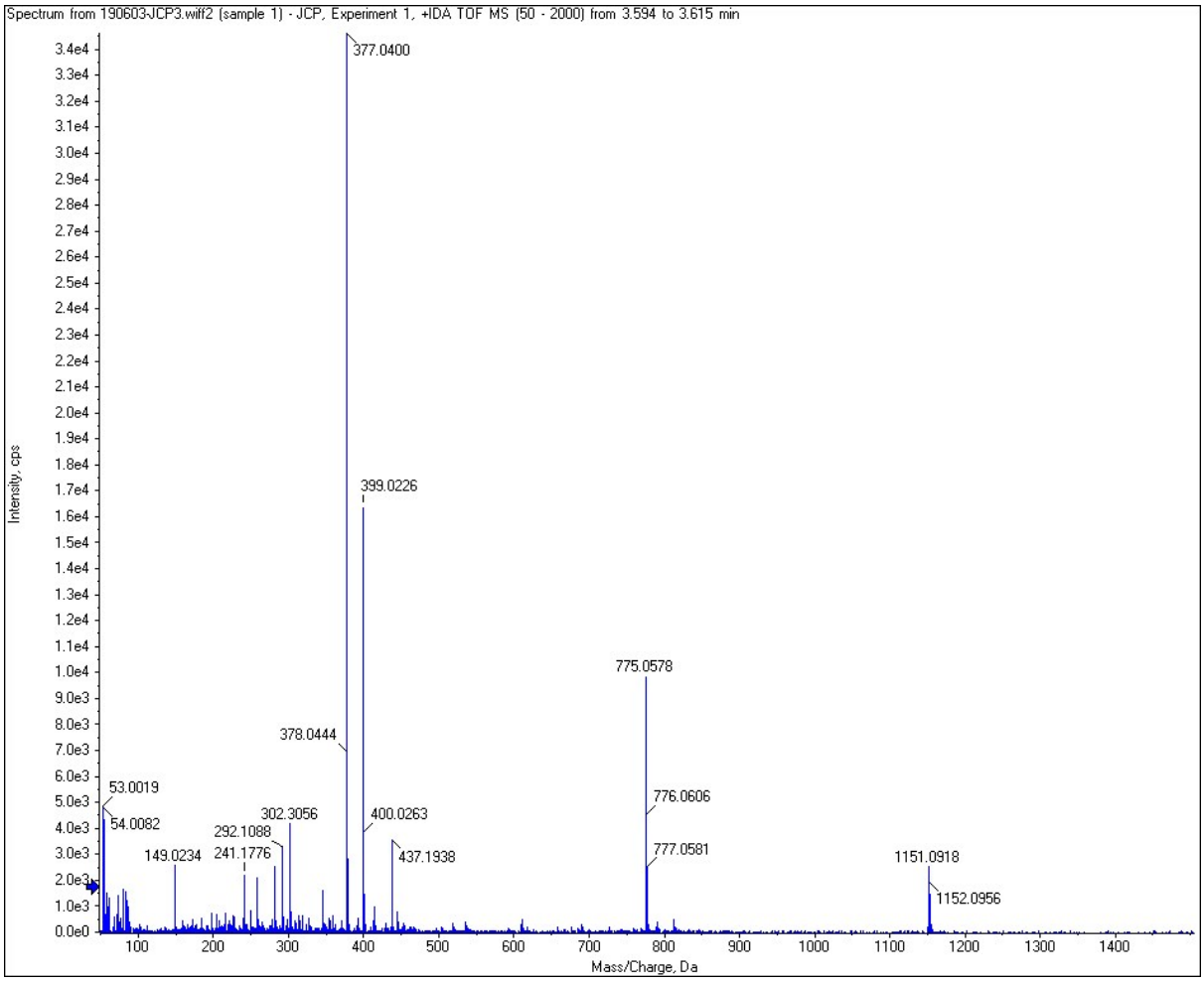



Fig. S5 HRMS spectra characterizations of Probe 1

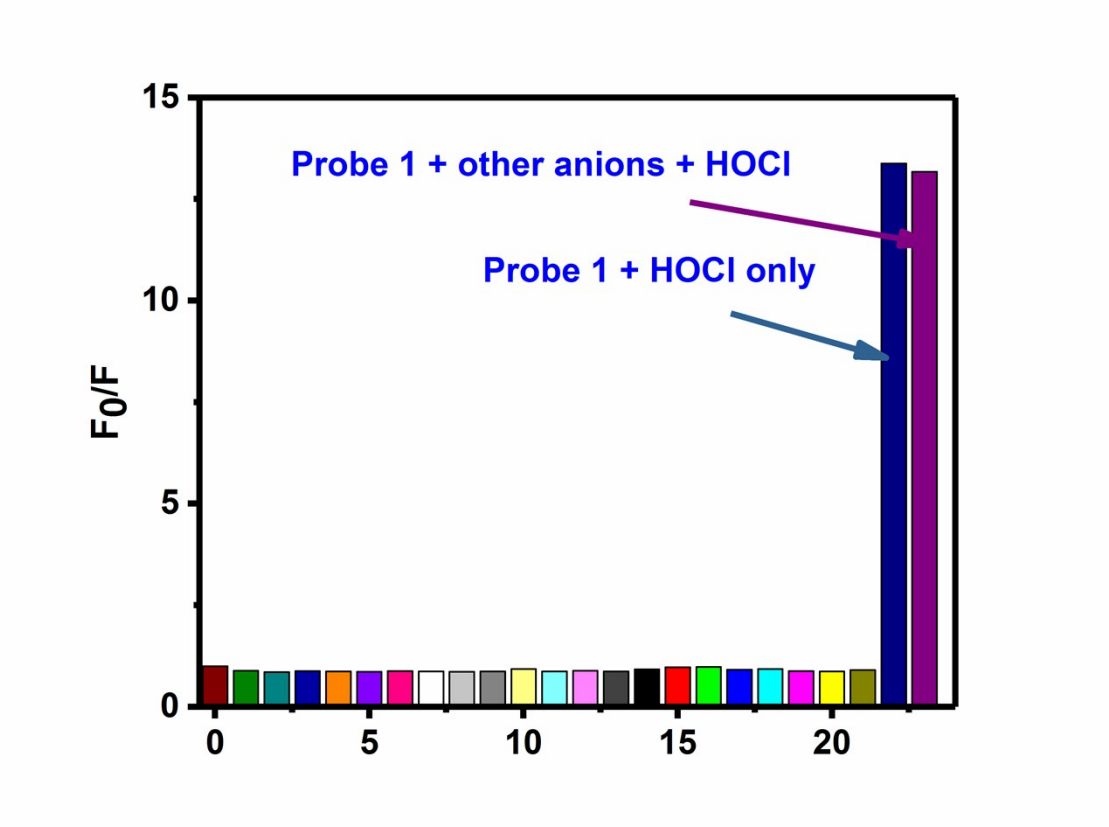



Fig. S6 Fluorescence spectra of Probe 1 to various relevant species (all 10eq; $NO_3^-$, $NO_2^-$, $Ag^+$, $Al^{3+}$, $Ca^{2+}$, $Cr^{3+}$, $Co^{2+}$, $Fe^{2+}$, $Fe^{3+}$, $Mn^{2+}$, $Ni^{2+}$, $Pb^{2+}$, $Zn^{2+}$, $Cu^{2+}$, $Hg^{2+}$, $Cd^{2+}$, $H_2O_2$, HOCl, NO, $ONOO^-$, •OH, T-$Buoo^-$).

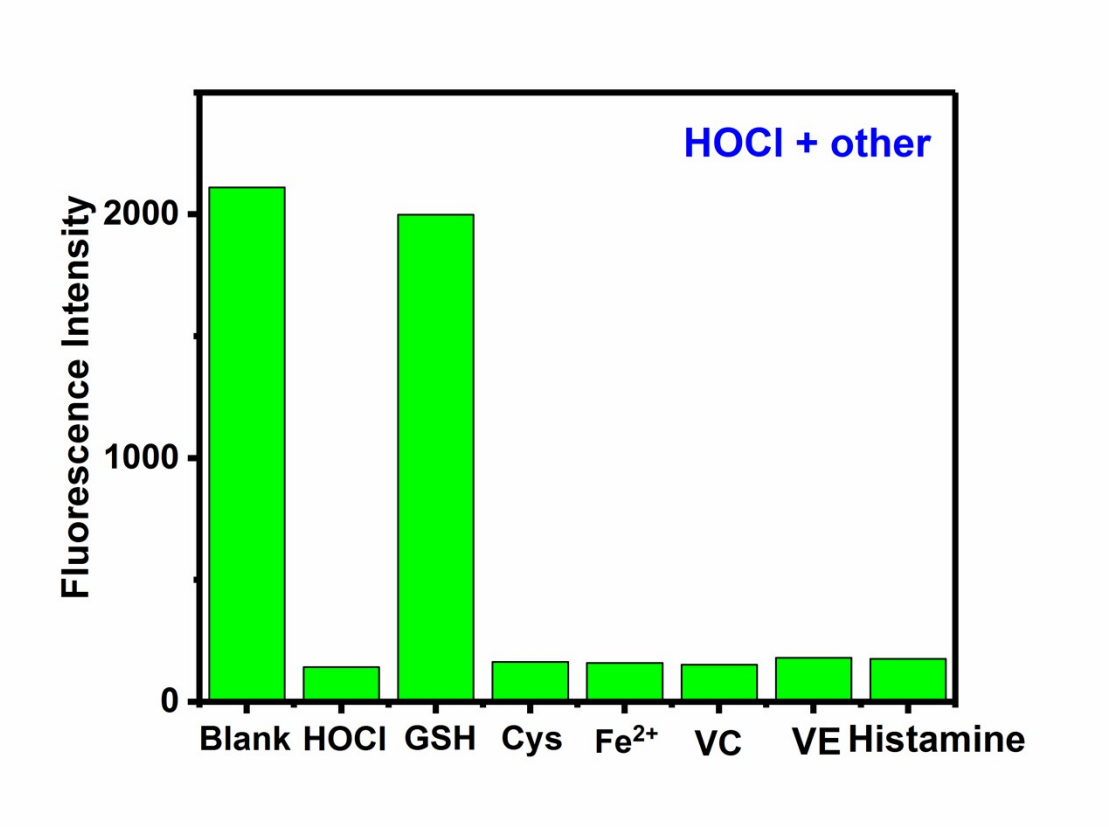
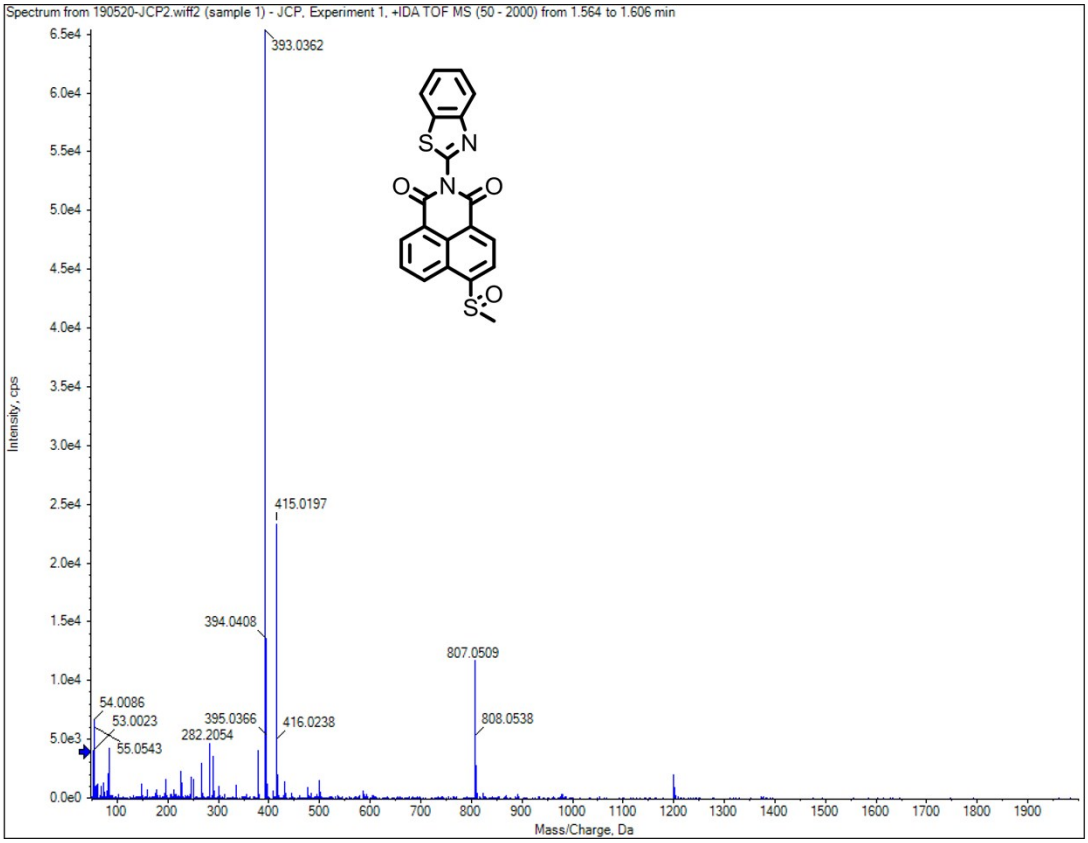


Fig. S7 Comparision of the fluorescence intensity with various reducing materials (10 eq) to **Probe 1** ($10^{-5}$M) + HOCl.



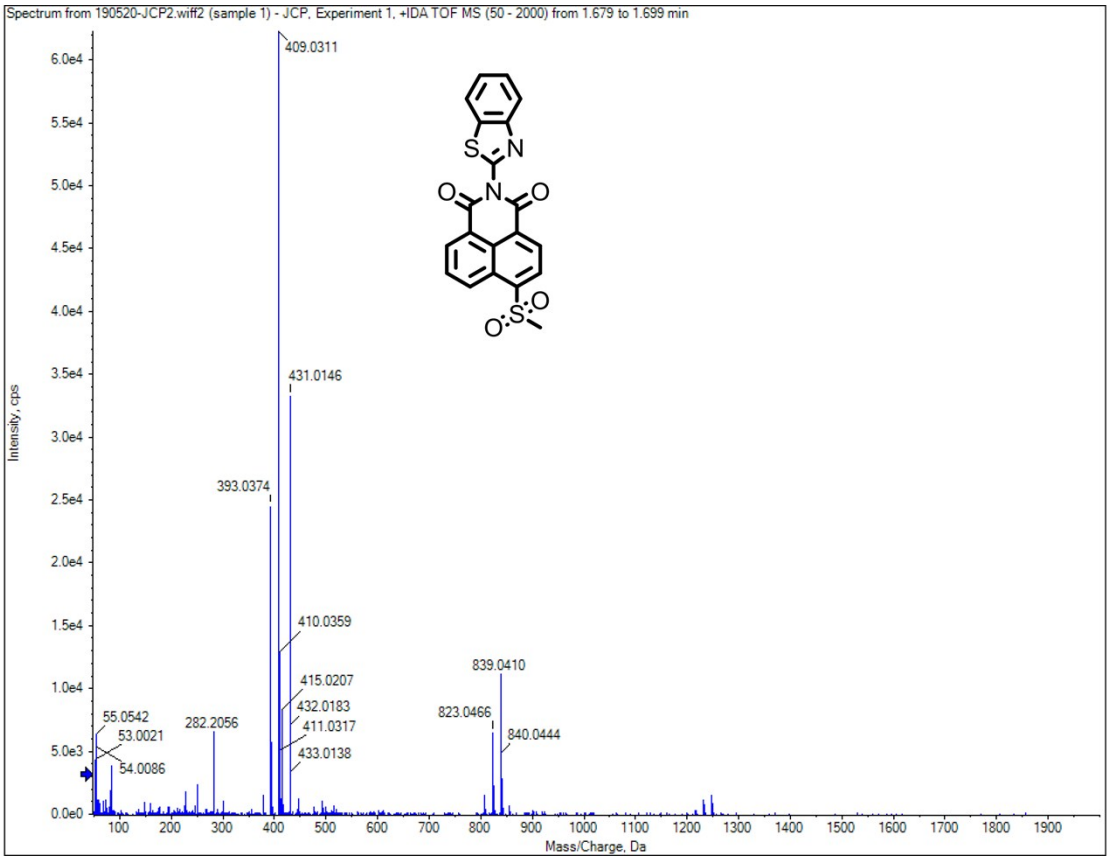



Fig. S8 Mass spectrum of Probe 1 after oxidation by HOCl

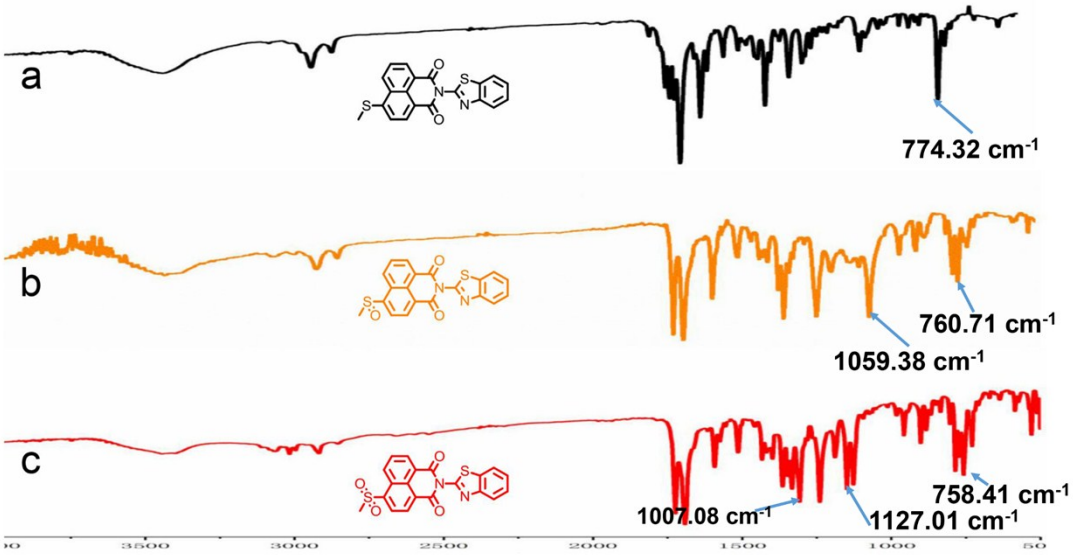



Fig. S9 FT-IR Spectra of Probe 1 and product after reaction with HOCl

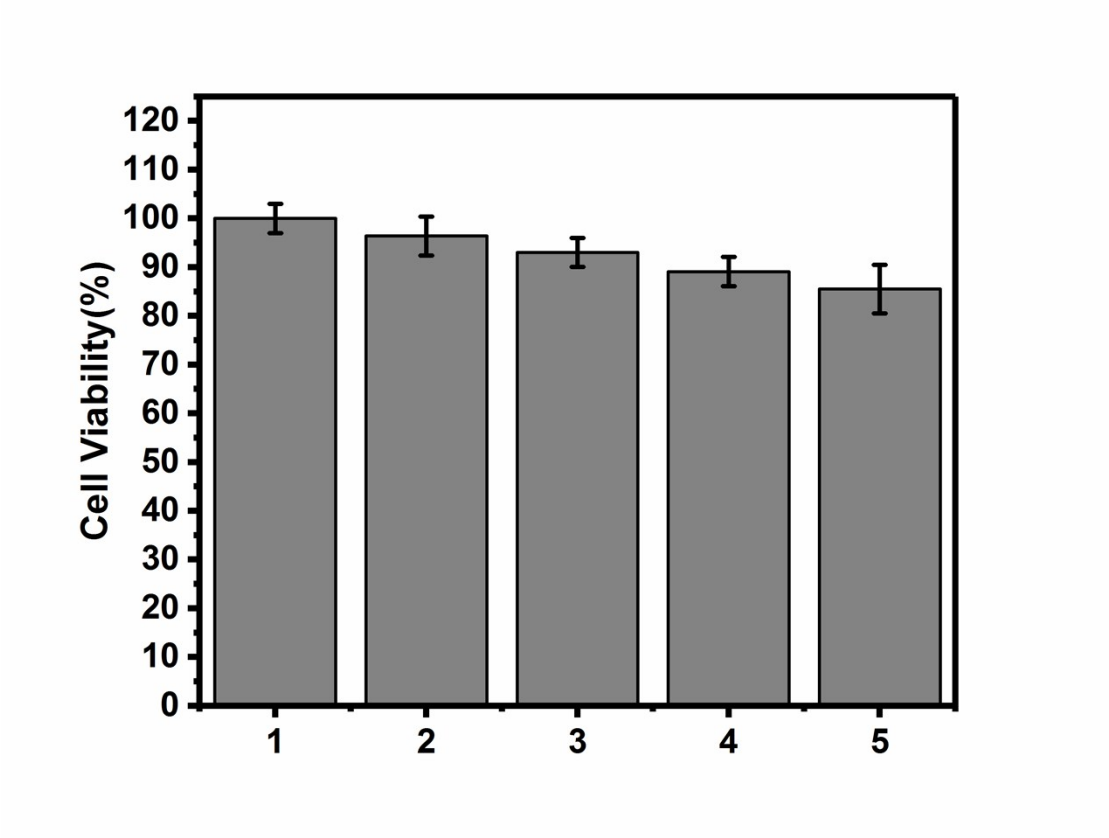
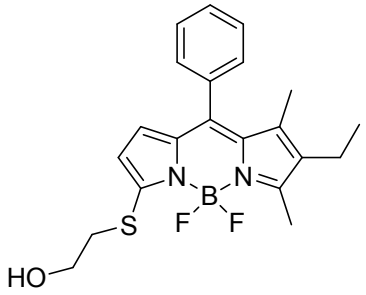
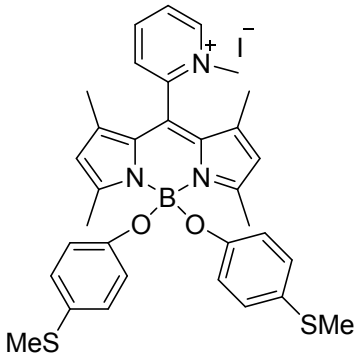
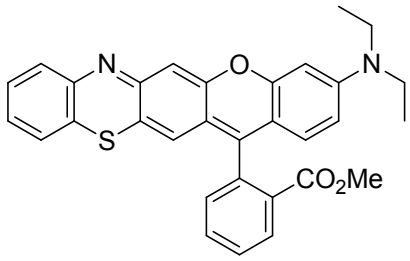
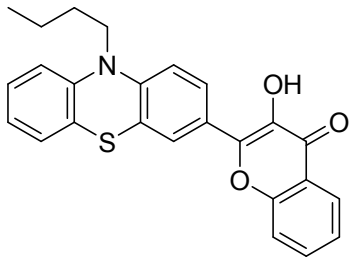
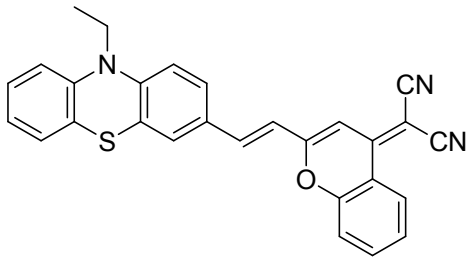
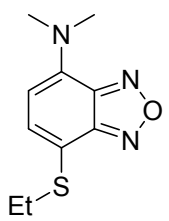
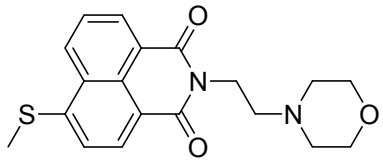
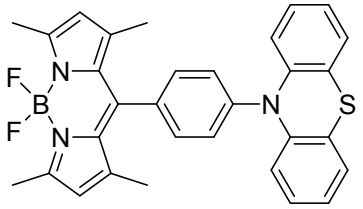
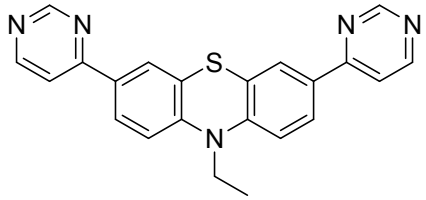
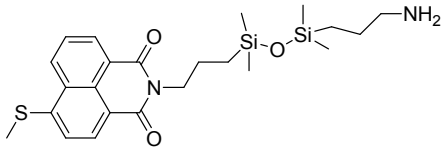
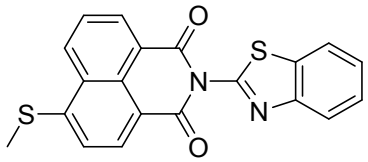



Fig. S10 MTT assay of HeLa cells treated in the presence of Probe 1 (1. 0μM 2. 5μM 3. 10μM 4. 20μM 5. 30μM) and incubated for 24 hours.

Table S1 Comparison of highly specific fluorescent probes for HOCl

| Probe | Detection limit | Reaction time | Stokes shift | Reference |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
|  | 0.4μM | fast | 12nm | 1 |
|  | 53nM | 10min | 40nm | 2 |
|  | 2.3nM | 10min | 97 nm | 3 |
|  | 6.6nM | 10min | 140nm | 4 |
|  | 0.72μM | null | 150nm | 5 |
|  | 0.34μM | 60min | 170nm | 6 |

| | | | | |
|---|---|---|---|---|
|  | 0.674μM | 2.5min | 105nm | 7 |
|  | 0.72μM | 15min | 14nm | 8 |
|  | 0.453μM | 20min | 68nm | 9 |
|  | 1.6 μM | 30s | 95nm | 10 |
|  | 0.237 μM | 2min | 120nm | This work |

## Reference


1. X. Wang, L. Zhou, F. Qiang, F. Wang, R. Wang and C. Zhao, *Analytica Chimica Acta*, 2016, **911**, 114-120.
2. Y. Jin, M. Lv, Y. Tao, S. Xu, J. He, J. Zhang and W. Zhao, *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy*, 2019, **219**, 569-575.
3. C. Liu, Q. Wang, X. Jiao, H. Yao, S. He, L. Zhao and X. Zeng, *Dyes and Pigments*, 2019, **160**, 989-994.
4. L. He, Y. Zhang, H. Xiong, J. Wang, Y. Geng, B. Wang, Y. Wang, Z. Yang and X. Song, *Dyes and Pigments*, 2019, **166**, 390-394.
5. B. Deng, M. Ren, X. Kong, K. Zhou and W. Lin, *Sensors and Actuators B: Chemical*, 2018, **255**, 963-969.
6. J. Sun, L. Zhang, Y. Hu and J. Fang, *Sensors and Actuators B: Chemical*, 2018, **266**, 447-454.
7. B. Zhang, Y. X, Z. R, L. Y, R. X, X. M, Y. Y and Z. Y, *Analytical Chemistry*, 2017, **89**, 10384-10390.
8. D. Soni, S. Gangada, N. Duvva, T. K. Roy, S. Nimesh, G. Arya, L. Giribabu and R. Chitta, *New Journal of Chemistry*, 2017, **41**, 5322-5333.
9. J. Weng, Q. Mei, B. Zhang, Y. Jiang, B. Tong, Q. Fan, Q. Ling and W. Huang, *Analyst*, 2013, **138**, 6607-6616.
10. Y. Zhang, Y. Zuo, T. Yang, Z. Gou, X. Wang and W. Lin, *Analyst*, 2019, **144**, 5075-5080.