Electronic Supplementary Material (ESI) for RSC Advances.


Supporting Information

# Ultra-selective Detection of $Fe^{2+}$ ion by Redox Mechanism Based on Fluorescent Polymerized Dopamine Derivatives

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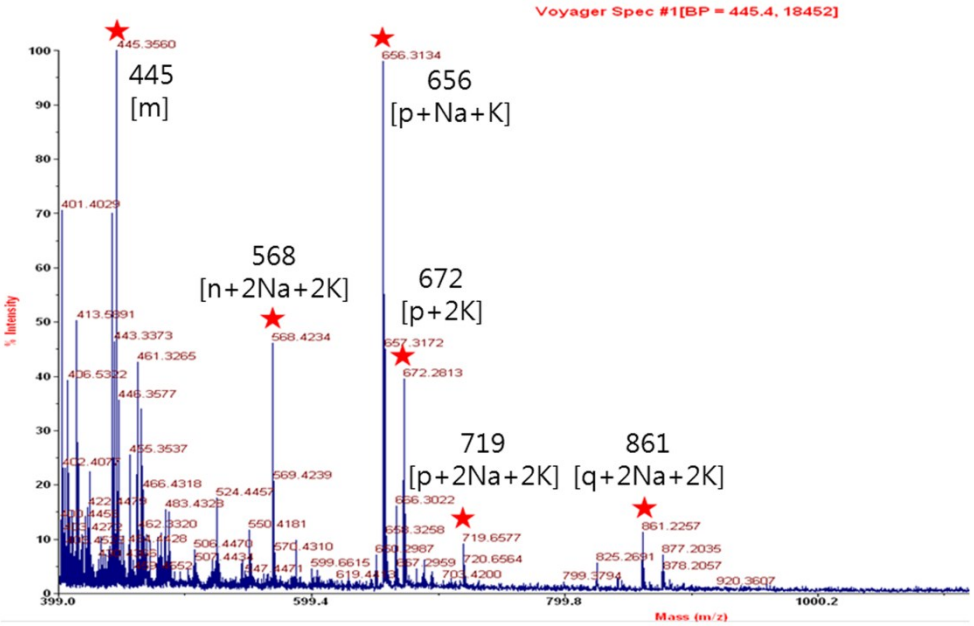
a.




b.

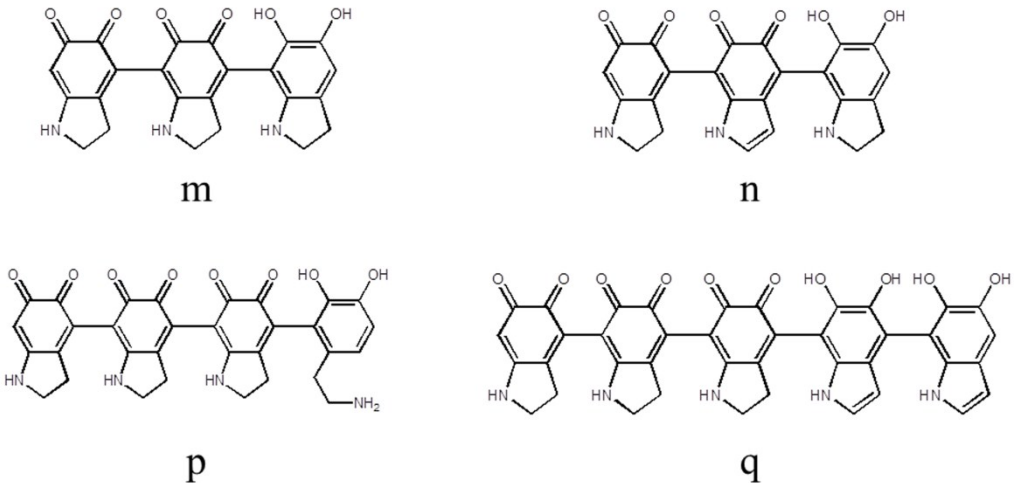



**Figure S1.** (a) MALDI-TOF mass spectra of F-ODA (pH 7.4) and (b) the proposed chemical structures of the F-ODA.

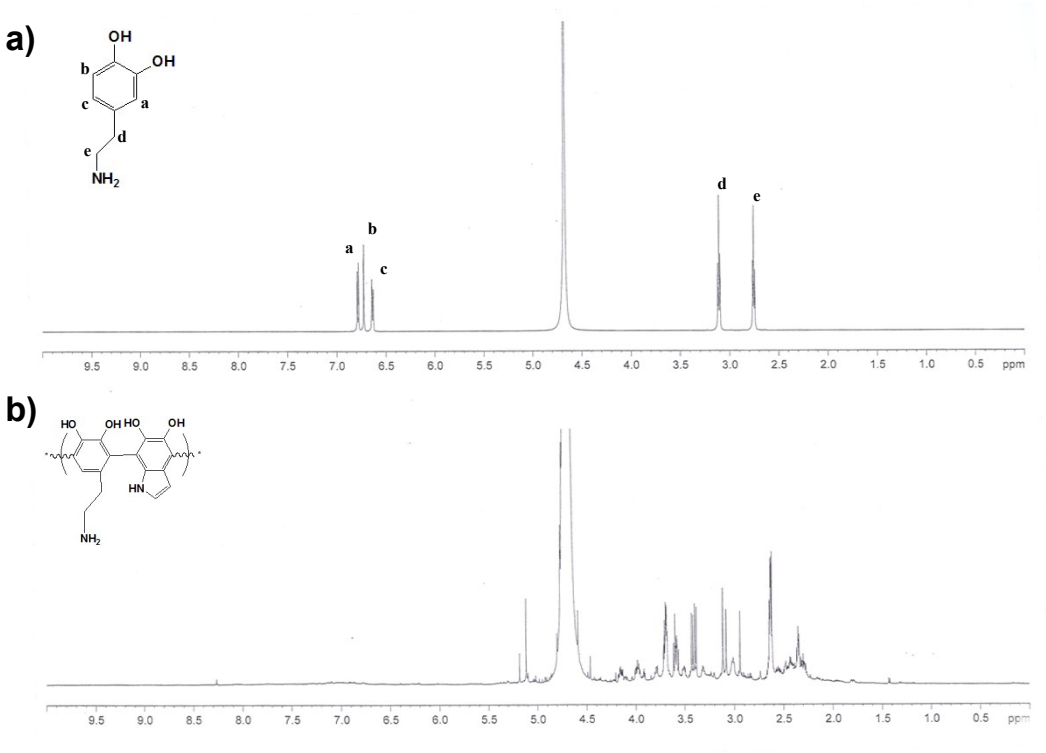



**Figure S2.** The $^{1}H$ NMR analysis ($D_2O$) of (a) pure dopamine and (b) F-ODA.

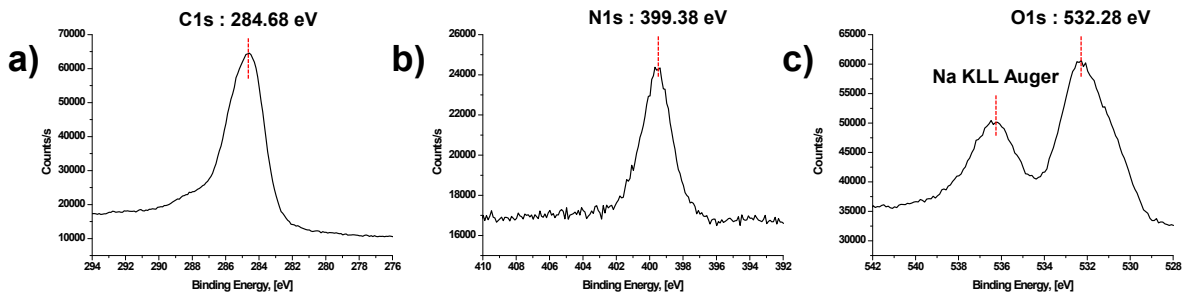



**Figure S3.** XPS spectra of polydopamine, (a) C1s, (b) N1s, and (c) O1s.

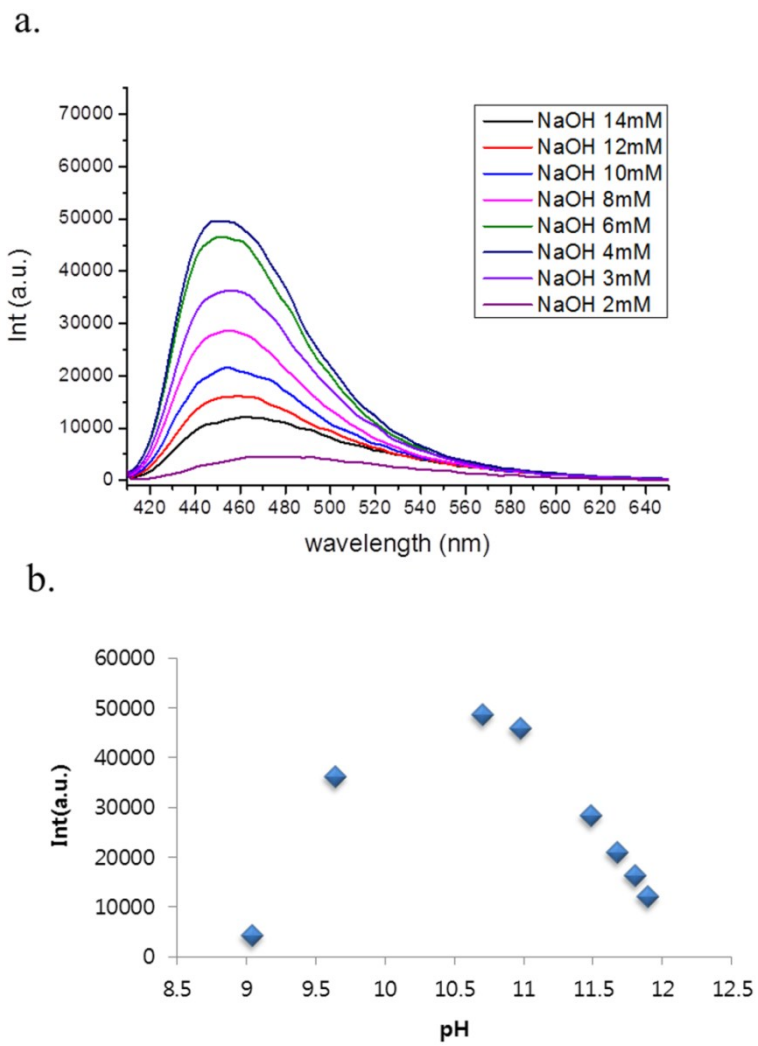



**Figure S4.** (a) Fluorescence spectra of F-ODA depending on the final concentration of NaOH and (b) maximum intensity of F-ODA upon the pH of reacting solution.

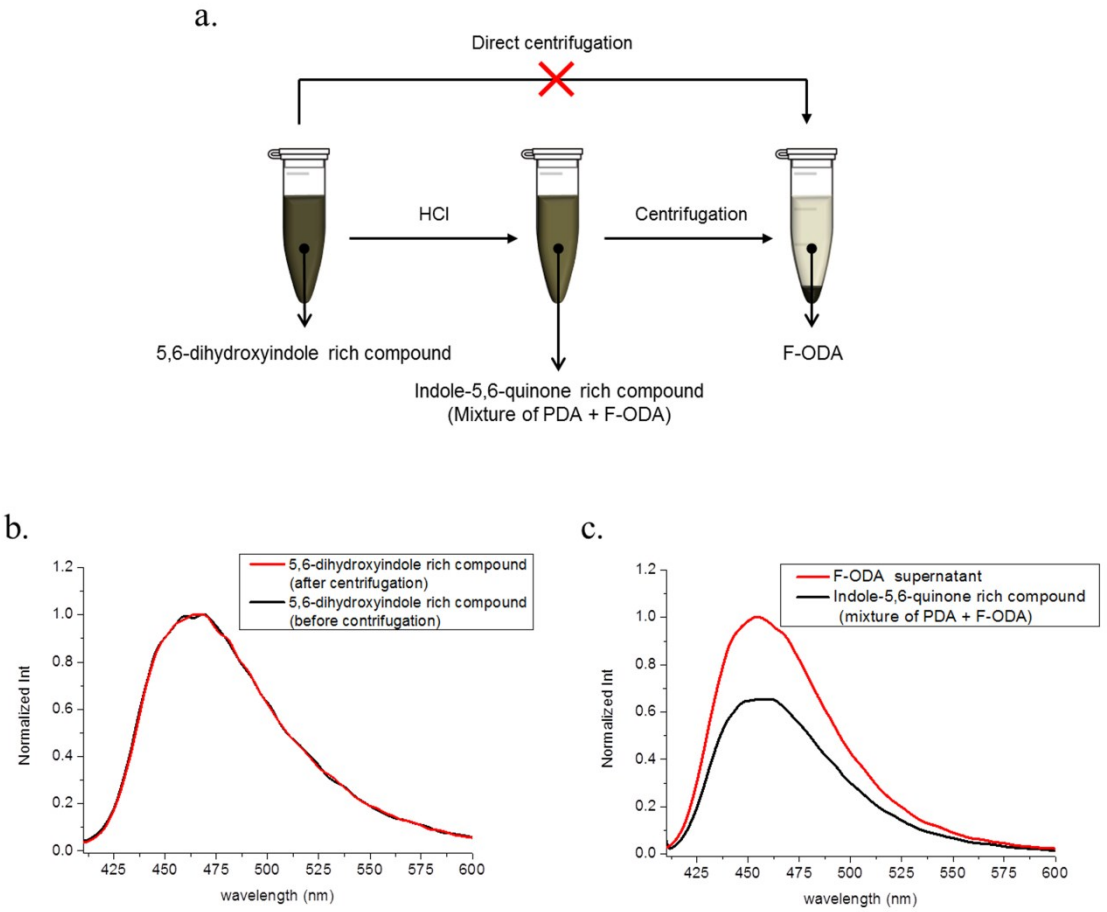



**Figure S5.** (a) A concise scheme for the experiment about effect of adding HCl. Normalized fluorescence spectra of (b) 5,6-dihydroxyindole-rich compound before and after centrifugation and (c) F-ODA supernatant and indole-5,6-quinone-rich compound.

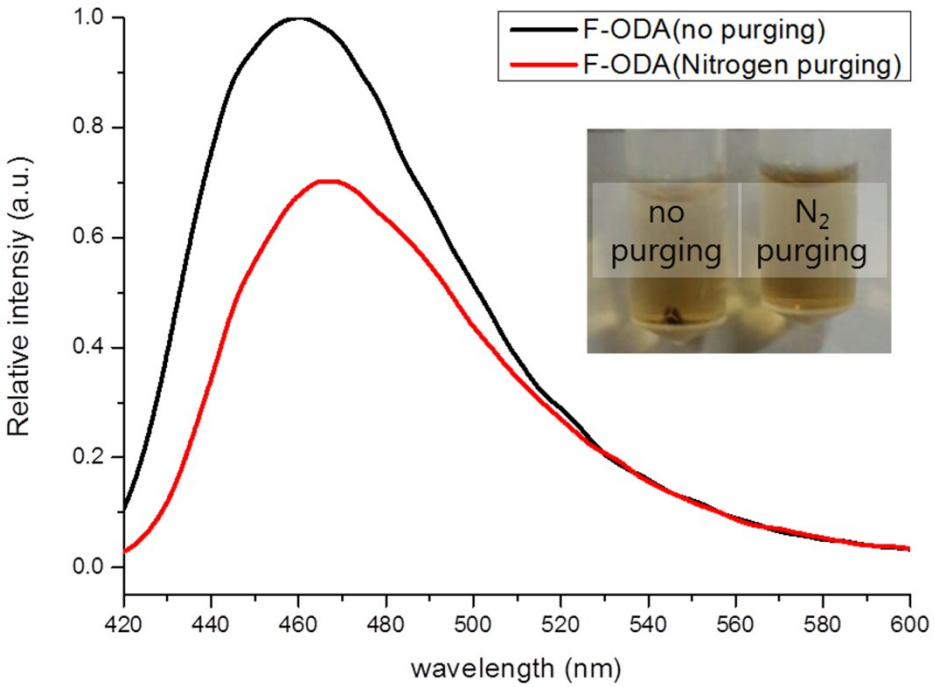



**Figure S6.** Fluorescence spectra of F-ODA depending on the presence or absence of nitrogen purging to eliminate dissolved oxygen before adding HCl.

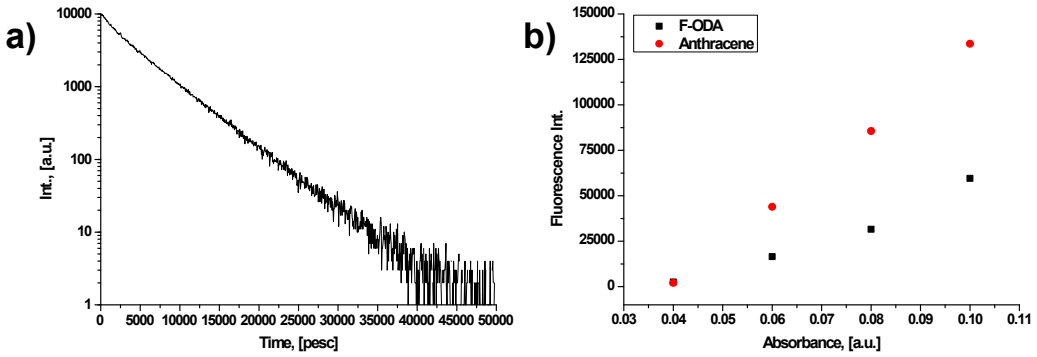



**Figure S7.** (a) The F-ODA decay curve measured at room temperature. (b) The plot of absorbance vs. area of fluorescence on anthracene (red dots) and F-ODA (black dots).

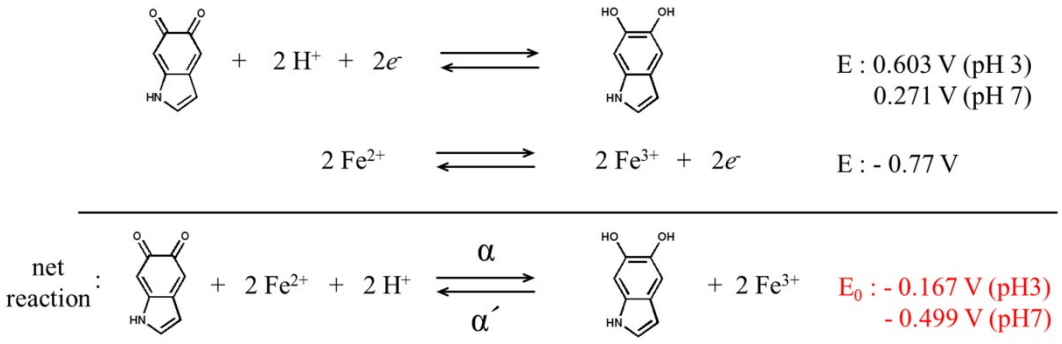



**Figure S8.** Redox potentials of half reactions triggered by adding $Fe^{2+}$ ion.

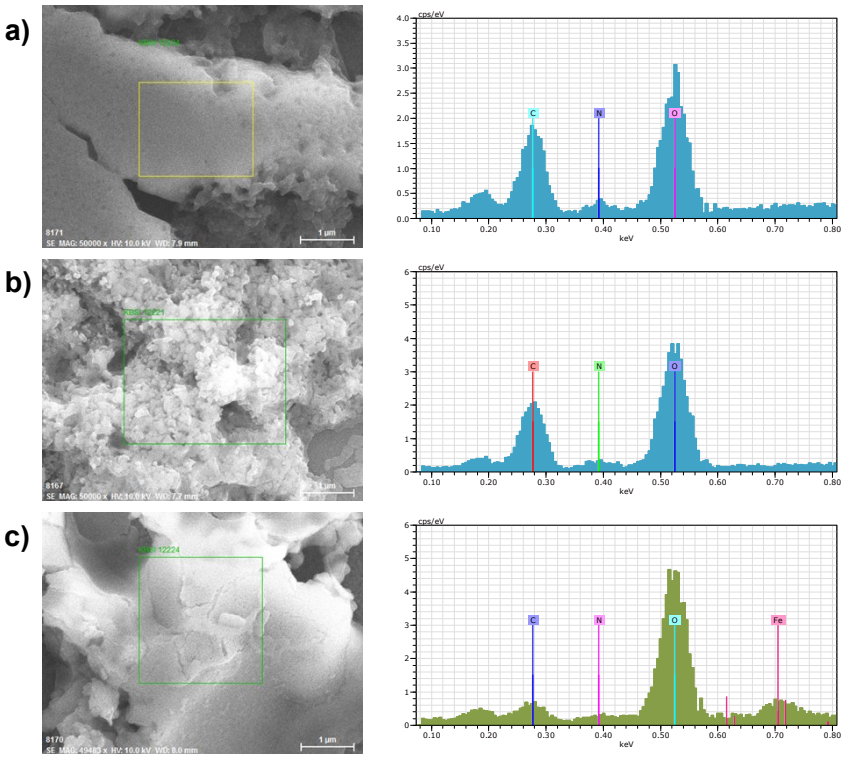



**Figure S9.** SEM-EDS results of (a) F-ODA (supernatant), (b) PDA (precipitate), and (c) F-ODA chelated with $Fe^{2+}$ ions.

$$aA + bB + n[e^-] + h[H^+] = cC + dD$$

$$E_h = E_0 + \frac{0.05916}{n}\log\left(\frac{\{A\}^a\{B\}^b}{\{C\}^c\{D\}^d}\right) - \frac{0.05916}{n}pH$$

**Equation S1.** Nernst Equation.