Supporting Information

A colorimetric and ratiometric fluorescent probe for rapid, sensitive and visual detection of metabisulfite in food and living cells

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Table S1. Comparison of ratiometric fluorescent probes for SO_2 derivatives.

Probes	λ_{ex} /nm	λ_{em} /nm	Solvent	Detection limit/nM	Sensitivity	Response time/s	Detection object	Application
NDMBT [1]	360 488	430 690	PBS buffer (5% DMSO)	43.0	good	< 100	HSO_3^-	Living cells
NHB-ID [2]	404 550	467 611	PBS buffer (30% DMSO)	58.6	good	< 90	HSO_3^-	Living cells
probe 1 [3]	420 600	485 640	PBS buffer (0.25% EtOH)	34.0	good	< 300	SO_3^{2-}	Living cells
probe 2 [4]	466 580	523 663	HEPES buffer	0.27	good	< 90	SO_3^{2-}	Living cells
CP [5]	380	450 645	PBS buffer (5% DMSO)	390	good	< 5	HSO_3^-	Living Cells, brain tissues, and zebrafishes
probe 1 [6]	500	560 717	PBS buffer (10% DMF)	87	good	< 30	HSO_3^-	Living cells and food samples
CZBI	322 510	462 588	PBS buffer (30% EtOH)	6.8	good	< 30	$S_2O_5^{2-}$	Living cells and food samples

[1] Y. Wang, Q. Meng, R. Zhang, H. Jia, C. Wang and Z. Zhang, *J. Lumin.*, 2017, **192** 297–302.

[2] H. Huang, W. Liu, X.-J. Liu, Y.-Q. Kuang and J.-H. Jiang, *Talanta*, 2017, **168**, 203–209.

[3] Y. Chen, X. Wang, X.-F. Yang, Y. Zhong, Z. Li and H. Li, *Sens. Actuators B*, 2017, **206**, 268–275.

[4] M.X. Li, W.Y. Feng, H.Y. Zhang and G.Q. Feng, *Sens. Actuators B*, 2017, **243**, 51−58.

[5] M.-Y. Wu, K. Li, C.-Y. Li, J.-T. Hou and X.-Q. Yu, *Chem. Commun.*, 2014, **50**, 183−185.

[6] Y. Ma, Y. Tang, Y. Zhao, S. Gao and W. Lin, *Anal. Chem.*, 2017, **89**, 9388−9393.

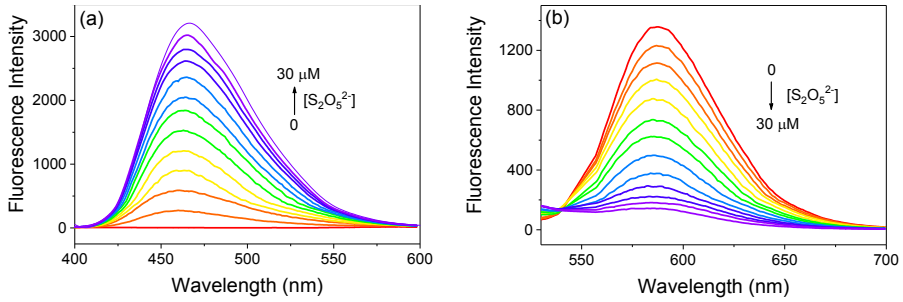

Fig. S1 Fluorescence spectra changes of **CZBI** in EtOH/PBS solution (*v*/*v* = 3/7, pH 7.4, 10 mM) upon addition of increasing amount of $S_2O_5^{2-}$ (0−30 μM). Each spectrum was recorded after **CZBI** was incubated with $S_2O_5^{2-}$ for 1 min. (a) λ_{em} = 462 nm, λ_{ex} = 322 nm, slits: 2.5/2.5 nm; (b) λ_{em} = 588 nm, λ_{ex} = 510 nm, slits: 2.5/10 nm.

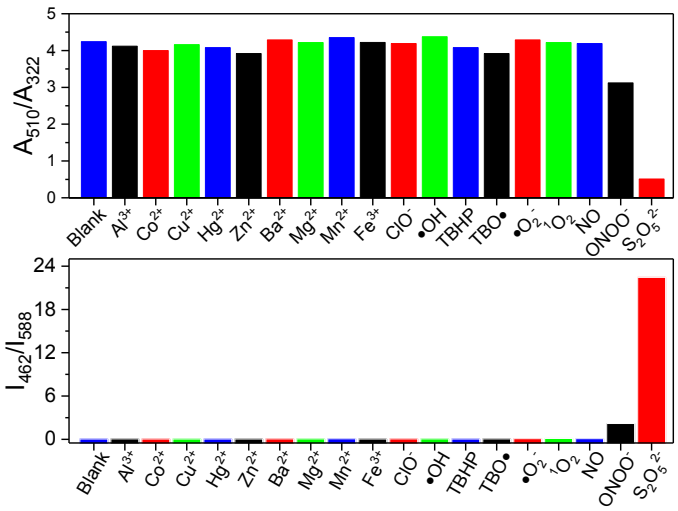

Fig. S2 (a) Absorbance ratios (A_{510}/A_{322}) and (b) Fluorescence intensity ratios (F_{462}/F_{588}) of **CZBI** (10 μM) in the presence of various analytes (100.0 μM) in EtOH/PBS solution (*v*/*v* = 3/7, pH 7.4, 10 mM) at 25 °C. Each spectrum was recorded after **CZBI** was incubated with $S_2O_5^{2-}$ for 1 min.

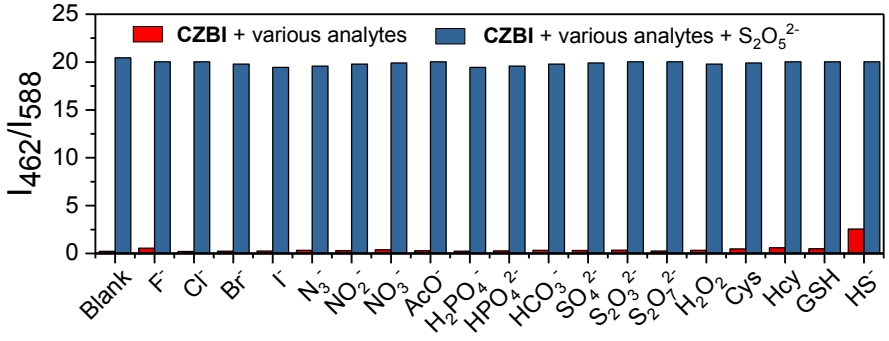

Fig. S3 Fluorescence response of **CZBI** (10 μM) towards $S_2O_5^{2-}$ in the presence of various analytes (100.0 μM) in EtOH/PBS solution (*v*/*v* = 3/7, pH 7.4, 10 mM) at 25 °C. Each spectrum was recorded after the analytes were incubated with **CZBI** (10 μM) for 1 min.

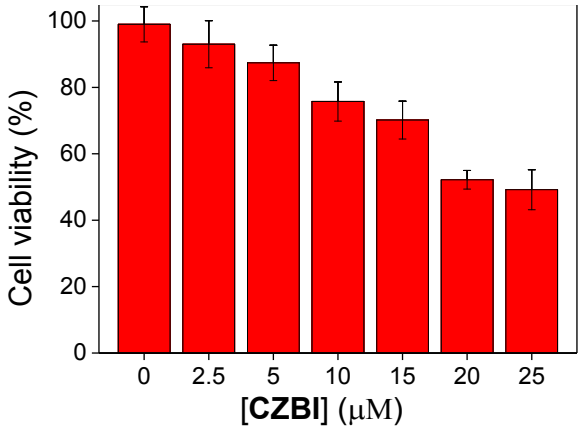

Fig. S4 Cytotoxicity of **CZBI**. HeLa cells were incubated with **CZBI** (0–25 μM) for 24 h. Results are mean ± SD, n = 5.

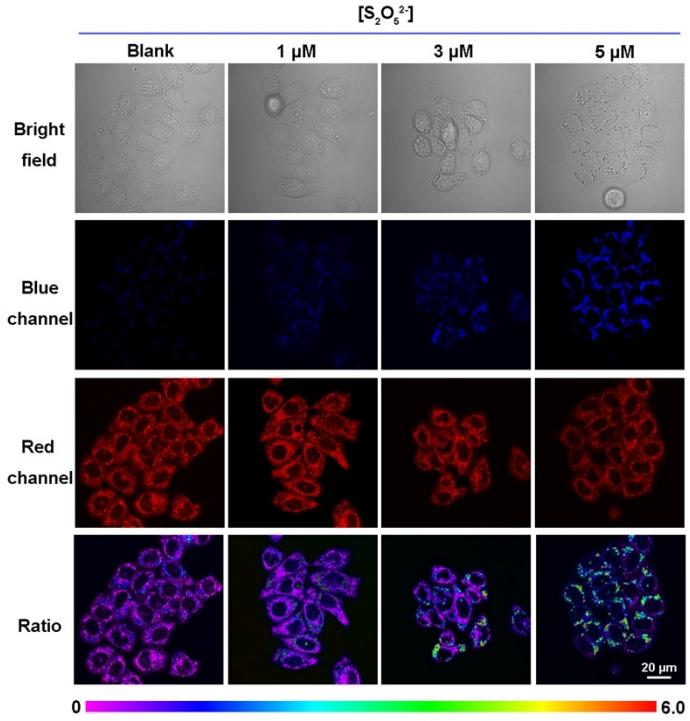

Fig. S5 Confocal fluorescence images of **CZBI** in HeLa cells incubated with different concentrations of $S_2O_5^{2-}$. HeLa cells were incubated with **CZBI** (10 μM) at 37 °C for 30 min, and then further treated with different amounts of $S_2O_5^{2-}$ for 10 min. Fluorescence images of HeLa cells from blue channel (λ_{ex} = 403 nm, λ_{em} = 425–475 nm) and red channel (λ_{ex} = 543 nm, λ_{em} = 552–617 nm). The ratiometric images (F_{blue}/F_{red}) were obtained by mediating the blue channel image with the related red channel image. Scale bar: 20 μm.

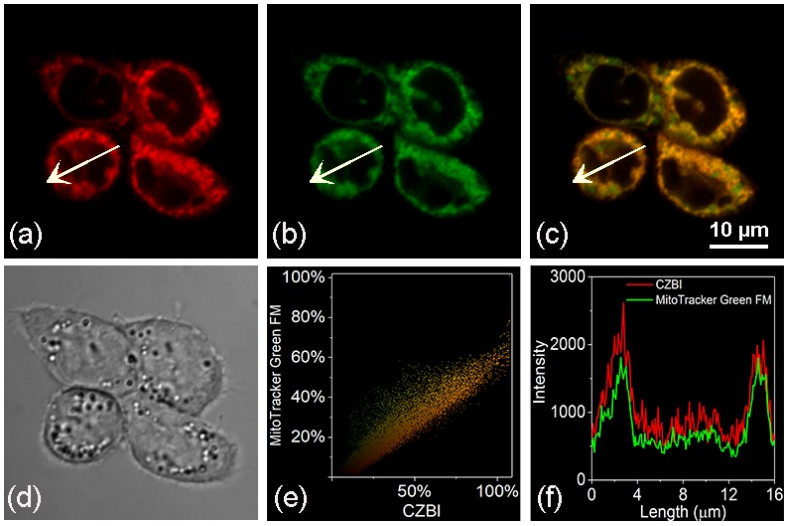

Fig. S6 Confocal fluorescence images of HeLa cells stained with (a) 10 μM **CZBI** (red channel: λ_{ex} = 543 nm, λ_{em} = 560–610 nm) and (b) 200 nM MitoTracker Green FM (green channel: λ_{ex} = 488 nm, λ_{em} = 500–530 nm) at 37 °C for 30 min (c) Merged image of (a) and (b). (d) Bright field image. (e) Correlation plot of MitoTracker Green FM and **CZBI** intensities. (f) Intensity profile of regions of interest (ROI) across HeLa cells. Scale bar: 10 μm.

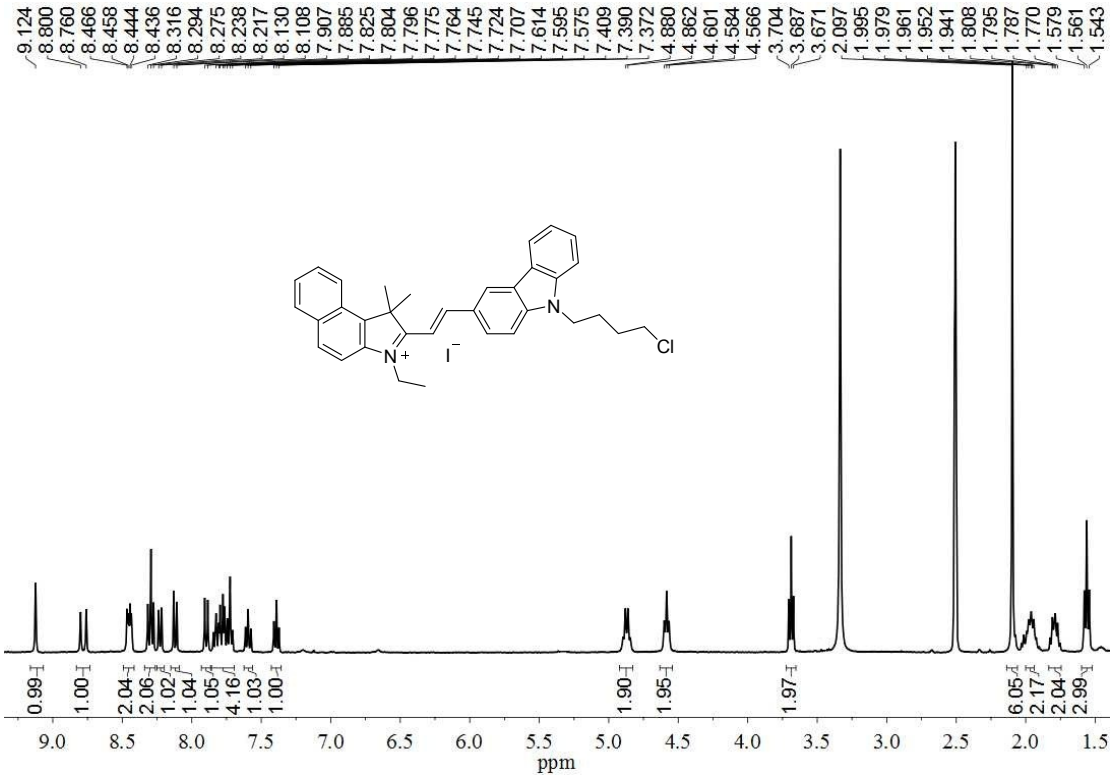

Fig. S7 ^{1}H NMR spectrum of compound **CZBI** in DMSO-d_6 (400 MHz).

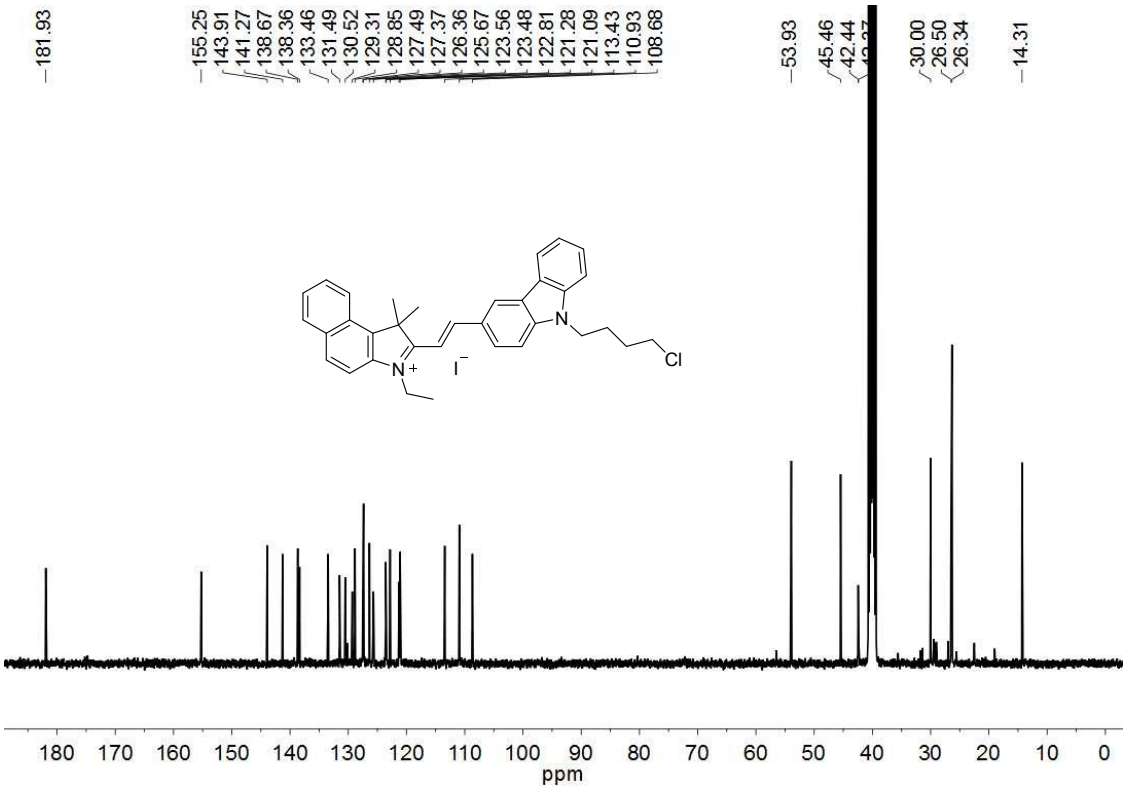

Fig. S8 ^{13}C NMR spectrum of **CZBI** in DMSO-d_6 (100 MHz).

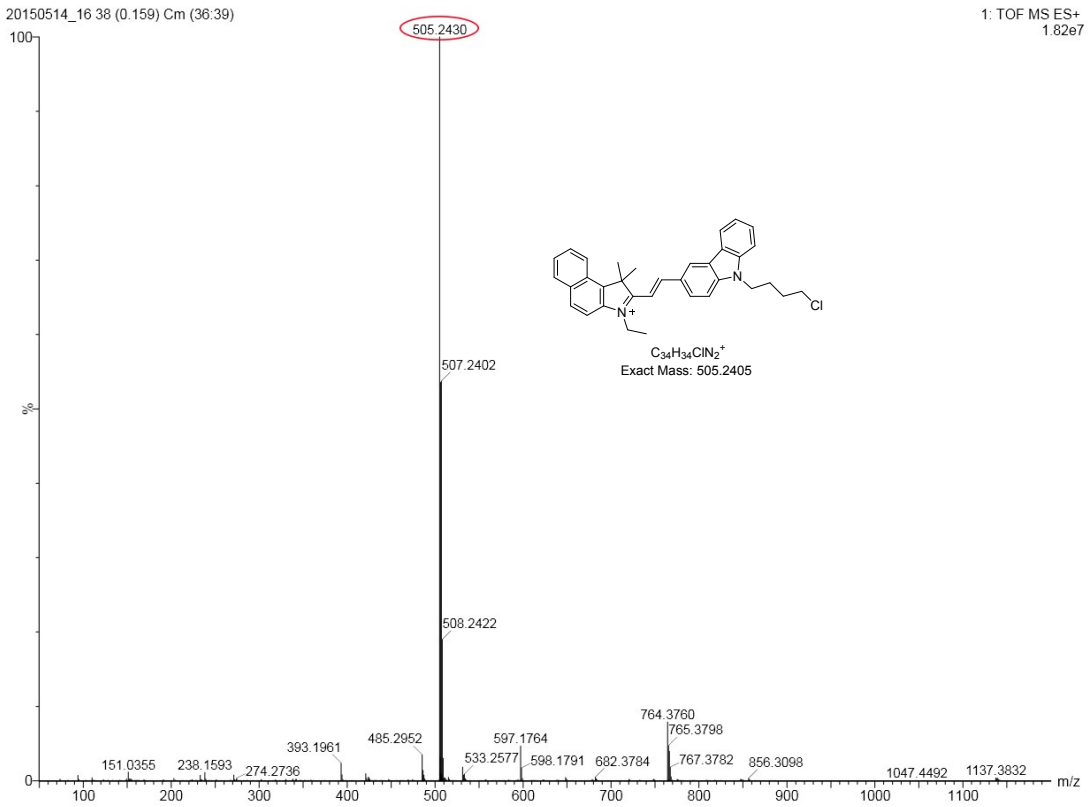

Fig. S9 HR-MS spectrum of **CZBI**.

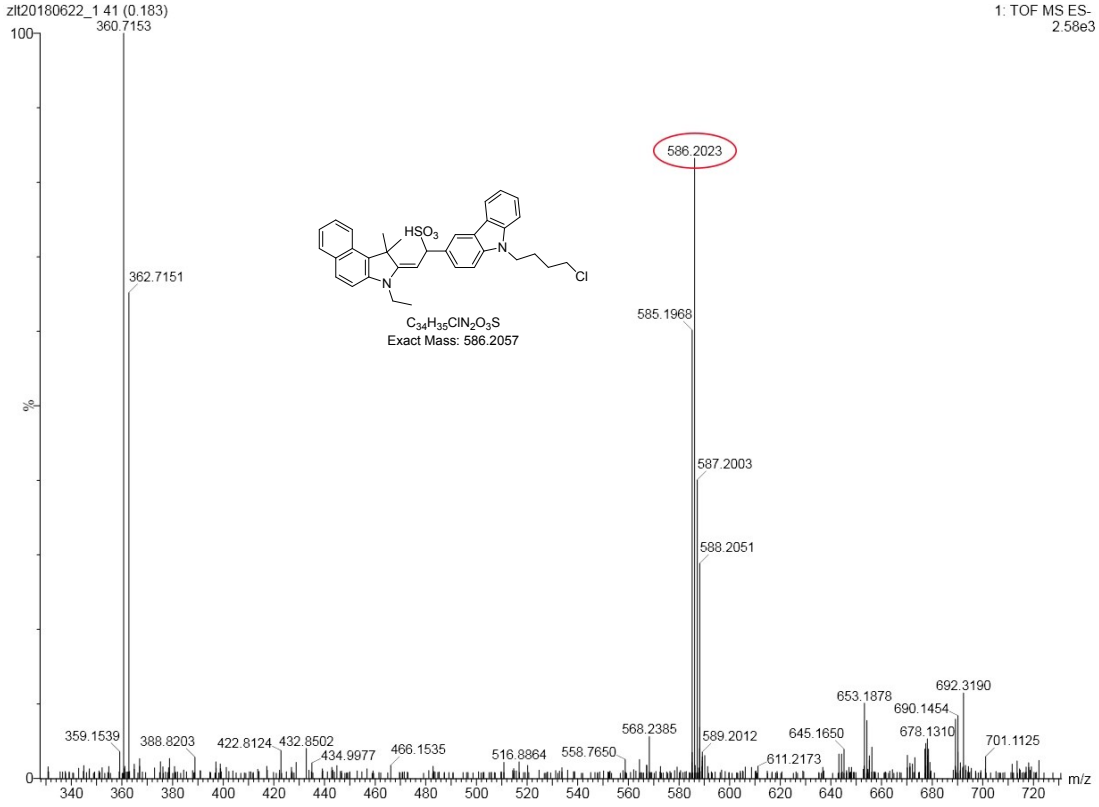

Fig. S10 HR-MS spectrum of **CZBI-HSO_3**.