Supplementary Information

C-ZIF-8 modified NiO photocathode and enhanced photosensitizer signal amplification for ultra-sensitive photoelectrochemical detection of lead ions

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Contents

1. Experimental Section

1.1 Reagents and Materials

Zinc nitrate hexahydrate ($Zn(NO_3)_2 \cdot 6H_2O$, ≥99%, AR), Lead nitrate ($Pb(NO_3)_2$, ≥99%, AR), Nickel nitrate hexahydrate ($Ni(NO_3)_2 \cdot 6H_2O$, ≥98%, AR) and 2-methylimidazole (2-MIM, 99%) were purchased from Sinopharm Chemical Reagent (Shanghai, China). Hexamethylenetetramine ($C_6H_{12}N_4$, AR) was purchased from Xiya Reagent (Linyi, China). Chlorohemin (Hemin, ≥98%) was purchased from Solarbio Reagent (Beijing, China). Potassium acetate (KAc, AR) and TritonX-100 ($C_{34}H_{62}O_{11}$, AR) were purchased from Aladdin Reagent (Shanghai, China). Indium tin oxide (ITO) slices (ITO-B001-1, sheet resistance < 10 ohm/sq, coating thickness of 180 ± 25 nm) were purchased from Kaiwo Semiconductor Technology Co., Ltd. (Zhuhai, China). G-quadruplex aptamer was obtained from Sangon Biotech Co., Ltd. (Shanghai, China) with the sequence of 5'-AAA GTG GGT AGG GCG GGT TGG. Ultrapure water (≥ 18 MΩ·cm) produced by Millipore system was used for aqueous solution preparation.

1.2 Apparatuses

The morphology and structure of the prepared materials were characterized by scanning electron microscopy (SEM, JEM-F200, Japan) and powder X-ray diffraction (XRD, D/MAX/2500PC, Japan). The ultraviolet visible (UV-vis) absorption spectra were recorded using a UV-2500 UV-vis spectrophotometer (BIOMATE 160, USA). The UV-vis diffuse reflectance spectra were recorded using a cary5000 UV-vis near infrared spectrophotometer (AGILENT, USA). PEC measurements were carried out using a homemade light source system combined with a CHI 660E electrochemical

workstation (Shanghai Chenhua, China). A LED lamp (5 W) was used as the irradiation source to provide white light. The modified ITO electrode, saturated calomel electrode (SCE), and platinum plate electrode were used as working electrode, reference electrode, and counter electrode, respectively. The cyclic voltammograms and electrochemical impedance spectroscopy were also measured using a CHI 660E electrochemical workstation (Shanghai Chenhua, China) with a three electrode system. The reference electrode used for cyclic voltammetry measurement was an Ag/AgCl electrode, while the others were the same as described above.

2. UV-Vis diffuse reflectance spectrum of C-ZIF-8/NiO film

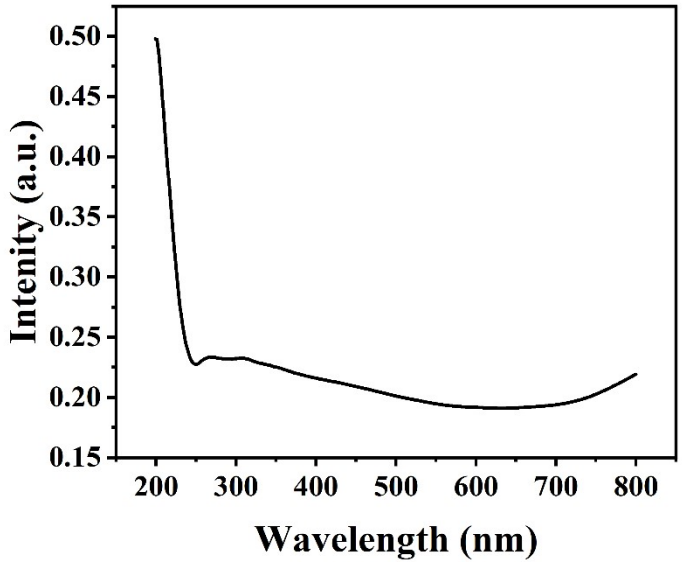

Fig. S1 UV-Vis diffuse reflectance spectrum of C-ZIF-8/NiO film.