Supporting Information

A Pentaquinone Based 4-2 Bit Photonic Encoder

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S3 UV-visible spectra of 5 in the presence of Hg$^{2+}$ ions.
S4 UV-visible spectra of 5 in the presence of Fe$^{3+}$ ions.
S5 UV-visible spectra of 5 in the presence of F$^{-}$ and CN$^{-}$ ions.
S6 UV-visible spectra of 5 in the presence of OH$^{-}$ ions.
S7 Fluorescence spectra of 5 in response to the presence of Hg$^{2+}$ ions (340-1000equiv.)
S8 Fluorescence spectra of 5 in response to the presence of F$^{-}$ ions (0-3000 equiv.)
S9 Job’s plot of 5 with Hg$^{2+}$ and Fe$^{3+}$ ions.
S10 Job’s plot of 5 with CN$^{-}$ and F$^{-}$ ions.
S11 Fluorescence spectra of 5 in response to the presence of Fe$^{3+}$ ions.
S12 Fluorescence spectra of 5 in response to the presence of various metal ions except Hg$^{2+}$ and Fe$^{3+}$ ions.
S13 Fluorescence spectra of 5 in response to the presence of various anions except CN$^{-}$ and F$^{-}$ ions.
S14 $^1$H NMR Spectrum of 3.
S15  Mass Spectrum of 3.
S16  ¹H NMR Spectrum of 5.
S17  ¹³C NMR Spectrum of 5.
S18  Mass Spectrum of 5.
S19  IR Spectrum of 5.
S20  IR Spectrum of 5.Hg²⁺ complex.
S21  Reversibility of 5.Fe³⁺ complex.
Figure S1. UV-visible spectra of 5 (1X 10^{-5} M) in the presence of Hg^{2+} ions (0-100 equiv.) in THF.
**Figure S2.** UV-visible spectra of 5 (1X 10⁻⁵ M) in the presence of Fe³⁺ ions (0-100 equiv.) in THF.
Figure S3. UV-visible spectra of $5 \ (1 \times 10^{-5} \text{ M})$ in the presence of $\text{F}^{-}$ ions (0-500 equiv.) in THF.

Figure S4. UV-visible spectra of $5 \ (1 \times 10^{-5} \text{ M})$ in the presence of $\text{CN}^{-}$ ions (0-500 equiv.) in THF.
Figure S5. UV-visible spectra of 5 (1X 10^{-5} M) in the presence of OH^- ions (0-300 equiv.) in THF.
Figure S6. Fluorescence spectra of 5 (1 X 10^{-5} M) in response to the presence of Hg^{2+} ions (340-1000 equiv.) in THF; \( \lambda_{ex} = 340 \) nm.
Figure S7. Fluorescence spectra of 5 (1 X 10^{-5} M) in response to the presence of F^- ions (0-3000 equiv.) in THF; $\lambda_{ex} = 340$ nm.
**Figure S8.** Job’s plot of 5 with $\text{Hg}^{2+}$ and $\text{Fe}^{3+}$ representing stoichiometry 1:1 (host: guest).
Figure S8. Job’s plot of 5 with CN⁻ and F⁻ representing stoichiometry 1:1 (host: guest).
**Figure S9.** Fluorescence spectra of 5 (1 X 10^{-5} M) in response to the presence of Fe^{3+} ions (1000 equiv.) in THF; \( \lambda_{ex} = 340 \) nm.
**Figure S10.** Fluorescence spectra of 5 (1 X 10^{-5} M) in response to the presence of various metal ions (1000 equiv.) except Hg^{2+} and Fe^{3+} ions in THF; \( \lambda_{ex} = 340 \) nm.
Figure S11. Fluorescence spectra of 5 (1 X 10^{-5} M) in response to the presence of various anions (3000 equiv.) except CN⁻ and F⁻ ions in THF; λ_{ex} = 340 nm.
\textbf{\textsuperscript{1}H NMR Spectrum of 3}

![H NMR Spectrum of 3](image)
Mass Spectrum of 3
$^1$H NMR Spectrum of 5
$^{13}$C NMR Spectrum of 5
Mass Spectrum of 5
IR Spectrum of 5
IR Spectrum of 5 + Hg$^{2+}$
Figure S12. Fluorescence emission spectra of (a) 5 (1 X 10^{-5}); (b) 5 + Fe^{3+} (1000 equiv.); (c) 5 + Fe^{3+} (1000 equiv.) + F^- (3000 equiv.) in THF.