A FRET based ratiometric fluorescent probe for detection of sulfite in food

Gongxiao Zhang,[a,1] Ruixue Ji,[a,1] Xiangyu Kong,[a,1] Fujiao Ning,[a,1] Aikun Liu,[a] Jichun Cui,[b] Yanqing Ge[a,*]

[a]*School of Chemistry and Pharmaceutical Engineering, Taishan Medical University, Taian, Shandong 271016, P. R. China.*

[b]*School of Chemistry and chemical Engineering, Liaocheng University, Liaocheng, Shandong 252000, P. R. China.*

[1] equal contribution

Corresponding Author: Yanqing Ge

E-mail address: geyanqing2016@126.com

Tel.: +86-538-6229741; Fax: +86-538-6229741

Table of Content:

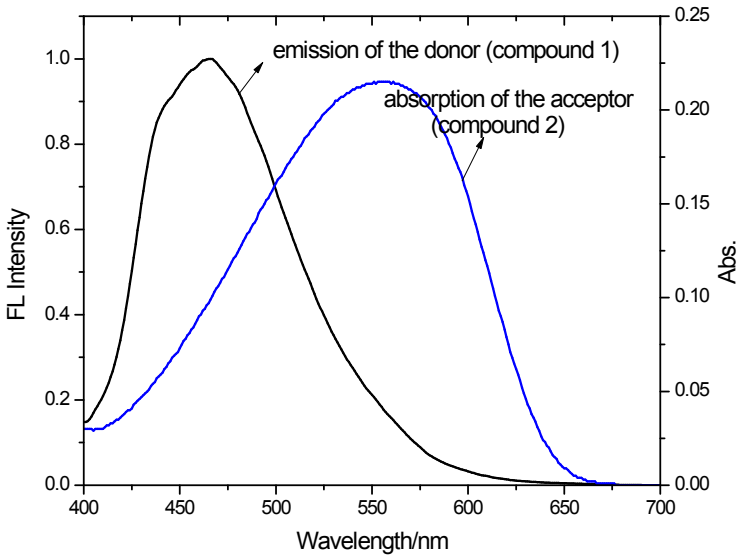


Fig. S1 Normalized emission spectra of donor (compound 1, black line) and normalized absorption spectra of acceptor (compound 2, blue line) Condition: donor, 5 μM, acceptor, 5 μM, Condition: DMF-PBS buffer solution (3/7, v/v, pH = 7.20). (λ_{ex} = 380 nm, slit = 10 nm/10 nm).

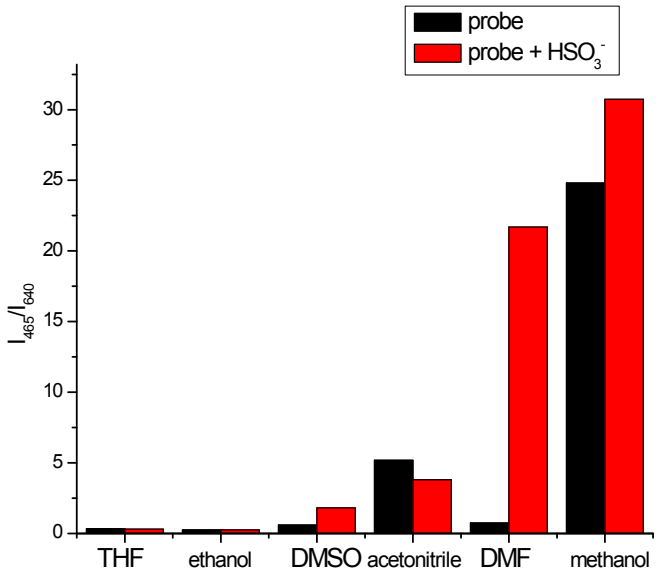


Fig. S2 The FL intensity ratio (I_{465}/I_{640}) of the probe with and without HSO_3^- in different solvent. The black line is the probe (5 μM) and the red line is probe (5 μM)

after addition of HSO_3^- (30 eq.) Condition: λ_{ex} = 380 nm, slit = 10 nm/10 nm

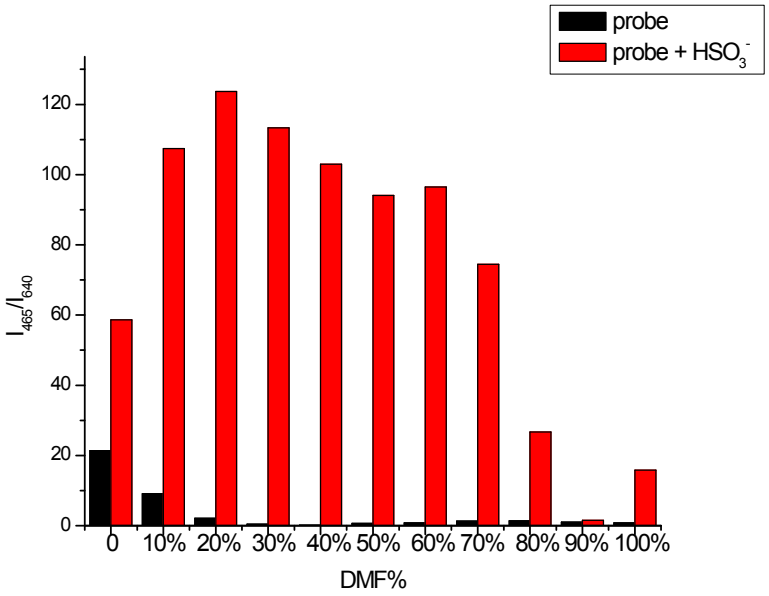


Fig. S3 The effect of water (PBS buffer solution, pH = 7.20) content on fluorescence spectra. The black line is the probe (5 μM) and the red line is probe (5 μM) after addition of HSO_3^- (30 eq.) Condition: λ_{ex} = 380 nm, slit = 10 nm/10 nm

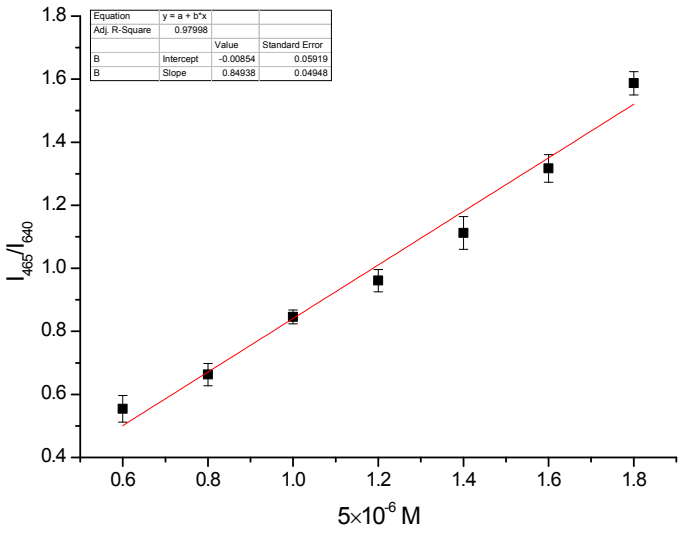


Fig. S4 Fluorescence intensity ratio changes (I_{640}/I_{465}) of probe (5 μM) upon gradual addition of HSO_3^- in DMF-PBS buffer solution (3/7, v/v, pH = 7.20) (λ_{ex} = 380 nm, slit = 10 nm/10 nm).

The results were presented as means ± SE with replicates n = 5.

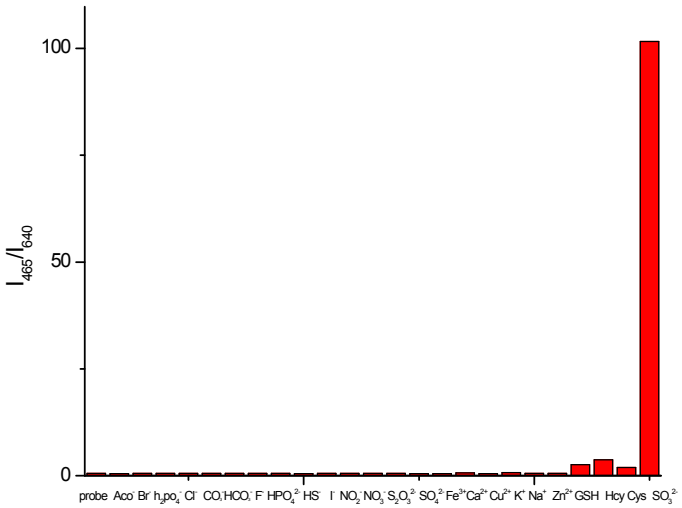


Fig. S5 Fluorescent intensity ratio changes at 465 nm and 640 nm (I_{465}/I_{640}) for each analyte(150 μM, probe **PBI-S** (5 μM), λ_{ex} = 380 nm, silt = 10 nm/10 nm).

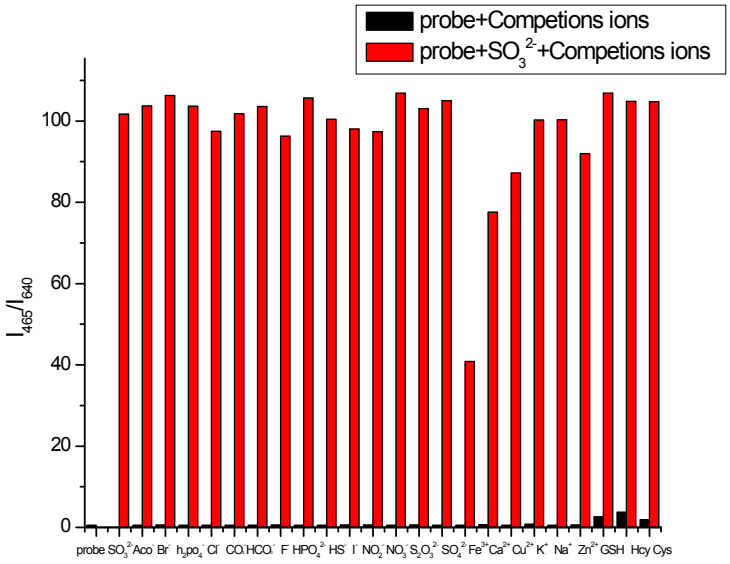


Fig. S6 The selectivity of probe **PBI-S** (5 μM) in DMF-PBS buffer solution (3/7, v/v, pH = 7.20). The black bars represent the fluorescence emission ratio of **PBI-S** and 30 equiv. of different anions (150 μM). The red bars show the ratio after the addition of 30 equiv. of HSO_3^- to the solution containing probe and different anions (150 μM).

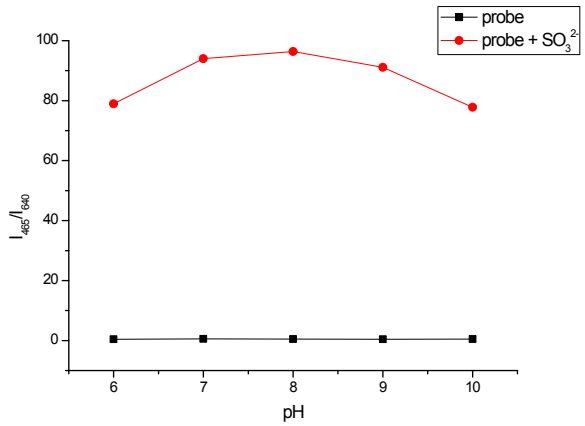


Fig. S7 The ratiometric fluorescence responses (I_{465}/I_{640}) of free probe (5 μM) and in the presence of 50 equiv of SO_3^{2-} in DMF-PBS buffer solution (3/7, v/v) solution with different pH conditions (λ_{ex}= 380 nm, slit = 10 nm/10 nm).

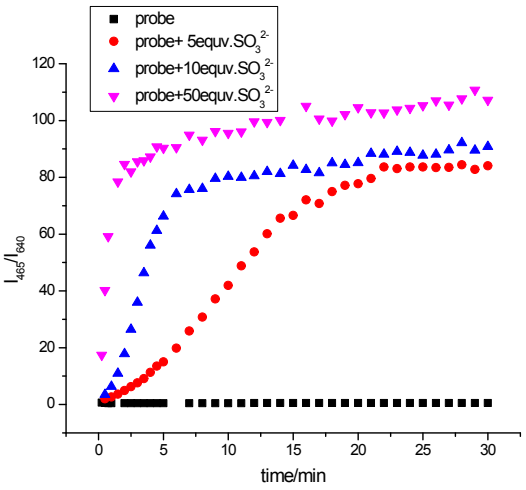


Fig. S8 Time dependent increase of probe (5 μM) fluorescence intensities after addition of various amounts of SO_3^{2-} in DMF-PBS buffer solution (3/7, v/v, pH = 7.20, λ_{ex}= 380 nm,slit = 10 nm/10 nm).

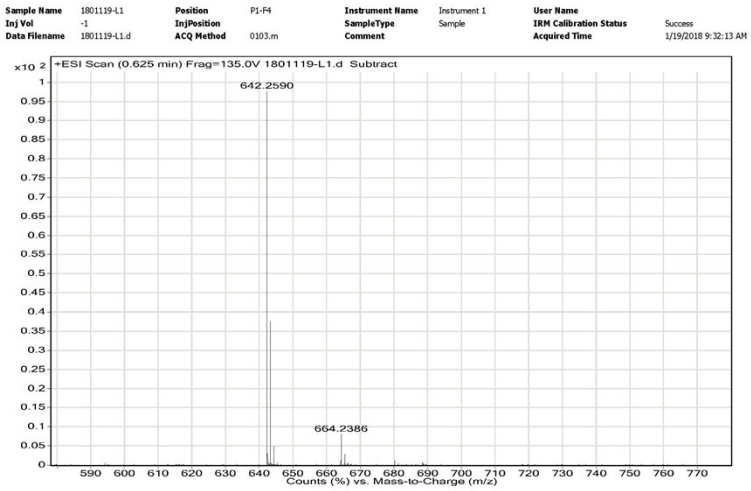


Fig. S9 HRMS of probe **PBI-S**.

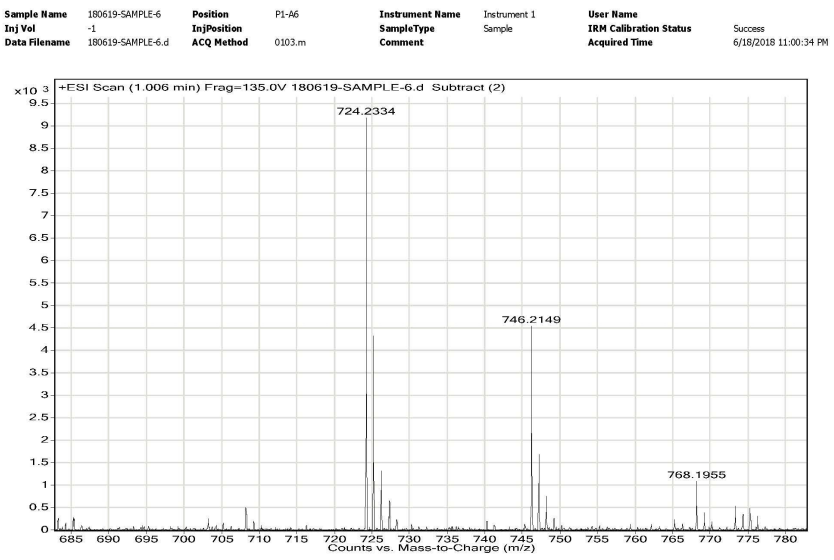


Fig. S10 HRMS of probe **PBI-S** after addition of $NaHSO_3$.

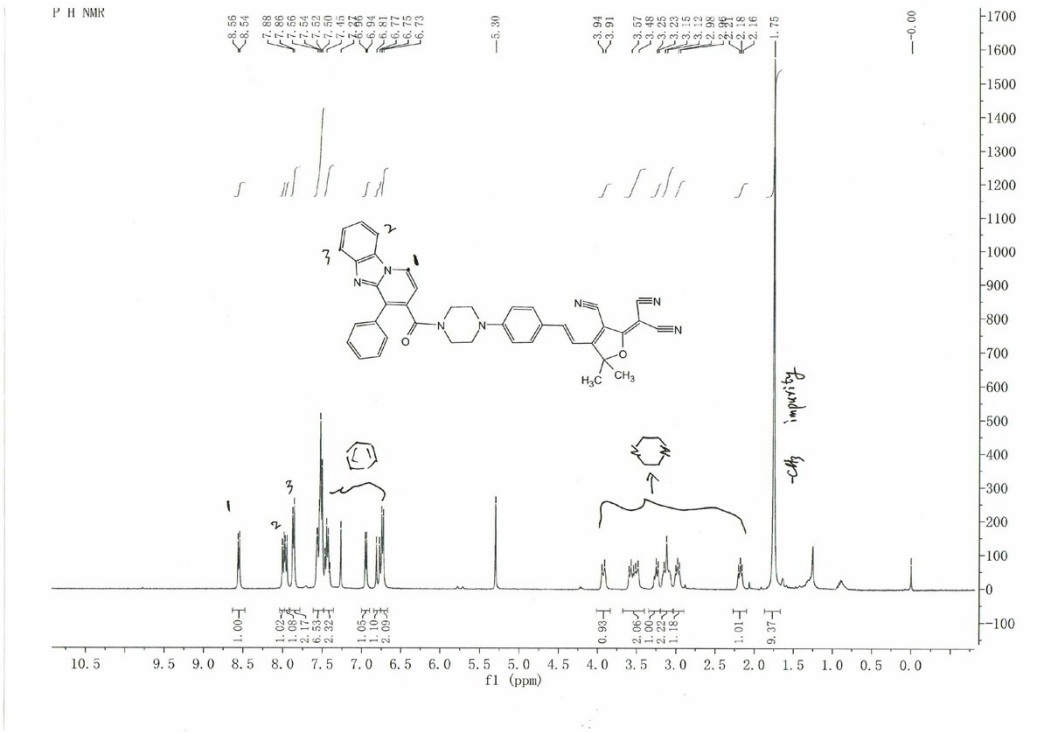


Fig. S11 ^{1}H NMR spectrum of probe **PBI-S.**

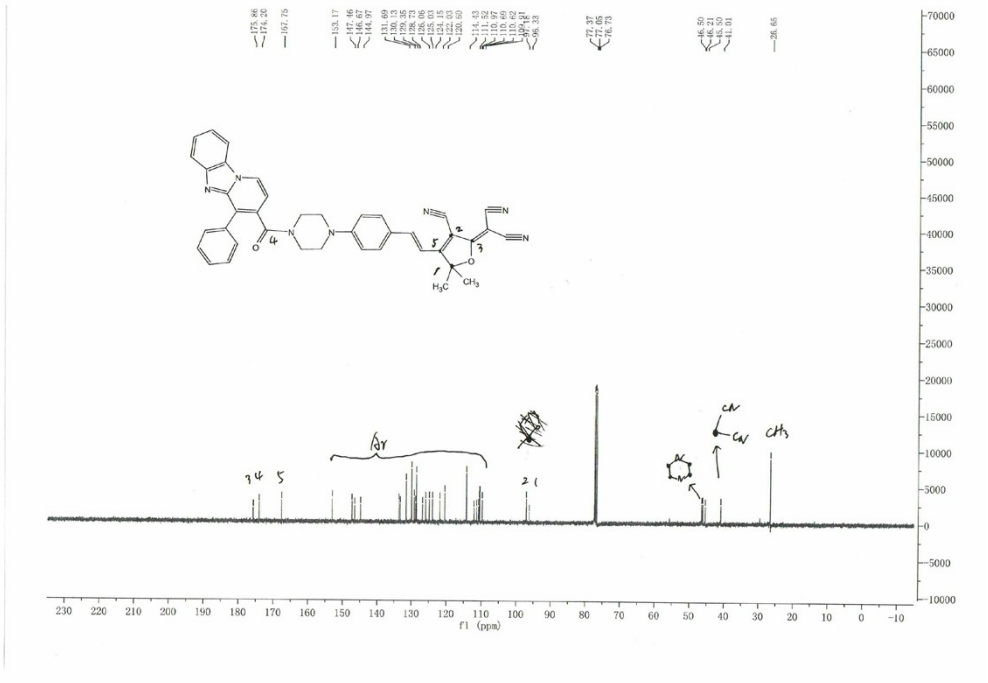
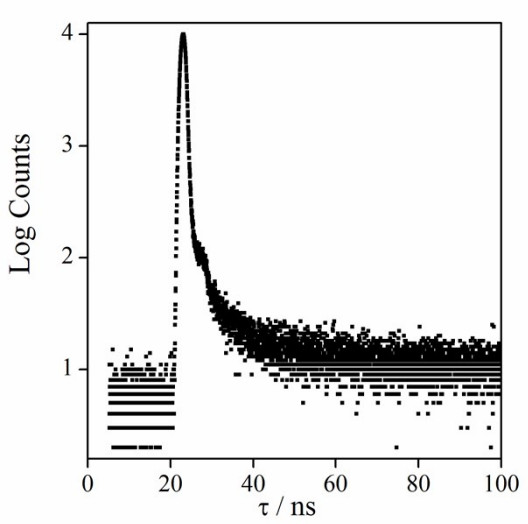


Fig. S12 ^{13}C NMR spectrum of probe **PBI-S**.

Table S1. The detection of sugar samples by titration method

Sample	This method(mg/kg)	Titration method(mg/kg)
Crytal sugar	0.79	0.82
Granulated sugar	1.52	1.65
Soft sugar	0.96	1.02

Fluorescence quantum yields in C_2H_5OH were determined (φ = 0.41) by a comparative method, using Rhodamine B (purchased from Sigma-Aldrich) as a standard sample with φ = 0.97 as the reference.



The fluorescence lifetime of the probe

τ_1 = 0.34 ns(68.8%), τ_2 = 3.58 ns(31.2%). CHISQ= 1.20. The luminescence lifetime studies were conducted with a HORIBA Jobin Yvon Fluorolog-3 spectro-fluorometer fitted with a time-correlated single photon counting detector and a NanoLED pulsed laser diode excitation source (370 nm).