

Electronic Supplementary Information

New Molecular Probe for Naked Eye Detection of Zinc Ion

**Hong Wang,^{b,*} Chun-Lin Sun^a, Yong-Hao Yue^a, Fen-Fen Yin^a, Jian-Qiao Jiang^a,
Hao-Rui Wu^a, Hao-Li Zhang^{a,*}**

^aState Key Laboratory of Applied Organic Chemistry (SKLAOC), College of Chemistry and Chemical Engineering, Lanzhou University, 222 Tianshui South Road, Lanzhou, 730000, China . Tel: +86 931 8912365; Fax: +86 931 8912365; E-mail:

haoli.zhang@lzu.edu.cn;

^bMechanical Engineering Department, Texas A&M University,

E-mail: albertwh@tamu.edu

1. Materials

DFDB was synthesized in our lab by condensing ferrocene aldehyde with 4, 4'-diaminobiphenyl. The 4, 4'-diaminobiphenyl hydrochloride was purchased from Aldrich (USA). All other chemicals used in the experiments were of analytical-reagent grade and were used as received. Milli-Q water (18 M Ω , Millipore USA) was used in the experiments.

2. Equipment

NMR spectra were recorded on a Varian 300 (300 MHz) spectrometer or a Bruker 400 (400MHz). Tetramethylsilane was used as the internal standard for ¹H-NMR. J values are given in Hz. High resolution mass spectral data (HRMS) were obtained on

a Bruker APEX II FT-MS mass spectrometer. Elemental analysis was carried out by Elementar Vario EL. The UV-vis properties of compounds **a-d** were characterized by using a T6 UV-Vis spectrometer (Puxi China). The electrochemical experiments were carried out using a CHI 660B potential station (CHI USA).

3. Synthesis of DFDB and DBDB

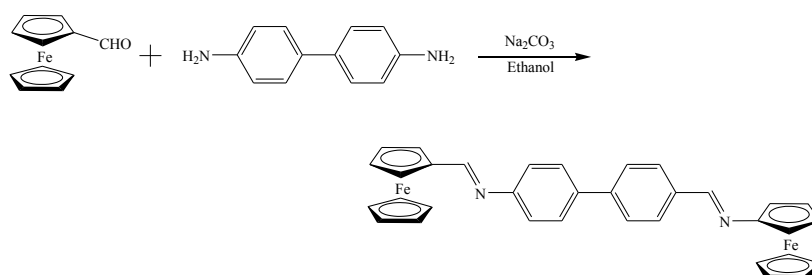


Figure S1 The synthesis of DFDB.

DFDB: To a mixture of ferrocenecarboxaldehyde (1.08 g, 5.0 mmol) and anhydrous sodium carbonate in anhydrous ethanol (100 mL), 0.50 g (2.5 mmol) of 4,4'-diaminobiphenyl hydrochloride was added at room temperature. After 6 hours reaction at 78 °C, a large amount of orange-colored solid was formed. Then the mixture was filtered and the solid was washed thoroughly with ethanol to afford compound **a** (1.06 g, 71%). The molecular structure was confirmed by NMR and high resolution MS. ^1H NMR (CDCl_3 , 400 MHz) δ 4.27 (s, 10H), 4.51 (s, 4H), 4.83 (s, 4H), 7.24 (d, J 8.4 Hz, 4H), 7.63 (d, J 7.6 Hz, 4H), 8.41 (s, 2H). ESI: $[\text{M}+\text{H}]$ 577.1023. Found 577.1028. Element analysis: calculate for **b**, C, 70.86; H, 4.90; N, 4.86; Fe, 19.38. Found: C, 70.66; H, 5.22; N, 4.63.

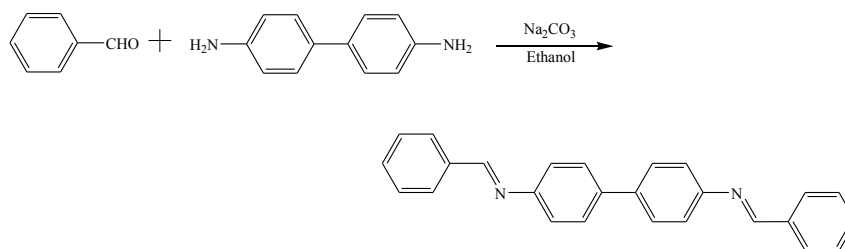


Figure S2 The synthesis of DBDB.

DBDB: 0.92g (8.68 mmol) 4, 4'-diaminobiphenyl and trace anhydrous sodium carbonate were added into a 250 mL three-neck flask in which 100 mL anhydrous ethanol had been injected. Then 1.11 mL benzaldehyde (18.2 mmol) was slowly dropped into the stirring solution in 30 minutes at room temperature. After that, the mixed system was stirred for 6 hours at 78 °C, which slowly turned to turbid. The mixture was filtered and the residue was washed thoroughly with large amount of ethanol to afford the **DBDB** (0.87g, 85%) as yellow solid. The molecular structure was confirmed by 400M NMR.

4. Electrochemistry

A standard one-compartment and three-electrode cell was used with an Au disk (1.8 mm in diameter) as working electrode, a Pt wire as the counter electrode and a silver wire as the reference electrode. Tetrabutylammonium hexafluorophosphate (TBAPF₆) was used as electrolyte. A 5 μM DFDB in CH₂Cl₂ was prepared and bubbled for 30 min prior to CV tests. ZnCl₂ dispersed in ethyl acetate was added to give controlled Zn²⁺ concentration.

5. Detection limit test

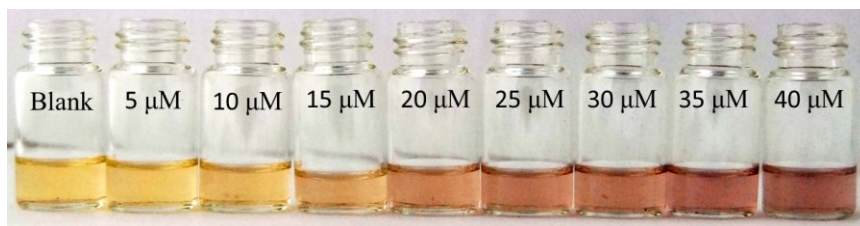


Figure S3 Color changes of the DFDB solution after adding different amounts of Zn^{2+} , which shows the detection limit for Zn^{2+} is $10 \mu\text{M}$ for naked eye detection.