A New Fluorescent Boronic Acid Sensor Based on Carbazole for Glucose Sensing via Aggregation-Induced Emission

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1. Experimental

1.2. Fluorescent measurements

The fluorescence intensity changes of CPBA were monitored at 367 nm and 517 nm (λ_ex = 260 nm) for the monomer and the excimer emission, respectively. pH titration was performed using acetate buffer (4.0-5.5),¹ phosphate buffer (6.0-8.0),² and carbonate buffer (8.5-10.0)³ with the pH control by the minimum amount of sodium hydroxide and hydrochloric acid solutions. The monosaccharide titration was performed in carbonate buffer at pH 9.5. First, solutions of CPBA (0.05 mM) and saccharide (various concentrations) were prepared. Then, 1.5 ml of the CPBA solution and 1.5 ml of each saccharide solution were transferred to the measurement cell, and the fluorescence spectra were obtained after 25 minutes.

Figure S1. Fluorescent emission of CPBA (0.05 m) in the presence of different concentrations of monosaccharides (5 mM) in distilled water with pH = 6.5 and λ_ex = 260 nm.
Figure S2. Fluorescent emission of a) CPBA (0.05 m) and CPBA (0.05 m) in the presence of b) fructose and c) glucose (5 mM) in different pH and $\lambda_{\text{ex}} = 260$ nm.

Figure S3. Fluorescent titration of CPBA (0.01 mM to 2 mM) in the presence of 5 mM Glucose in carbonate buffer with pH = 9.5 and $\lambda_{\text{ex}} = 260$ nm.
Figure S4. Fluorescent emission of CPBA (0.05 mM) at 367 and 517 nm in the presence of different concentrations of a) fructose, b) glucose, c) galactose, and d) mannose (0-10 mM) in carbonate buffer with pH = 9.5 and $\lambda_{ex} = 260$ nm after 25 min.

Figure S5. Fluorescence intensity of CPBA in carbonate buffer at pH 9.5 with respect to saccharides (patterned bars) or glucose with other saccharide interference (solid bars).
Figure S6. Job’s plots for CPBA (0.05 mM) in the presence of glucose (a) and fructose (b) in carbonate buffer with pH = 9.5 and $\lambda_{ex} = 260$ nm.

Figure S7. Relative fluorescence intensity of CPBA (0.05 mM) a) at 517 nm versus glucose concentration (points) and fitting (line) under a 2:1 stoichiometry of sensor to glucose and b) at 367 nm versus fructose concentration (points) and fitting (line) under a 1:1 stoichiometry of sensor to fructose in carbonate buffer with pH = 9.5 and $\lambda_{ex} = 260$ nm after 25 min.
Figure S8. Fluorescent emission at 367 nm of a) CPBA (0.05 mM) b) CPBA (0.05 mM) in the presence of 5 mM glucose in solvents (polarity): THF (0.207), DMF (0.386), MeCN (0.460), and MeOH (0.762) from 10% to 50% in carbonate buffer with pH = 9.5 and $\lambda_{ex} = 260$ nm.

1.3. UV-Vis titration experiment

The UV-Vis titration of CPBA with glucose was performed in carbonate buffer at pH 9.5. Different concentrations of glucose (2, 2.5, 3, 3.5, 4, 4.5, and 5 mM) were prepared, then 1.5 ml of CPBA (0.05 mM) and 1.5 ml of each glucose solution were mixed.

Figure S9. UV-visible titration of CPBA (0.05 mM) in the presence of different concentrations of glucose (40-100 eq) in carbonate buffer at pH = 9.5 and after 25 min.
Figure S10. Fluorescent emission of CPBA (0.05 m) in the presence of different concentrations of Mannitol (0-10 mM) in carbonate buffer with pH = 9.5 and λ_{ex} = 260 nm after 25 min.

^{1}H NMR (400 MHz, CDCl$_3$) of BBC
$^1$H NMR (400 MHz, CD$_3$OD) of PBA

$^1$H NMR (400 MHz, D$_2$O) of CPBA
$^{13}$C NMR (100 MHz, D$_2$O) of CPBA

FT-IR spectrum of CPBA
2. References

