A novel polynobern-base chemosensor fluorescence sensing of Zn$^{2+}$ and Cd$^{2+}$ and subsequent pyrophosphate in absolute aqueous solution

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Figure S1. Emission spectra of 1 upon the addition of various metal ions (2 equiv) in CH$_3$CN solution.

Figure S2. Emission spectra of P1 upon the addition of various metal ions (2 equiv) in CH$_3$CN solution.
Figure S3. Emission titration of P1 (20 mM) upon the addition of various Cd$^{2+}$ ions in Tris-HCl solution (pH = 7.4). Inset: emission intensity at 425 nm upon titration with Cd$^{2+}$.

Figure S4. Job plots of P1 with Zn$^{2+}$ (left) and Cd$^{2+}$ (right).
Figure S5. The calculated binding constants of P1-Zn$^{2+}$.

Figure S6. The calculated binding constants of P1-Cd$^{2+}$. 
Figure S7. Optimized conformation of 1-Cd\(^{2+}\) by DFT calculation. Selected distances (Å): Cd–N1, 2.320; Zn–N2, 2.328; Zn–O1, 2.478; Zn–O2, 2.366; Zn–O3, 2.512; Zn–O4, 2.324.

Figure S8. Competition experiments
Figure S9. Fluorescence intensities of P1 (20 μm) at 425 nm before and after the addition of Zn$^{2+}$ (5 equiv) at various pH values in H$_2$O solution.

Figure S10. The emission spectra of P1-Cd$^{2+}$ upon the addition of various anions (20 equiv) in aqueous solution. Inset shows the emission intensity at 425 nm upon the addition of various anions (0–P1-Cd$^{2+}$, 1–F$^-$, 2–Cl$^-$, 3–Br$^-$, 4–I$^-$, 5–NO$_3^-$, 6–CH$_3$COO$^-$, 7–CO$_3^{2-}$, 8–HSO$_4^-$, 9–Pi, 10–ATP, 11–AMP, 12–ADP, 13–PPI).
Figure S11. The emission titration of P1-Cd\(^{2+}\) upon the addition of PPi in 100% aqueous solution.

Figure S12. Benesi-Hildebrand plot of for evaluation of binding constants of PPi with P1-Zn\(^{2+}\) (left) and P1-Cd\(^{2+}\) (right) with the 1:1 binding stochiometry in aqueous (PH-7.4) solution.
Figure S13. $^1$H-NMR of 4 in CDCl$_3$ solution

Figure S14. $^1$H-NMR of 1 in CDCl$_3$ solution
Figure S15. $^{13}$C-NMR of 1 in CDCl$_3$ solution.

Figure S16. ESI-MS of 1.
Figure S17. $^1$H-NMR of P1 in DMSO.