Electronic Supplementary Information

Water-soluble diboronic acid-based fluorescent sensors recognizing D-sorbitol

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UV-vis absorption spectra of sensor 1, 2 and 15c

Fig. S1 UV-vis absorption spectra of sensor 1, 2 and 15c DMSO/PBS (pH 9, 0.1M) solution (1:99, v/v), at room temperature.
Fluorescence properties of sensors

Fig. S2 A) Fluorescence spectra of sensor 1 (1×10^{-5} M) in the presence of different concentrations of D-sorbitol in DMSO/PBS (pH 9, 0.1M) solution (1:99, v/v), at room temperature; B) The photograph of sensor 1 linear range. C) Benesi-Hildebrand plot of sensor 1/(I - I_0) versus 1/[D-sorbitol].

The calculation process of LOD:

\[
\begin{align*}
I &= 9545110c + 247.19996 \\
R^2 &= 0.98522 \\
S &= 9545110 \\
\delta &= \sqrt{\frac{\Sigma(F_i - F_0)^2}{N - 1}} = 4.87 \text{ (N=5)} \text{ K=3} \\
\text{LOD} &= K \times \delta / S = 1.53 \times 10^{-6} \text{ M}
\end{align*}
\]

Fig. S3 A) Fluorescence spectra of sensor 15a (1×10^{-5} M) in the presence of different concentrations of D-sorbitol in DMSO/PBS (pH 9, 0.1M) solution (1:99, v/v), at room temperature; B) The photograph of sensor 15a linear range. C) Benesi-Hildebrand plot of sensor 15a1/(I - I_0) versus 1/[D-sorbitol].

The calculation process of LOD:

\[
\begin{align*}
I &= 18502600c + 482.6485 \\
R^2 &= 0.9763 \\
S &= 18502600 \\
\delta &= \sqrt{\frac{\Sigma(F_i - F_0)^2}{N - 1}} = 5.02 \text{ (N=5)} \text{ K=3} \\
\text{LOD} &= K \times \delta / S = 8.14 \times 10^{-7} \text{ M}
\end{align*}
\]
**Fig. S4** A) Fluorescence spectra of sensor 15b (1×10^{-5} M) in the presence of different concentrations of D-sorbitol in DMSO/PBS (pH 9, 0.1M) solution (1:99, v/v), at room temperature; B) The photograph of sensor 15b linear range. C) Benesi-Hildebrand plot of sensor 15b (1/(I - I_0) versus 1/[D-sorbitol]).

The calculation process of LOD:

\[ I = 17165000c + 442.93993 \]

\[ R^2 = 0.98234 \]

\[ S = 17165000 \]

\[ \delta = \sqrt{\frac{\sum (F_i - F_0)^2}{N - 1}} = 4.37 \text{ (N=5) } K=3 \]

LOD = K × δ/S = 7.64×10^{-7} M

**Fig. S5** A) Fluorescence spectra of sensor 15c (1×10^{-5} M) in the presence of different concentrations of D-sorbitol in DMSO/PBS (pH 9, 0.1M) solution (1:99, v/v), at room temperature; B) The photograph of sensor 15c linear range. C) Benesi-Hildebrand plot of sensor 15c (1/(I - I_0) versus 1/[D-sorbitol]).

The calculation process of LOD:

\[ I = 17508000c + 394.88005 \]

\[ R^2 = 0.98496 \]

\[ S = 17508000 \]

\[ \delta = \sqrt{\frac{\sum (F_i - F_0)^2}{N - 1}} = 4.03 \text{ (N=5) } K=3 \]

LOD = K × δ/S = 6.91×10^{-7} M
Fig. S6 A) Fluorescence spectra of sensor 15d (1×10^{-5} M) in the presence of different concentrations of D-sorbitol in DMSO/PBS (pH 9, 0.1M) solution (1:99, v/v), at room temperature; B) The photograph of sensor 15d linear range. C) Benesi-Hildebrand plot of sensor 15d I/(I - I₀) versus 1/[D-sorbitol].

The calculation process of LOD:

$$\text{LOD} = K \times \frac{\delta}{S} = 1.22 \times 10^{-6} \text{ M}$$

Fig. S7 A) Fluorescence spectra of sensor 15e (1×10^{-5} M) in the presence of different concentrations of D-sorbitol in DMSO/PBS (pH 9, 0.1M) solution (1:99, v/v), at room temperature; B) The photograph of sensor 15e linear range. C) Benesi-Hildebrand plot of sensor 15e I/(I - I₀) versus 1/[D-sorbitol].

The calculation process of LOD:

$$\text{LOD} = K \times \frac{\delta}{S} = 5.48 \times 10^{-7} \text{ M}$$
Fig. S8 Fluorescence spectra of sensor 2 (1×10^{-5} M) in the presence of different carbohydrates (from 0 to 13×10^{-5} M) in DMSO/PBS (pH 9, 0.1M) solution (1:99, v/v), at room temperature.
Fig. S9 Fluorescence spectra of sensor 1 (1×10^{-5} M) in the presence of different carbohydrates (from 0 to 13×10^{-5} M) in DMSO PBS (pH 9, 0.1M) solution (1:99, v/v), at room temperature.
**Fig. S10** Fluorescence spectra of sensor 15c (1×10^{-5} M) in the presence of different carbohydrates (from 0 to 13×10^{-5} M) in DMSO/PBS (pH 9, 0.1M) solution (1:99, v/v), at room temperature.

**Copies of NMR (^{1}H and ^{13}C) and HRMS spectra**

![NMR and HRMS spectra](image)

**Fig. S11** ^{1}H NMR spectrum of 2
Fig. S12 $^{13}$C NMR spectrum of 2

Fig. S13 HRMS spectrum of compound 2
Fig. S14 $^1$H NMR spectrum of 3

Fig. S15 $^{13}$C NMR spectrum of 3
Fig. S16 HRMS spectrum of compound 3

Fig. S17 $^1$H NMR spectrum of 15a
Fig. S18 $^{13}$C NMR spectrum of 15a

Fig. S19 HRMS spectrum of compound 15a
Fig. S20 $^1$H NMR spectrum of 15b

Fig. S21 $^{13}$C NMR spectrum of 15b
Fig. S22 HRMS spectrum of compound 15b

Fig. S23 $^1$H NMR spectrum of 15c
**Fig. S24** $^{13}$C NMR spectrum of 15c

**Fig. S25** HRMS spectrum of compound 15c
Fig. S26 $^1$H NMR spectrum of 15d

Fig. S27 $^{13}$C NMR spectrum of 15d
Fig. S28 HRMS spectrum of compound 15d

Fig. S29 $^1$H NMR spectrum of 15e
Fig. S30 $^{13}$C NMR spectrum of 15e

Fig. S31 HRMS spectrum of compound 15e