Supporting Information

Combination of Hematin and PEDOT via 1-Pyrenebutanoic acid: A new platform for direct electrochemistry of hematin and biosensing applications

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Experimental Section

Apparatus

The electrochemical experiments were performed on CHI660D (CH Instruments, Shanghai, China). Electrochemical impedance Spectroscopy (EIS) was measured by Autolab PGSTAT302N (Metrohm, Switzerland). Field emission scanning electron microscope (FE-SEM) and X-ray photoelectron spectroscopy (XPS) were carried out

with S-4800 (Hitachi Co., Ltd., Japan) and PHI Quantera Ⅱ (Japan). Electrochemical experiments were performed with a three-electrode system, with bare GCE (d=3 mm) as the working electrode, a platinum wire as the auxiliary electrode, and an Hg/HgCl/Saturated KCl as the reference electrode.

Materials

3,4-Ethylenedioxythiophene and Poly(4-styrenesulfonate) sodium was obtained from Aladdin reagents. PBA was purchased from J&K (Shanghai, China). $ZrOCl_2$ and hematin were purchased from Sigma (USA). H_2O_2, N,N-Dimethylformamide (DMF) and absolute alcohol were all obtained from Sinopharm Chemical Reagent (Beijing, China). All reagents used were of analytical grade.

Electrode preparation

GCEs were carefully polished to a mirror like surface by polishing by 0.05 μm alumina slurry first, followed by ultrasonication in anhydrous ethanol and double distilled deionized water for 3 min, respectively. After drying the electrode with nitrogen, the EDOT was polymerized on the GCE by CV with 8 potential cycles from -0.1-1.0 V at a scan rate of 100 $mV \cdot s^{-1}$, in PBS containing 10 $mmol \cdot L^{-1}$ EDOT and 0.3 $mg \cdot mL^{-1}$ PSS under magnetic stirring and N_2 degassing [**Fig. S1**];[1] then the treated GCEs were cleaned in 0.5 mL ultrapure water by stirring 1 min and dried with N_2. After that, the GCEs were incubated in 0.5 mL, 2.3 $mg \cdot mL^{-1}$ solution of PBA in DMF for 2 h. Then the GCE was rinsed with 1 mL DMF and 1 mL ultrapure water successively. After drying with N_2, the GCE was immersed in 1 $mg \cdot mL^{-1}$ $ZrOCl_2$ solution (Water: ethanol=2:3) for 30 min, then 4 μL 0.1 $mmol \cdot L^{-1}$ hematin in DMF

was deposited on GCE surface for other 30 min, then GCE was cleaned with DMF and ultrapure water respectively.

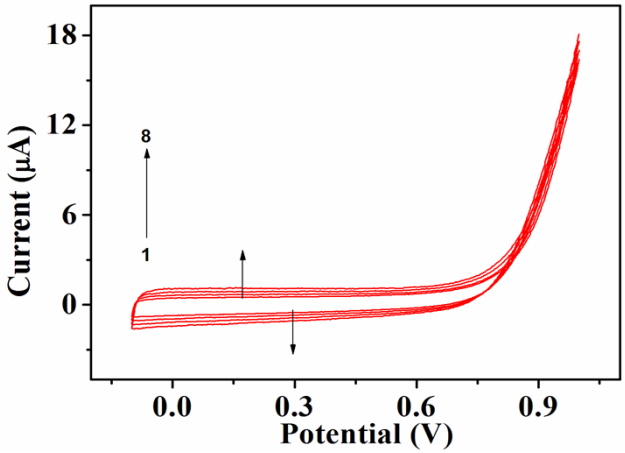

Fig. S1 CVs of GCE in 0.01mol·L^{-1} EDOT at a sweep rate of 100 mV·s^{-1} in the potential range between −0.1 and 1.0 V.

The effect of different amount of hematin on catalysis of H_2O_2

Amount of hematin is an important factor to catalyze H_2O_2. The current response of H_2O_2 is different with altering of concentration of hematin (Fig. s2). We have prepared a serious of GCE/PEDOT/PBA/Hematin sensors with different amount of hematin from 0.01 μmol·L^{-1}~5 mmol·L^{-1}, and the volume is 4 μL. From Fig. s2, we can determine the optimal concentration of hematin is 0.1 mmol·L^{-1}, the volume of modification is 4μL.

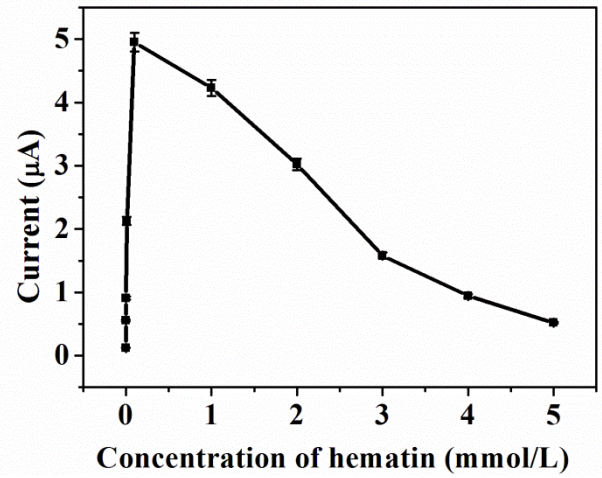

Fig. s2 Different current response of H_2O_2 (0.08 mmol·L^{-1}) on GCE/PEDOT-PBA-Hematin sensors with a serious

of amount of hematin from $4*10^{-14}$ ~$2*10^{-8}$ mol. (The scan rate is 100 $mV \cdot s^{-1}$. pH of PBS is 7.0.)

References

1. W. M. Si, W. Lei, Y. H. Zhang, M. Z. Xia, F. Y. Wang and Q. L. Hao, *Electrochimica Acta*. 2012, 85, 295