

A turn-on fluorescent probe based on indolizine for detection of sulfite

Renle Cui,¹ Yunlong Gao,² Haiyan Ge,¹ Guowei Shi,¹ Yongchao Li,¹ Hao Liu,¹ Chuanjun Ma,¹ Yanqing Ge,^{1*} Caihong Liu^{1*}

¹Department of Chemistry and Pharmaceutical Engineering, Shandong First Medical University, Shandong Academy of Medical Sciences, Taian, Shandong 271016, P. R. China.

²Center for disease control and prevention, Weifang binhai economic and technological development zone, Weifang, Shandong, P. R. China.

geyanqing2016@126.com (Y. Ge); liuch7688@163.com (C. Liu)

Table of Contents:

Fig. S1 L Fluorescence intensity changes (I_{458}) of **CRL-1** (10 μ M) upon gradual addition of SO_3^{2-} .

Fig. S2 Fluorescence spectra of **CRL-1** with other ions.

Fig. S3 UV absorption spectra of **CRL-1** in different solvents.

Fig. S4 Fluorescence emission spectra of **CRL-1** in different solvents.

Fig. S5 ^1H NMR spectrum of compound **1**.

Fig. S6 ^1H NMR spectrum of probe **CRL-1**.

Fig. S7 ^{13}C NMR spectrum of probe **CRL-1**.

Fig. S8 Comparison of the ^1H NMR spectrum of the probe and the probe with SO_3^{2-} .

Fig. S9 HRMS spectra of **CRL-1**.

Fig. S10 HRMS spectra of **CRL-1** in the presence of SO_3^{2-} .

Table 1. Comparison of fluorescent probes for aldehyde group detection of SO_3^{2-} .

Table 2. Hygroscopic test of **CRL-1**.

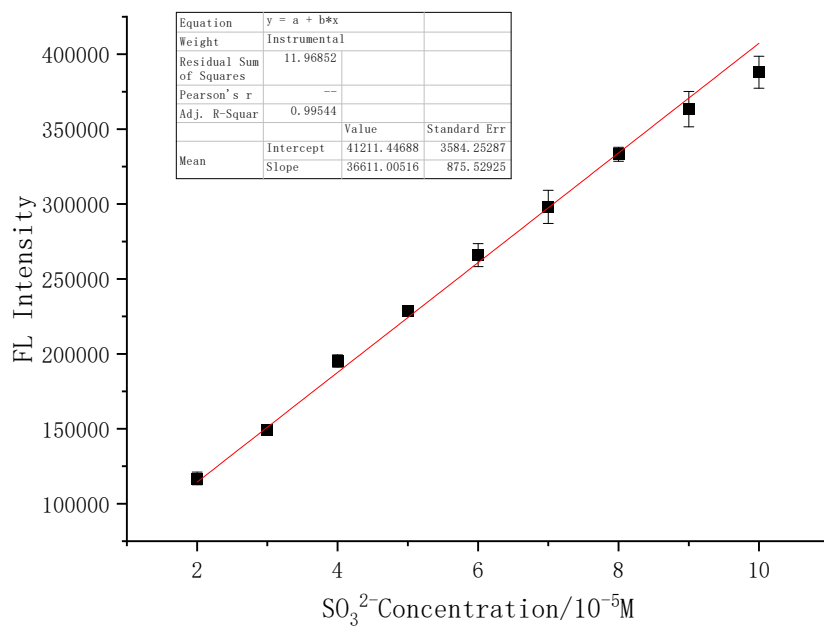


Fig. S1 L Fluorescence intensity changes (I_{458}) of **CRL-1** (10 μ M) upon gradual addition of SO_3^{2-} .

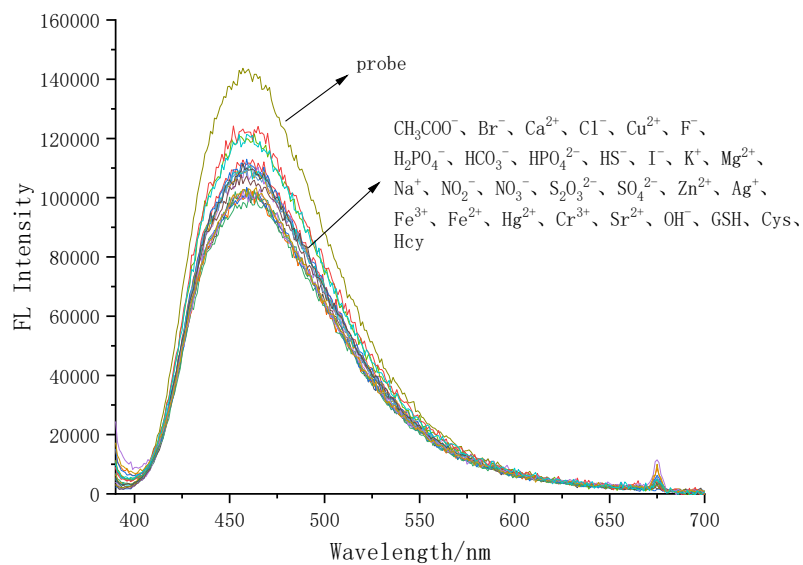


Fig. S2 Fluorescence spectra of **CRL-1** with other ions in DMSO/PBS=3/7 (pH = 7.4, λ_{ex} = 380 nm, slit:

2 nm/2 nm)

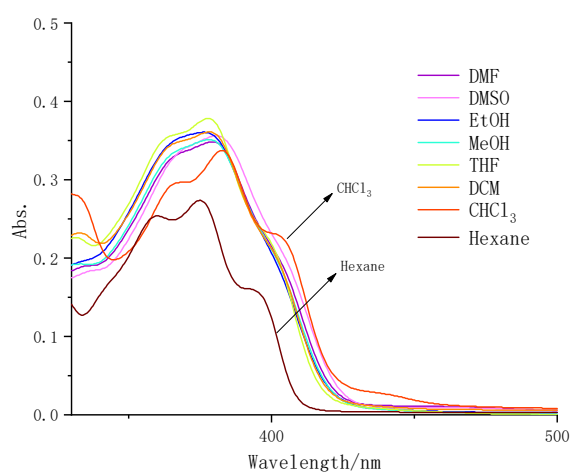


Fig. S3 UV absorption spectra of **CRL-1** in different solvents.

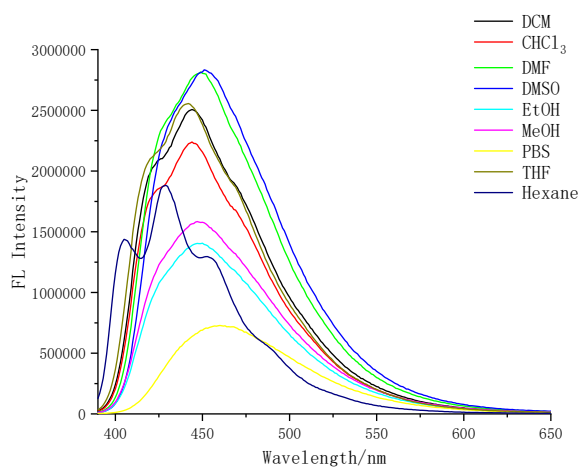


Fig. S4 Fluorescence emission spectra of **CRL-1** in different solvents.

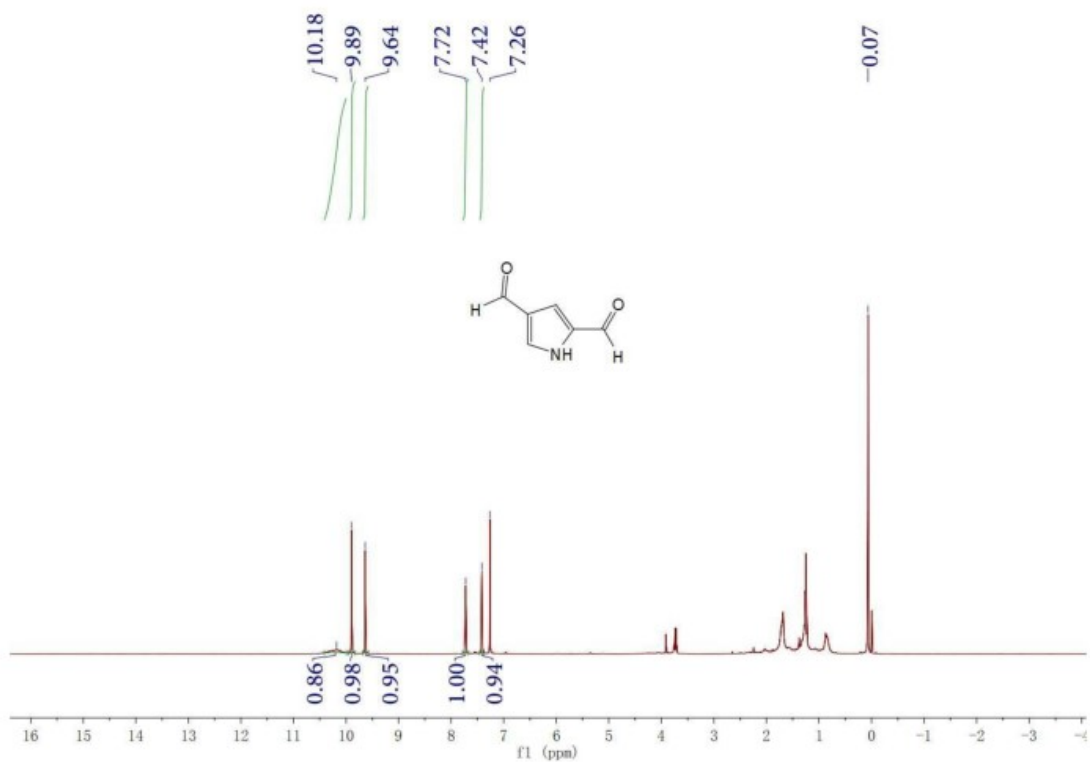


Fig. S5 ¹H NMR spectrum of **compound 1**.

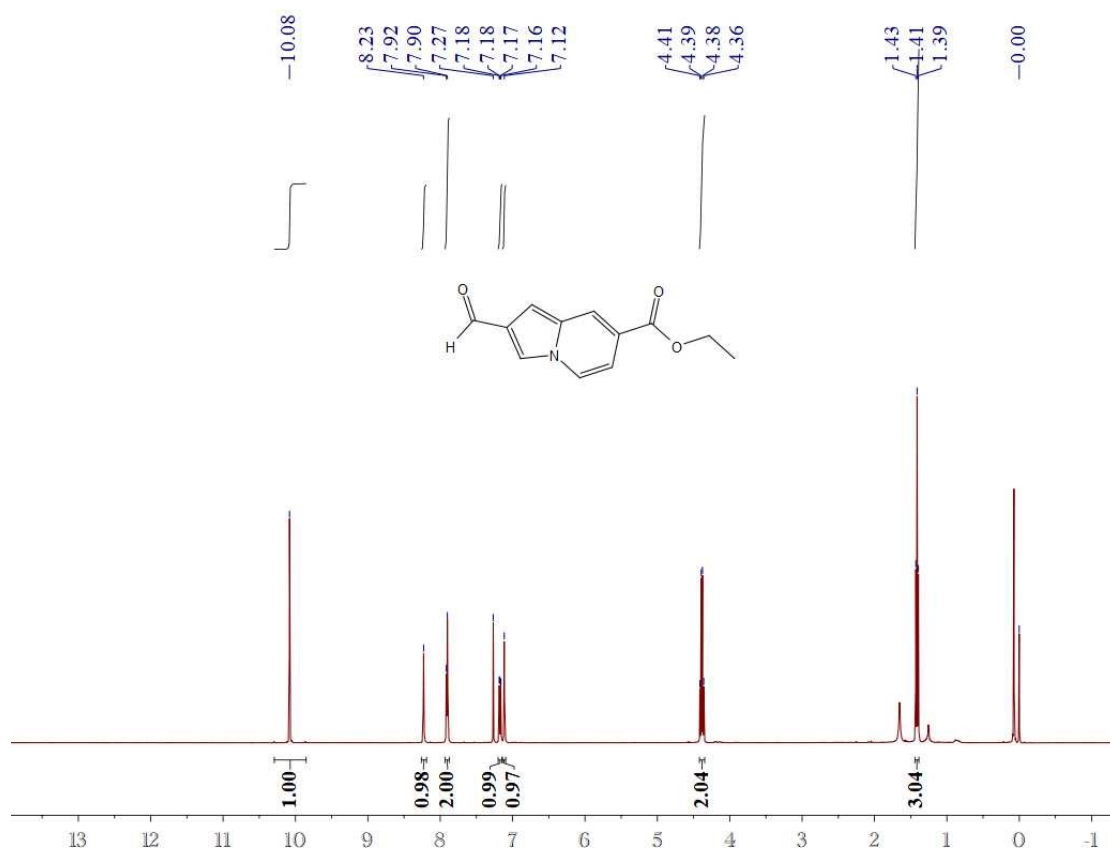


Fig. S6 ¹H NMR spectrum of probe **CRL-1**.

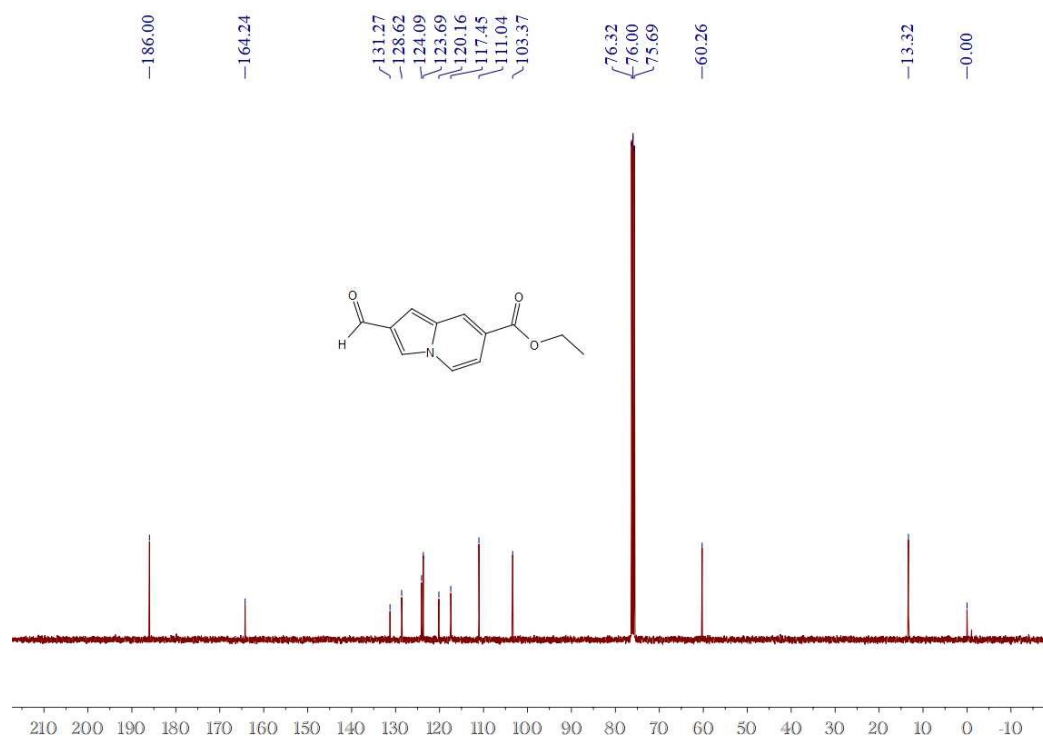


Fig. S7 ¹³C NMR spectrum of probe CRL-1.

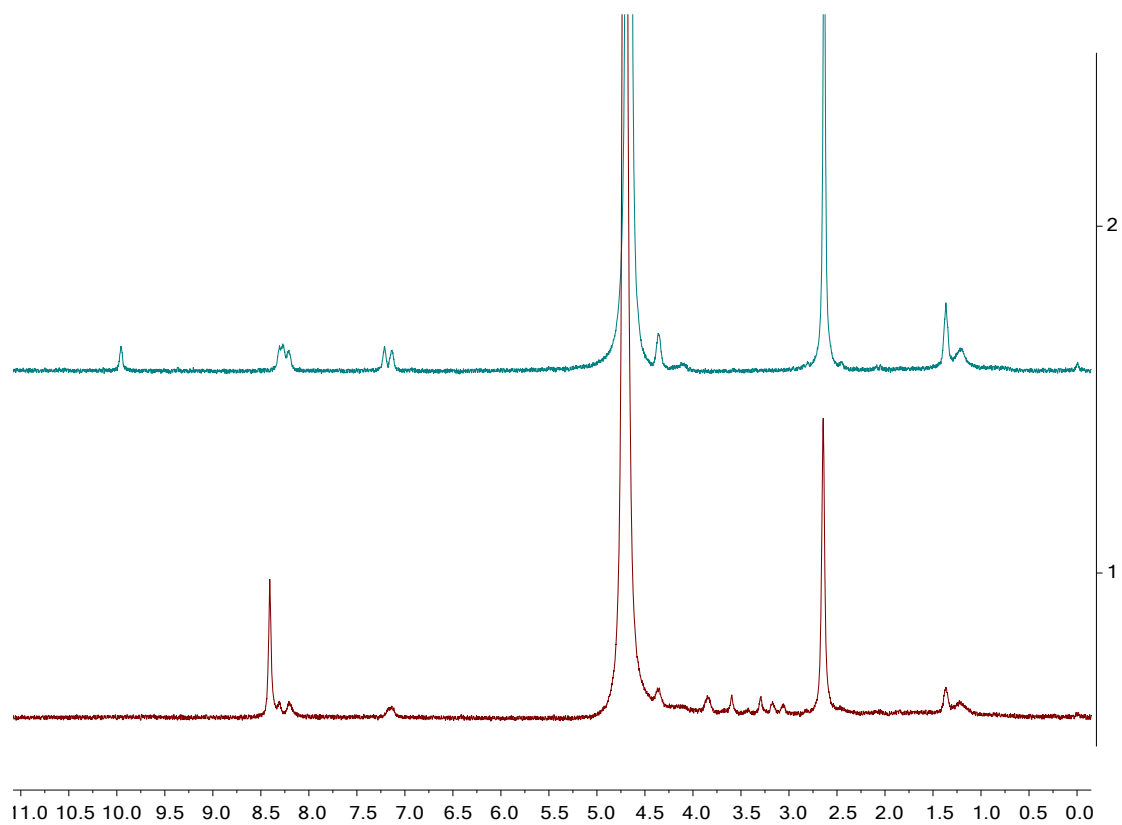


Fig. S8 Comparison of the ¹H NMR spectrum of the probe and the probe with SO_3^{2-} .

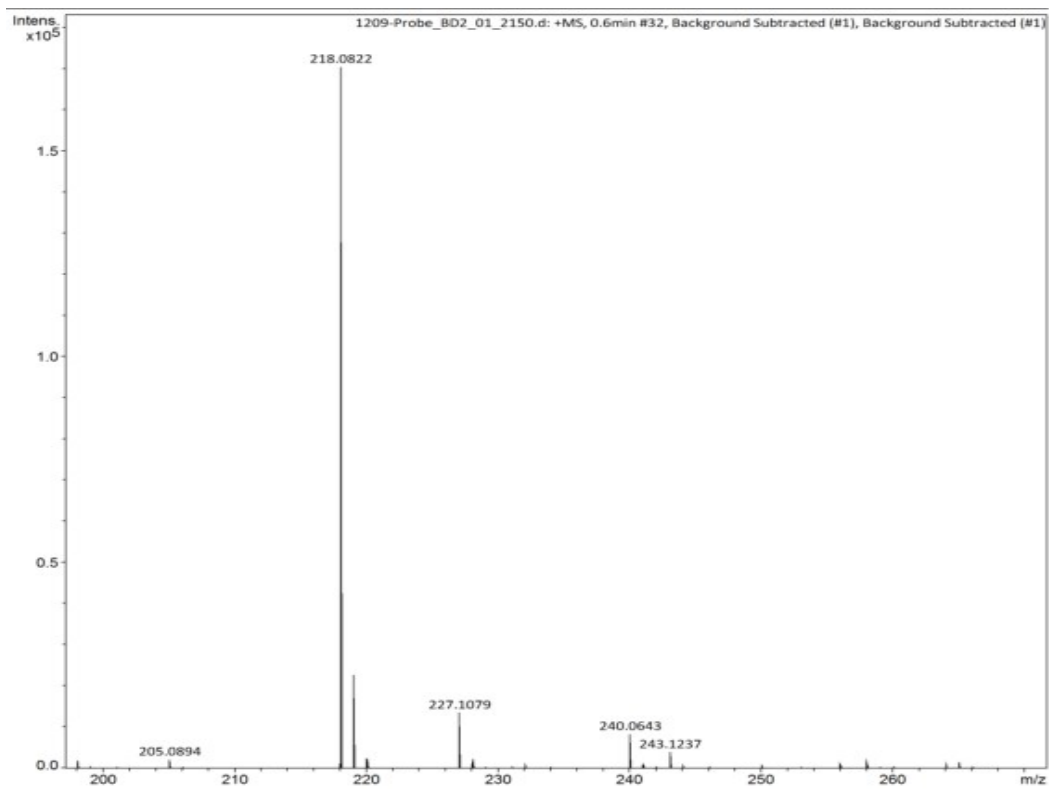


Fig. S9 HRMS spectra of CRL-1([M+H]⁺ :218.0817)

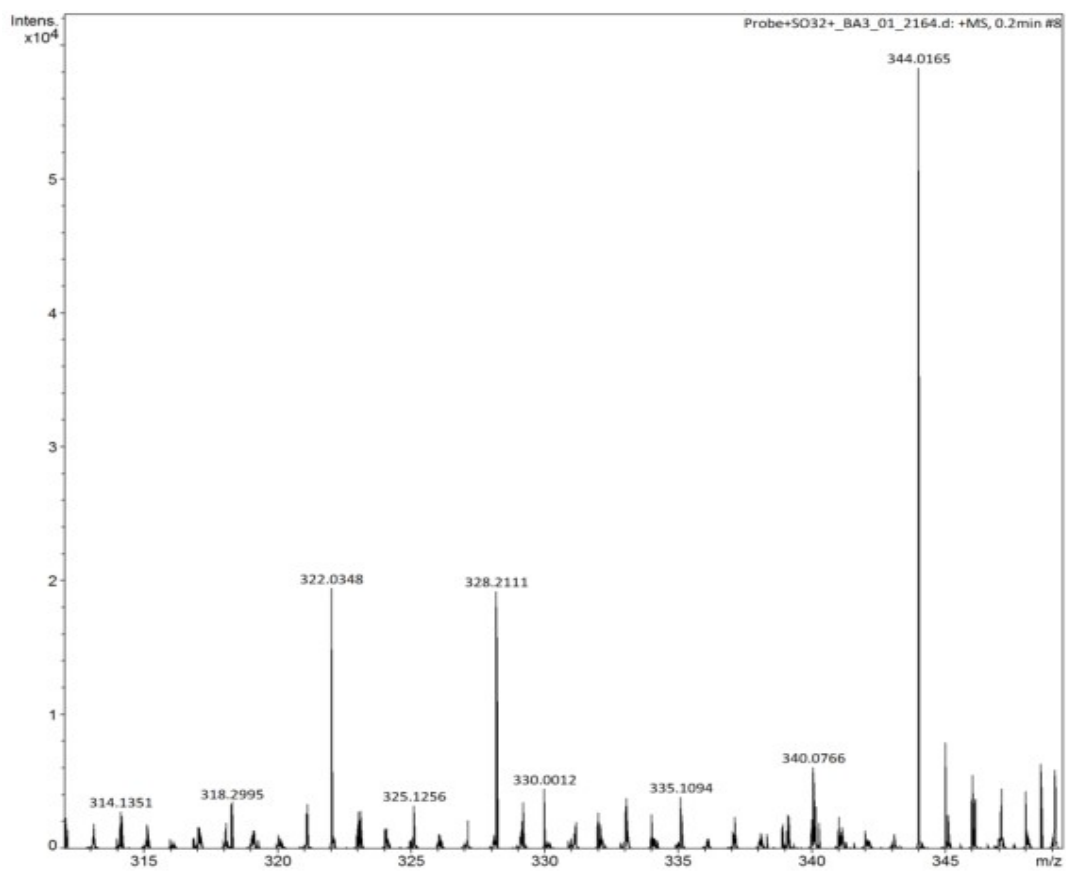
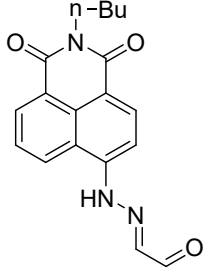
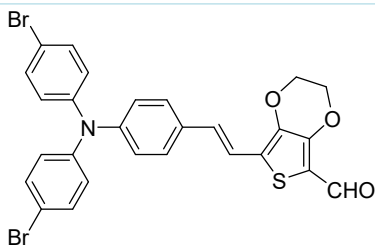
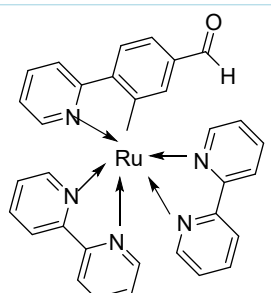
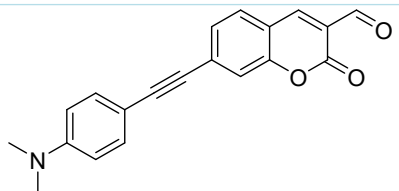
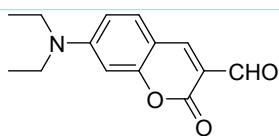
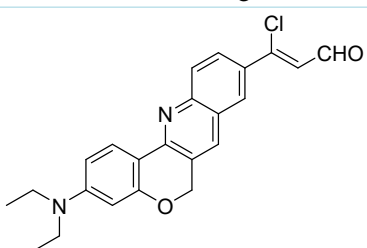
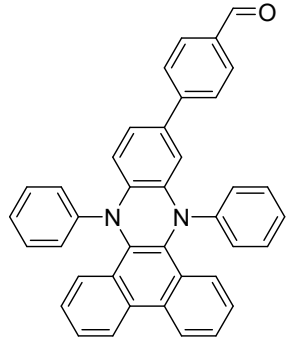
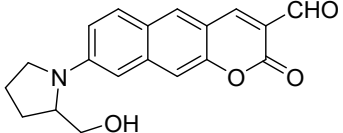
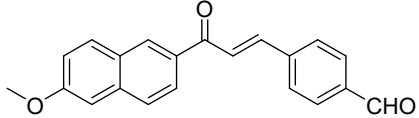
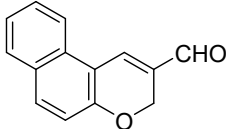
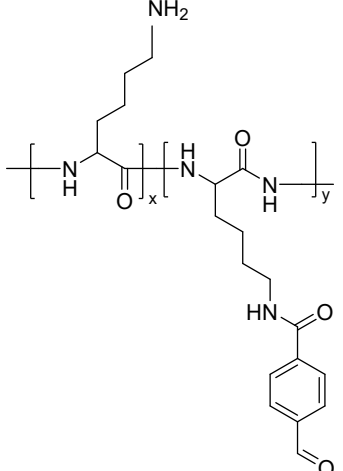
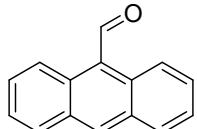
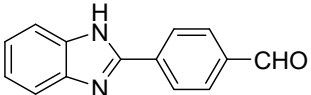
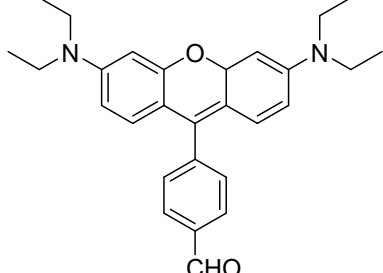


Fig. S10 HRMS spectra of CRL-1 in the presence of Na₂SO₃([M+Na]⁺ :344.0181)

Table 1. Comparison of fluorescent probes for aldehyde group detection of SO_3^{2-}

Probe	Solvent	Detection limit	Response time	Ref.
	DMSO/acetate=1/1	100 μM	5min	1
	THF/H ₂ O = 8/2	0.9 μM	10min	2
	EtOH H ₂ O = 1/99	2.73 μM	4h	3
	aqueous/DMSO=99/1	13.8 μM	2min	4
	THF/H ₂ O=1/99	3.0 μM	2min	5
	DMSO/H ₂ O = 2/8	0.016 μM	5s	6

	DMSO/H ₂ O =7/3	0.071μM	6min	7
	DMSO/H ₂ O =99/1	0.08μM	30s	8
	DMSO/H ₂ O = 1/1	43.0μM	200s	9
	DMSO/H ₂ O=0.5:99.5	0.2μM	80min	10
	H ₂ O	3.6μM	1min	11
	DMSO/H ₂ O=1:99	3.19μM	3min	12
	EtOH H ₂ O =2/8	0.4μM	5min	13
	Tris-HCl	0.07μM	2min	14

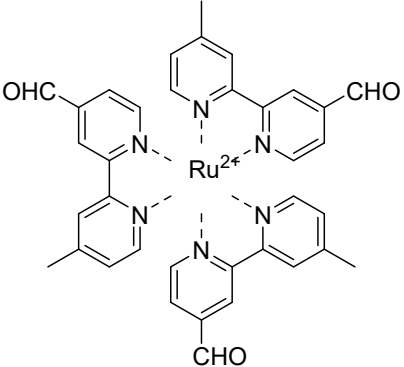
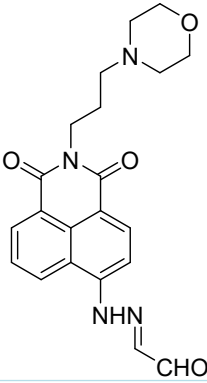
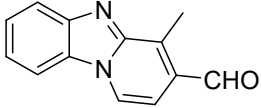
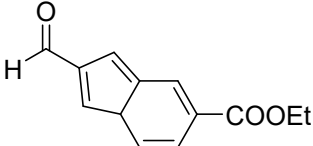
	H ₂ O	0.52 μM	60s	15
	H ₂ O	330μM	30s	16
	DMSO/H ₂ O=1:1	0.076μM	30s	17
	DMSO/H ₂ O=3:7	0.81μM	20s	This work

Table 2. hygroscopic test of CRL-1.

Project	The first time			The second time (two weeks later)		
	1	2	3	1	2	3
Pre-test weight	0.510	0.520	0.525	0.510	0.520	0.525
After testing weight	0.505	0.515	0.520	0.500	0.510	0.520
Moisture content	0.98%	0.96%	0.95%	0.99%	0.96%	0.95%
Average moisture content	0.963%			0.966%		

References

1. Y. Q. Sun, P. Wang, J. Liu, J. Y. Zhang and W. Guo, *Analyst.*, 2012, **137**, 3430-3433.
2. X. H. Cheng, P. He, Z. C. Zhong and G. J. Liang, *Luminescence.*, 2016, **31**, 1372-1378.
3. X. L. Su, X. H. Li, T. T. Ding, G. L. Zheng and Z. Q. Liu, *J. Organomet. Chem.*, 2015, **781**, 59-64.
4. S. L. Yu, X. L. Yang, Z. L. Shao, Y. Feng, X. G. Xi, R. Shao, Q. X. Guo and X. M. Meng, *Sens. Actuators, B*, 2016, **235**, 362-369.
5. X. H. Cheng, H. Z. Ji, J. Feng, J. G. Qin and Z. Li, *J. Mater. Chem. B*, 2013, **1**, 4110-

- 4114.
6. F. Y. Cai, B. Hou, S. P. Zhang, H. Chen, S. C. Ji, X. C. Shen and H. Liang, *J. Mater. Chem. B*, 2019, **7**, 2493-2498.
 7. Y. R. Li, L. J. Shi, Y. Y. Zhang, G. C. Sun, L. Sun and J. H. Su, *Dyes Pigm.*, 2019, **160**, 794-798.
 8. U. Tamima, S. Singha, H. R. Kim, Y. J. Reo, Y. W. Jun, A. Das and K. H. Ahn, *Sens. Actuators, B*, 2018, **277**, 576-583.
 9. X. Guo, L. L. Xia, J. X. Huang, Y. M. Wang, Y. Q. Gu and P. Wang, *RSC Adv.*, 2018, **8**, 21047-21053.
 10. B. B. Wang, M. X. Lv, W. N. Wu, Z. H. Xu, Y. C. Fan, L. Y. Bian and Y. Wang, *J. Photoch. Photobio. A*, 2021, **411**, 113193.
 11. H. F. Xie, F. Zeng, C. M. Yu and S. Z. Wu, *Polym. Chem.*, 2013, **4**, 5416.
 12. H. F. Xie, X. H. Jiang, F. Zeng, C. M. Yu and S. Z. Wu, *Sens. Actuators, B*, 2014, **203**, 504-510.
 13. G. Wang, H. P. Qi and X. F. Yang, *Luminescence.*, 2013, **28**, 97-101.
 14. D. Zhang, W. Y. Liu, K. K. Chen, J. Y. Cheng, Y. F. Zhao and Y. Ye, *RSC Adv.*, 2016, **6**, 103905-103909.
 15. W. Z. Zhang, H. Liu, F. Y. Zhang, Y. L. Wang, B. Song, R. Zhang and J. L. Yuan, *Microchem. J.*, 2018, **141**, 181-187.
 16. F. J. Huo, Q. Wu, C. X. Yin, W. J. Zhang and Y. B. Zhang, *Spectrochim. Acta. A*, 2019, **214**, 429-435.
 17. L. J. Zhang, Z. Y. Wang, X. J. Cao, J. T. Liu and B. X. Zhao, *Sens. Actuators, B*, 2016, **236**, 741-748.