Electronic Supplementary Material (ESM)

An electrochemical sensor based on metal organic framework-chiral ionic liquid composites for the enantiorecognition of tryptophan enantiomers

Huipeng Hou, Shanshan Tang, Miao Liu, Fulai Zhang, Axin Liang, Liquan Sun, Lina Geng, Bingteng Xie, Yue Yi, Aiqin Luo*

Key Laboratory of Molecular Medicine and Biotherapy, School of Life Science, Beijing Institute of Technology, Beijing 100081, China

* Corresponding Author Phone: +86 10 68915996
E-mail: aqluobit@163.com (A. Luo)

S1. Experimental

1.1 Materials

Sodium dihydngen phosphate anhydrous (NaH_2PO_4) and Sodium phosphate dibasic dodecahydrate ($Na_2HPO_4•12H_2O$) were purchased from Innochem Bio-Chem Technology Co., Ltd. (Beijing, China). The chiral ionic liquid, 1-ethyl-3-methyl-imidazolium L-tartrate, was purchased from Chengjie Chem Co., Ltd. (Shanghai, China), and 2-aminoterephthalic acid was provided by Adamas-Beta Co., Ltd. (Shanghai, China). Moreover, L-tryptophan (L-Trp), D-tryptophan (D-Trp), L-cysteine (L-Cys), L-phenylalanine (L-Phen), D-phenylalanine (D-Phen), L-lysine (L-Lys), L-tyrosine enantiomers (L-Tyr), D-tyrosine enantiomers (D-Tyr), 5-Aminoquinoline, Chitosan (CS), multi-walled carbon nanotubes (MWCNTs) were purchased from Aladdin Bio-Chem Technology Co., Ltd. (Shanghai, China), with 10-30μm in length and 5-15nm in diameter. D-lysine (D-Lys) was purchased from Shanghai Bide Medical Technology Co., Ltd. (Shanghai, China). Potassium chloride (KCl) was provided by Tianjin Guangfu Fine Chemical Research Institute (Tianjin, China). Ferric chloride ($FeCl_3$), N, N-dimethylformamide (DMF), Potassium ferricyanide ($[K_3Fe(CN)_6]$) and acetic acid (HAc) were purchased from Beijing Tong Guang Fine Chemicals Company (Beijing, China). Fetal bovine serum (FBS) was provided by Zhejiang Tianhang Biotechnology Co., Ltd. (Zhejiang, China). All reagents and solvents adopted in this work were analytically pure (AR). Ultrapure water (18.2 MΩ*cm, 25℃) was used in all solution.

1.2 Apparatus

The materials were obtained by CT15RT Versatile Refrigerated Centrifuge, and the images of surface morphology were gained by field emission scanning electron microscope (JSM-7500F). Furthermore, the XRD patterns are obtained by Rigaku Ultima IV X-ray diffractometer. The pH of phosphate-buffered saline (PBS) was determined by Sartorius pH (PB-10). All electrochemical measurements were examined using CHI6043E electrochemical workstation (Shanghai, China). And the traditional three-electrode system consisted of working electrode (glassy carbon electrode, GCE), reference electrode (saturated calomel electrode, SCE) and counter electrode (platinum wire, Pt).

S2. Circular dichroism (CD) spectrum of Fe-CIL

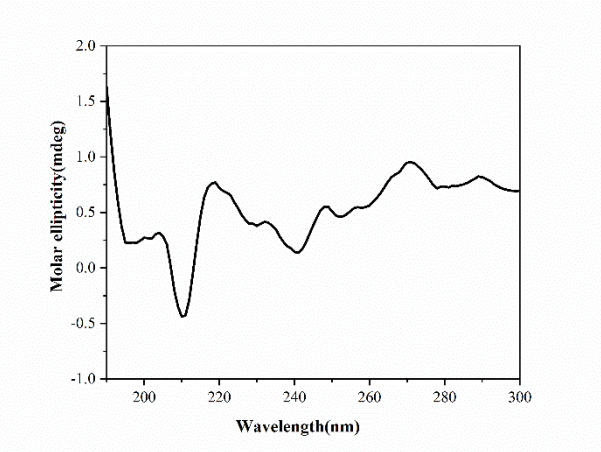

Fig. S1. The CD spectrum of Fe-CIL.

S3. Calculation method of active surface area.

The *Randles-Sevcik* equation as follows could be used to calculate the active surface area in a reversible progress.

$$I_{pa} = (2.69 \times 10^5) n^{3/2} D^{1/2} C A v^{1/2}$$

I_{pa} is the anodic peak current, n is the electron transfer number, A refers to the active surface area of the working electrode, D is the diffusion coefficient which was 7.6×10^{-6}cm/s for $[Fe(CN)_6]^{3-/4-}$, C is the concentration of $[Fe(CN)_6]^{3-/4-}$ and v is the CV scanning rate [1].

Reference:

[1] Patel B R, Imran S, Ye W Y, Weng H Y, Noroozifar M and Kerman K, Electrochimica Acta, 2020, 362: 137094.

S4. Optimization of synthesis ratio of Fe-CIL

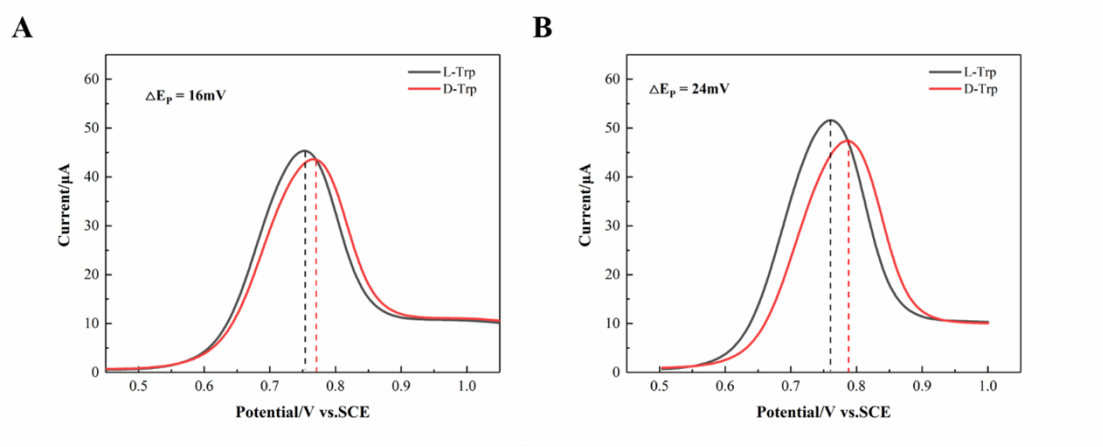

Fig. S2. Effect of the ratio of Fe-MIL-88-NH_2 to CIL on the performance of enantiorecognition of Trp enantiomers by Fe-CIL/GCE: (A) 1:1, (B) 2:1.

S5. The formula of PBS buffer with different pH

Table S1. Volume ratios between NaH_2PO_4(0.10mol/L) and Na_2HPO_4(0.10mol/L) for the preparation of 0.10mol/L PBS with different pH values

pH	6.0	6.5	7.0	7.5	8.0
Volume ratios (v/v)	87.7/12.3	68.5/31.5	39.0/61.0	16.0/84.0	5.3/94.7