Electronic Supplementary Information

An Electrochemical Method for Sensitively and Rapidly Sensing of Sudan I in Food Based on the Ni-Fe Bimetal Organic Frameworks

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Chemicals and reagents

Zinc nitrate hexahydrate and nickel chloride hexahydrate were purchased from Xilong Scientific Co.,Ltd. Ferric chloride hexahydrate and N,N-dimethylformamide(DMF) and anhydrous ethanol were purchased from Sinopharmaceutical Chemical Reagents Co., Ltd. Acetylene black was purchased from the battery sales department of Yingze District, Taiyuan City. Nafion (5% in water) was purchased from Alfa Aesar. Sudan I was purchased from Shanghai Aladdin Biochemical Technology Co., Ltd. The phosphate buffer solution is configured by mixing Na_2HPO_4 and KH_2PO_4 reserve solutions. All solution configurations use deionized water (Millipore, ≥18.2 MΩ cm^{-1}).

Apparatus

Cyclic voltammetry (CV) and differential voltammetry (DPV) experiments were performed using electrochemical workstation (CHI440a). The morphology of the prepared samples was tested by scanning electron microscopy (SEM, Hitachi S-8100) and transmission electron microscopy (TEM, Hitachi-7700). The composition of the material was tested by the energy dispersive X-ray detector (EDS). The crystallinity and purity of the material were tested by the X-ray diffractometer (XRD, Rigaku Rint-2200/XRD-600). The specific surface area and pore size distribution of the samples were investigated by nitrogen adsorption and desorption experiments. (BET, ASAP 2460, Micromeritics, US). A traditional three-electrode system consisting of a modified glassy carbon electrode (GCE) as a working electrode, saturated calomel electrode as a reference electrode and platinum wire as a reference electrode. All experiments were carried out at room temperature.

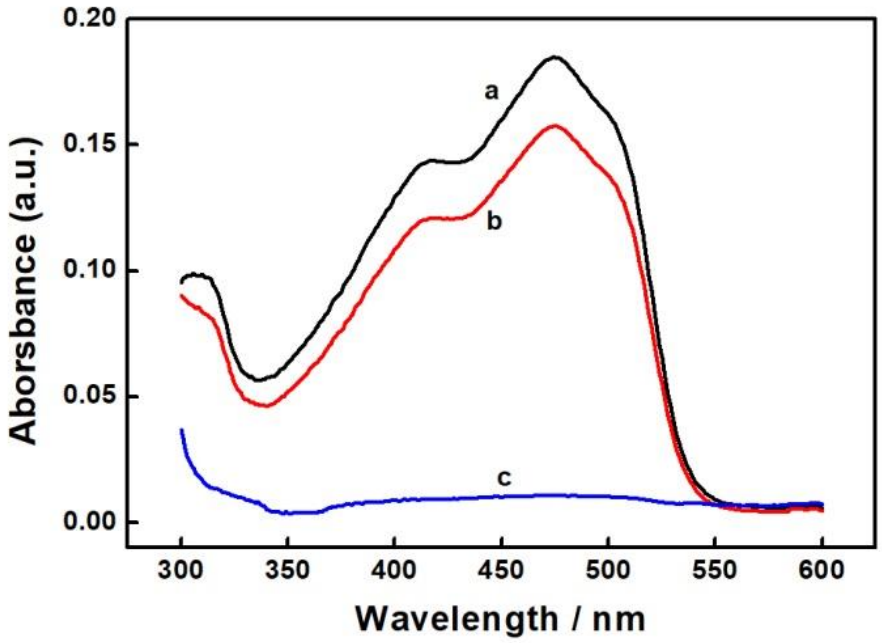


Fig. S1. The UV spectra of 10^{-5} M Sudan I (a), the centrifugate after 1h adsorpting by MIL-53(NiFe) (b) and the centrifugate after 1h adsorpting by AB (c).

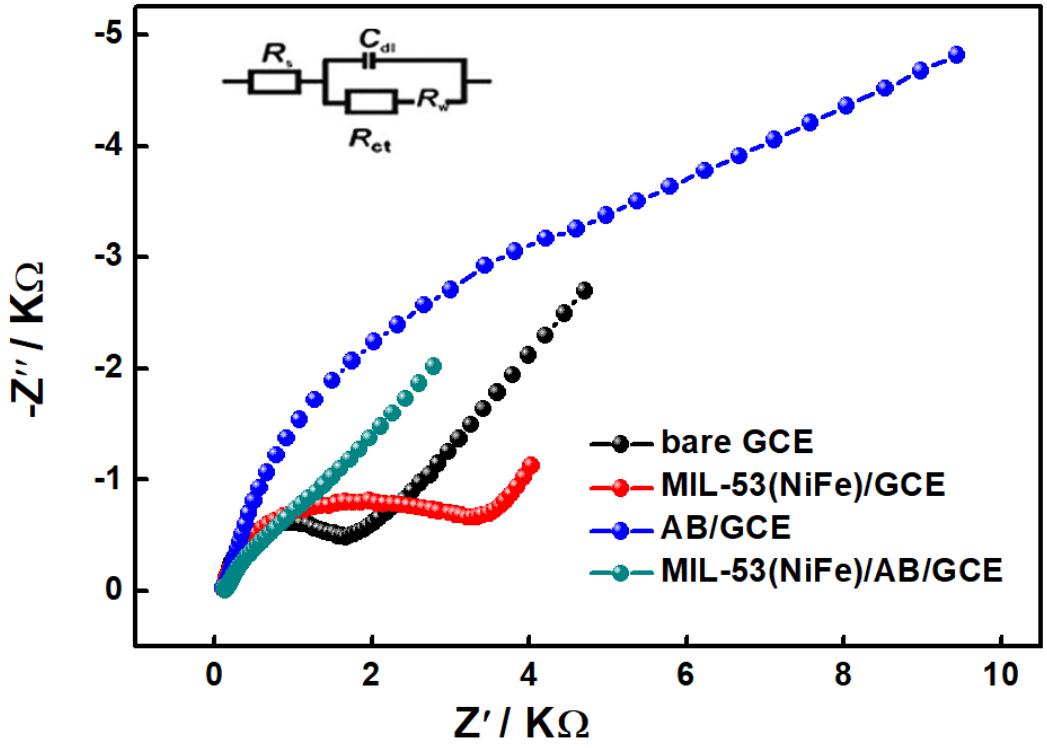


Fig. S2. EIS of bare GCE, MIL-53(NiFe)/GCE, AB/GCE and MIL-53(NiFe)/AB/GCE in 0.1 M KCl containing 0.25 Mm $Fe(CN)_6^{3-/4-}$ in a frequency range from 0.01 Hz to 10 MHz.

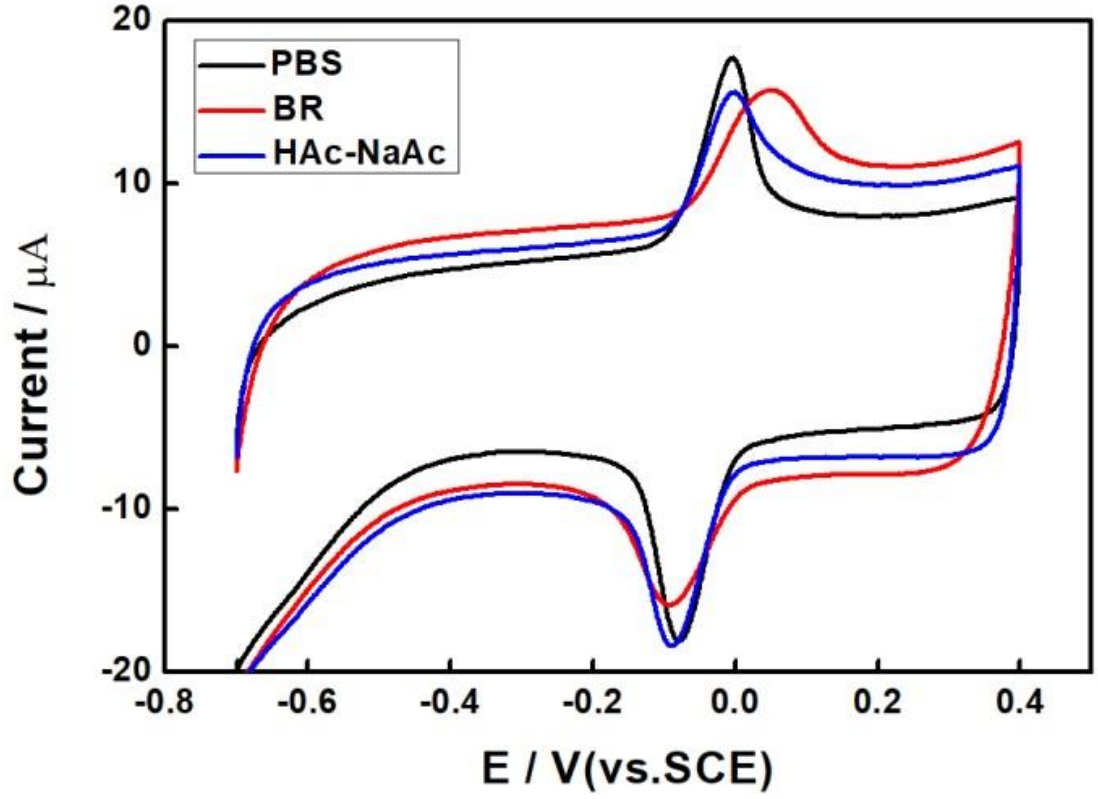


Fig. S3. Plots of peak current vs. different buffer solutions.

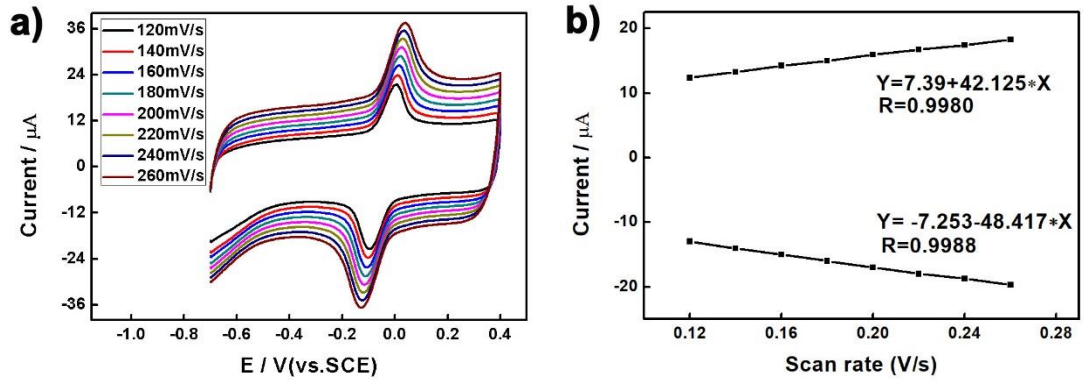


Fig. S4. (a) CV curves of MIL-53(NiFe)/AB/GCE at different scan rates (scan rates are 120, 140, 160, 180, 200, 220, 240, and 260 mV/s), (b) Fitting curve of peak current and scan rates.

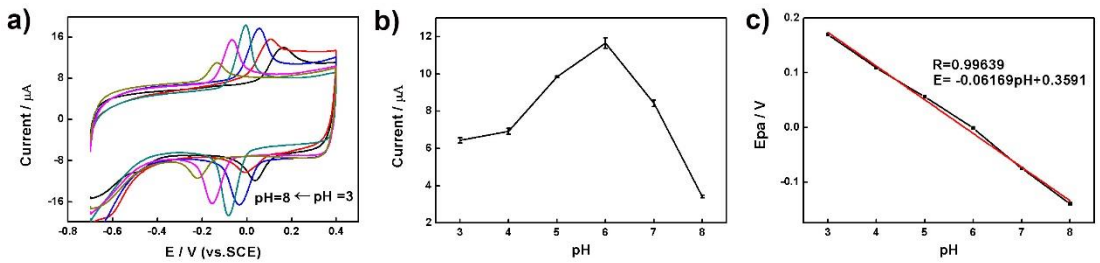
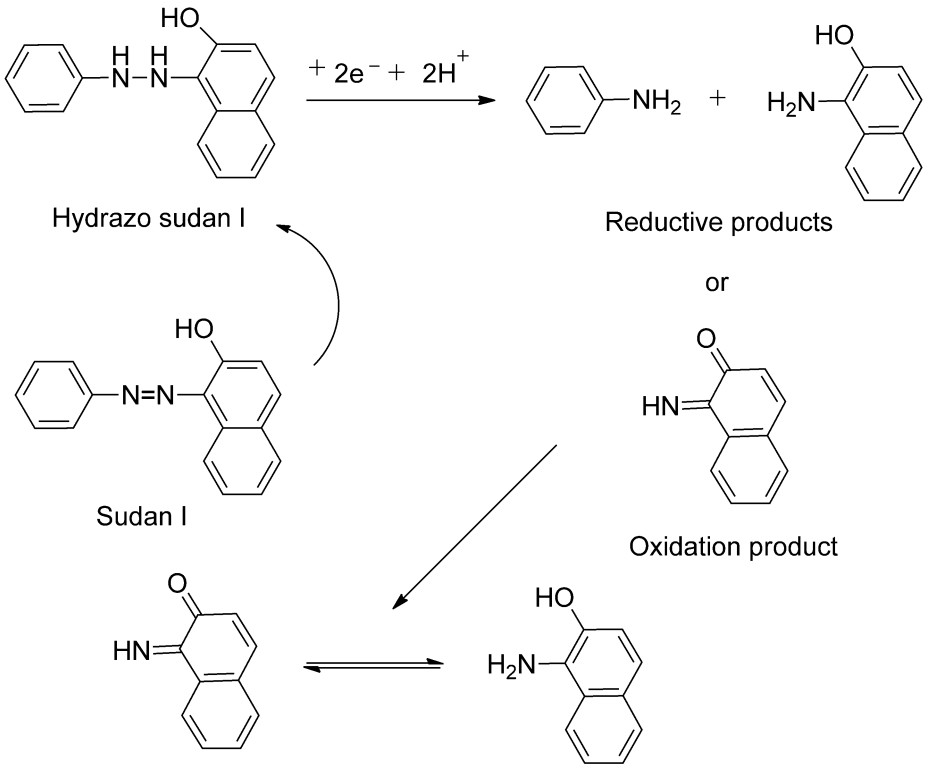


Fig. S5. (a) CV curves of different pH, (b) the line chart of O_1 peak current vs. pH and (c) fitting curve of the peak potential with different pH.



Scheme S1. The electrochemical redox mechanism of Sudan I.

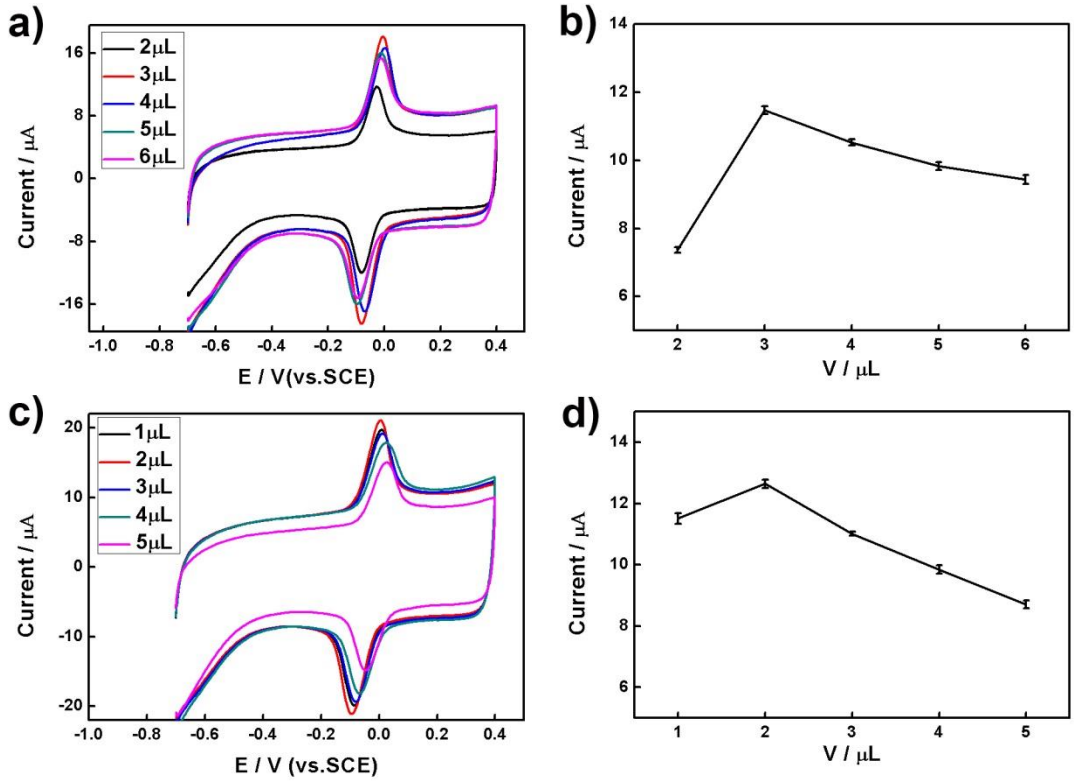


Fig. S6. (a) and (c) The effects of different modifiers of AB and MIL-53(NiFe) on the peak current for 50 μM Sudan I respectively, (b) and (d) Line chart of O_1 current vs. amount of modifier of AB and MIL-53(NiFe).

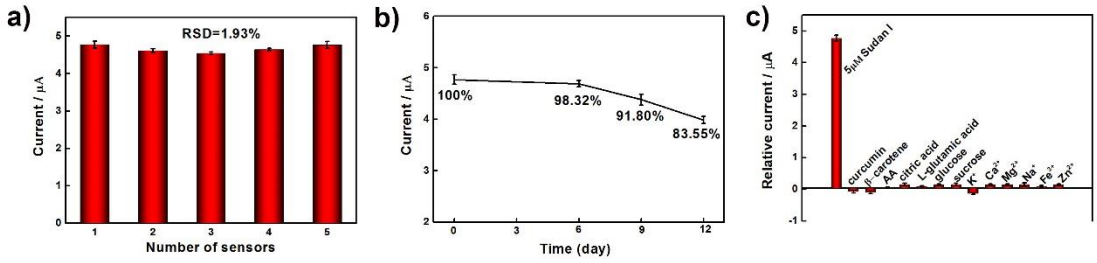


Fig. S7. The (a) repeatability, (b) stability and (c) selectivity.