

An ultrasensitive label-free photoelectrochemical sensor based on Ag_2O sensitized WO_3/TiO_2 acicular composite for detection of AFB1

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1. Materials and reagents

Fluorine-doped SnO_2 transparent conductive glass (FTO) was obtained from Zhuhai Kay-woo Electronic Components Co., Ltd., China. Bovine serum albumin (BSA) was obtained from Sigma-Aldrich (Beijing, China). Thioglycolic acid (TGA) was obtained from Tianjin Kermel Chemical Reagent Co., Ltd. 1-ethyl-3-(3-dimethylaminopropyl) carbodiimide hydrochloride (EDC) and N-hydroxysuccinimide (NHS) were obtained from Aladdin Reagent Database Inc (Shanghai, China). Phosphate buffered saline (PBS, 1/15 mol/L KH_2PO_4 and 1/15 mol/L Na_2HPO_4) containing GSH was used as an electrolyte for the PEC measurements.

2. Apparatus

Electrochemical impedance spectroscopy (EIS) analysis was performed on an RST5200F electrochemical workstation (Zhengzhou Shiruisi Technology Co., Ltd, China) with a three-electrode system in a 5.0 mmol/L $[\text{Fe}(\text{CN})_6]^{3-/4-}$ solution containing 0.10 mol/L KCl. Scanning electron microscope (SEM) images and energy dispersive spectrometry (EDS) were obtained using a field emission SEM (Zeiss, Germany). X-ray diffraction (XRD) patterns were collected on a D8 advance X-ray diffractometer (Bruker AXS, Germany). UV-vis spectra were obtained on a Shimadzu UV-3101PC spectrometer (Japan).

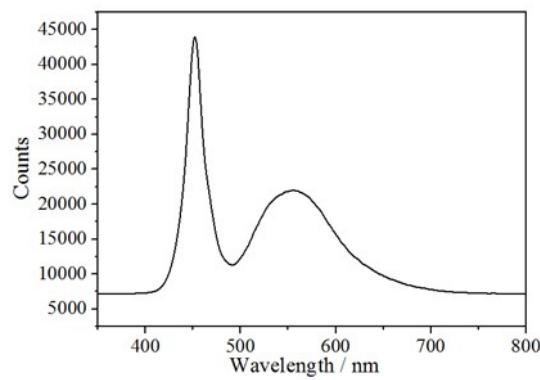


Fig. S1. Wavelength range of the LED lamp resource.

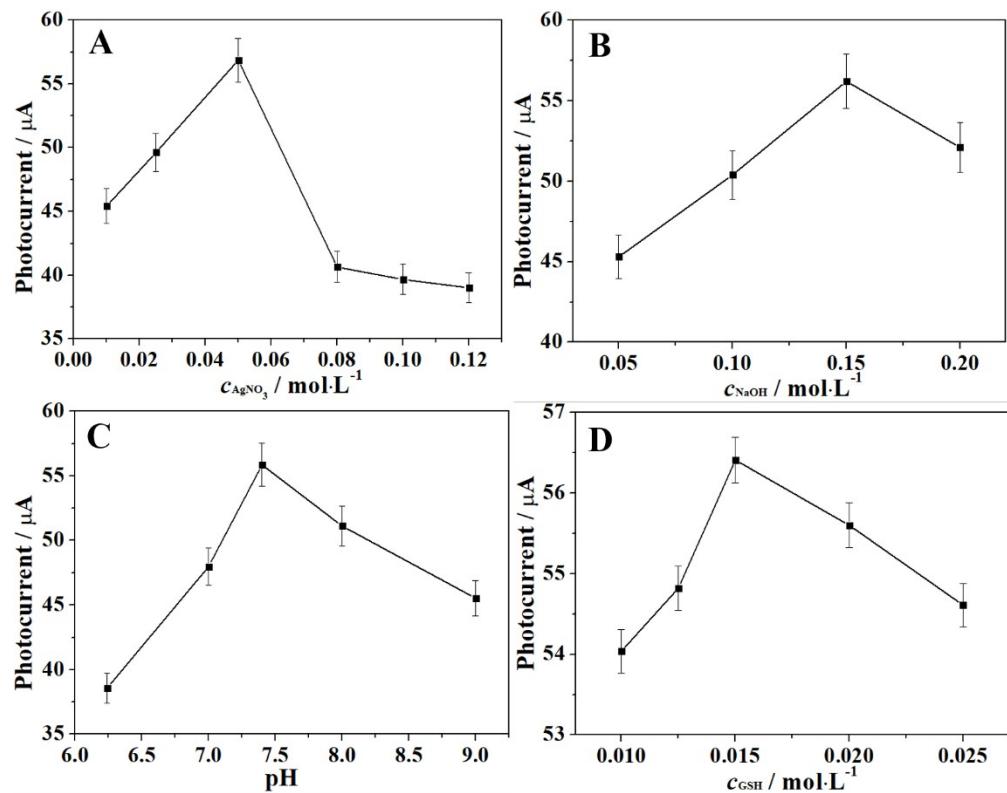


Fig. S2 Effects of concentration of (A) AgNO_3 and (B) NaOH , (C) pH and (D) concentration of GSH in the PBS buffer solution on the photocurrent response of the FTO/ WO_3 / TiO_2 / Ag_2O electrode

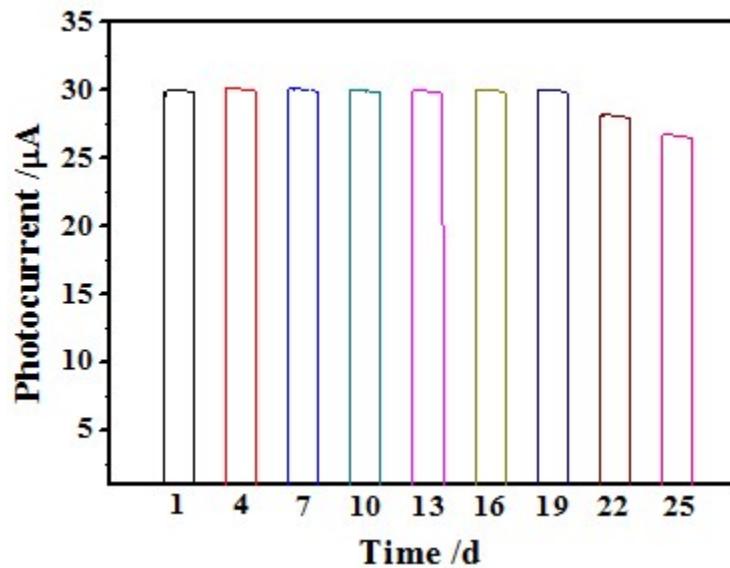


Fig. S3. The life time of the label-free PEC sensor.

Table S1 Simulation parameters of the equivalent circuit components

Electrode	R_s (Ω)	R_{et} (Ω)	C_{dl} (F)	Z_W
FTO	56.43	123	5.849×10^{-6}	0.008091
FTO/WO ₃	57.76	515.4	6.716×10^{-6}	0.001232
FTO/WO ₃ /TiO ₂	58.34	938	3.189×10^{-5}	0.005060
FTO/WO ₃ /TiO ₂ /Ag ₂ O	56.12	979.4	6.758×10^{-6}	0.001867
FTO/WO ₃ /TiO ₂ /Ag ₂ O/TGA	55.27	1220	3.083×10^{-6}	0.002619
FTO/WO ₃ /TiO ₂ /Ag ₂ O/TGA/(EDC/NHS)	55.89	2062	2.873×10^{-5}	0.001579
FTO/WO ₃ /TiO ₂ /Ag ₂ O/TGA/(EDC/NHS)/Ab ₁	57.92	3364	2.981×10^{-5}	0.003279
FTO/WO ₃ /TiO ₂ /Ag ₂ O/TGA/(EDC/NHS)/Ab ₁ /BSA	56.47	3374	2.792×10^{-5}	0.001204
FTO/WO ₃ /TiO ₂ /Ag ₂ O/TGA/(EDC/NHS)/Ab ₁ /BSA/AFB1	58.89	5121	2.847×10^{-5}	0.002315