Supporting Information

Porphyrin-based multi-signal chemosensors for Pb\(^{2+}\) and Cu\(^{2+}\)

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**Figure S1.** $^1$H NMR (A) and $^{13}$C NMR spectra (B) of Porphyrin-1-DPA 1 in CDCl$_3$. * indicate the residual solvent signals.
Figure S2. (A) Experimental and (B) simulated isotopic pattern for molecular ion of porphyrin-1-DPA 1 shown in the MALDI-TOF mass spectrum, respectively.
Figure S3. $^1$H NMR (A) and $^{13}$C NMR spectra (B) of 1Zn in CDCl$_3$/[D$_5$]Pyridine (9:1). *, +, and # indicate the residual solvent signals of CHCl$_3$, Pyridine, and hexane impurities, respectively.
Figure S4. (A) Experimental and (B) simulated isotopic pattern for molecular ion of porphyrin-1-DPA 1Zn shown in the MALDI-TOF mass spectrum, respectively.
Figure S5. $^1$H NMR (A) and $^{13}$C NMR spectra (B) of Porphyrin-4-DPA 2 in CDCl$_3$. * indicate the residual solvent signals.
Figure S6. (A) Experimental and (B) simulated isotopic pattern for molecular ion of porphyrin-4-DPA 2 shown in the MALDI-TOF mass spectrum, respectively.
Figure S7. The proposed coordinating mode of porphyrin-1-DPA (1) with Pb$^{2+}$ (A) and Cu$^{2+}$ (B), respectively.
Figure S8. The electronic absorption (A) and fluorescence emission spectra (B) of 1-Pb$^{2+}$ in CH$_2$Cl$_2$/MeOH (1:1) upon addition of K$^+$, Li$^+$, Cd$^{2+}$, Ni$^{2+}$, Mn$^{2+}$, Ba$^{2+}$, Fe$^{2+}$, Co$^{2+}$, Mg$^{2+}$, Ca$^{2+}$, Na$^+$, Hg$^{2+}$, Cu$^{2+}$, or Zn$^{2+}$ (Pb$^{2+}$:M = 1:1), respectively, with the excitation of 420 nm.
Figure S9. The electronic absorption spectra (top) and the naked color change in solution (bottom) of porphyrin-1-DPA (1) (2 µM) in CH$_2$Cl$_2$/MeOH (1:1) upon addition of K$^+$, Li$^+$, Cd$^{2+}$, Ni$^{2+}$, Pb$^{2+}$, Cu$^{2+}$, Mn$^{2+}$, Ba$^{2+}$, Fe$^{2+}$, Co$^{2+}$, Mg$^{2+}$, Ca$^{2+}$, Na$^+$, Hg$^{2+}$, or Zn$^{2+}$ (10 equiv), respectively.
Figure S10. The fluorescence spectra of porphyrin-1-DPA (1) (2 µM) in CH$_2$Cl$_2$/MeOH (1:1) upon addition of K$^+$, Li$^+$, Cd$^{2+}$, Ni$^{2+}$, Pb$^{2+}$, Cu$^{2+}$, Mn$^{2+}$, Ba$^{2+}$, Fe$^{2+}$, Co$^{2+}$, Mg$^{2+}$, Ca$^{2+}$, Na$^+$, Hg$^{2+}$, or Zn$^{2+}$ (10 equiv), respectively, with the excitation of 420 nm.
Figure S11. Fluorescence responses of porphyrin-1-DPA (I) (2 µM) to various metal cations (10 equiv) in CH₂Cl₂/MeOH (1:1), with the excitation of 420 nm. $F_0$ and $F$ represent the fluorescence intensity in the range from 620 to 750 nm before and after addition of K⁺, Li⁺, Cd²⁺, Ni²⁺, Pb²⁺, Cu²⁺, Mn²⁺, Ba²⁺, Fe²⁺, Co²⁺, Mg²⁺, Ca²⁺, Na⁺, Hg²⁺ or Zn²⁺, respectively.
Figure S12. The electronic absorption (A) and fluorescence emission spectra (B) of 1-Cu$^{2+}$(10 equiv) in CH$_2$Cl$_2$/MeOH (1:1) upon addition of K$^+$, Li$^+$, Cd$^{2+}$, Ni$^{2+}$, Mn$^{2+}$, Ba$^{2+}$, Fe$^{2+}$, Co$^{2+}$, Mg$^{2+}$, Ca$^{2+}$, Na$^+$, Hg$^{2+}$, Pb$^{2+}$, or Zn$^{2+}$ (10 equiv), respectively, with the excitation of 420 nm.
**Figure S13.** The electronic absorption (A) and fluorescence emission spectra (B) of \(2\text{-Pb}^{2+}\) in \(\text{CH}_{2}\text{Cl}_{2}/\text{MeOH}\) (1:1) upon addition of \(\text{Fe}^{2+}, \text{Co}^{2+}, \text{Hg}^{2+}, \text{Mn}^{2+}, \text{Zn}^{2+}, \text{Ni}^{2+}, \text{Cd}^{2+}, \text{Ca}^{2+}, \text{Ba}^{2+}, \text{Mg}^{2+}, \text{Li}^+, \text{Na}^+, \text{Cu}^{2+}, \) or \(\text{K}^+\) (\(\text{Pb}^{2+}:\text{M} = 1:1\)), respectively, with the excitation of 420 nm.
**Figure S14.** The fluorescence emission spectra (A) and the change of fluorescence intensity in the range from 550 to 700 nm (B) of 2-Cu$^{2+}$ in CH$_2$Cl$_2$/MeOH (1:1) upon addition of Fe$^{2+}$, Co$^{2+}$, Hg$^{2+}$, Mn$^{2+}$, Zn$^{2+}$, Ni$^{2+}$, Cd$^{2+}$, Cu$^{2+}$, Ba$^{2+}$, Mg$^{2+}$, Li$^+$, Na$^+$, Pb$^{2+}$, or K$^+$ (Cu$^{2+}$:M = 1:1), respectively, with the excitation of 420 nm.
**Figure S15.** The fluorescent emission spectra of porphyrin-4-DPA (2) (2 µM) in CH$_2$Cl$_2$/MeOH (1:1) upon addition of increasing amount (0, 0.4, 0.8, 1, 1.2, 1.4, 1.6, 2, 2.5, 3, 4, 6, 8 and 10 equiv) of Pb$^{2+}$, respectively, with the excitation of 420 nm.
Figure S16. The electronic absorption (A) and fluorescence emission spectra (B) of 1Zn (2 µM) in CH$_2$Cl$_2$/MeOH (1:1) upon addition of Pb$^{2+}$, Cu$^{2+}$, Fe$^{2+}$, Co$^{2+}$, Hg$^{2+}$, Mn$^{2+}$, Zn$^{2+}$, Ni$^{2+}$, Cd$^{2+}$, Ca$^{2+}$, Ba$^{2+}$, Mg$^{2+}$, Li$^+$, Na$^+$, or K$^+$ (10 equiv), respectively, with the excitation of 420 nm.
Figure S17. $^1$H NMR spectrum (Top) of metal free 5,10,15,20-tetra(4-tert-butylphenyl) porphyrin in CDCl$_3$; experimental and simulated isotopic pattern (bottom A and B) for its molecular ion shown in the MALDI-TOF mass spectrum. * and # indicate the residual solvent signals of CHCl$_3$ and H$_2$O impurities, respectively.
Figure S18. The schematic molecular structure (A) of metal free 5,10,15,20-tetra(4-tert-butylphenyl)porphyrin together with its electronic absorption (B) and fluorescence emission spectra (C) (2 µM) in CH₂Cl₂/MeOH (1:1) upon addition of Pb²⁺ and Cu²⁺ (10 equiv), respectively, with the excitation of 420 nm.