

*Supplementary For*

**High-performance photoelectrochemical sensor based on CdS-Au  
composite nanomaterials and localized surface plasmon resonance  
for ultrasensitive detection of ascorbic acid**

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## Reagents and instruments

All the reagents for the experiments were analytically pure and no further purification.  $\text{Cd}(\text{Ac})_2 \cdot 2\text{H}_2\text{O}$  and diethylenetriamine ( $\text{C}_4\text{H}_{13}\text{N}_3$ ) were acquired from Shanghai Aladdin Biochemical Technology Co., Ltd.(Shanghai, China). Thiourea ( $\text{NH}_2\text{CSNH}_2$ ) and chloroauric acid ( $\text{HAuCl}_4 \cdot 4\text{H}_2\text{O}$ ) were obtained from Sinopharm Chemical Reagent Co., Ltd.(Shanghai, China). Ascorbic acid, sodium hydroxide ( $\text{NaOH}$ ) and sucrose were purchased from Tianjin Damao Chemical Reagent Factory (Tianjin, China). Cytochrome C, uric acid, bilirubin, and triglyceride were supplied from Meryer Chemical Technology Co.,Ltd.(Shanghai, China).

The morphologies and internal molecular structure of as-prepared nanomaterials were characterized using Transmission Electron Microscope (TEM) and High-Resolution Transmission Electron Microscope (HRTEM) from a JEOL-2100F microscope with 200 KV accelerating voltage. The phase and arrangement of atoms inside the crystal were determined using X-ray diffraction (XRD) with  $\text{Cu K}\alpha$  radiation ( $\lambda = 1.540 \text{ \AA}$ , Bruker D8 Advance X-ray diffractometer, the scanning speed is  $4^\circ \cdot \text{min}^{-1}$ ). The chemical state and elemental composition of nano-semiconductor materials were recorded by X-ray photoelectron spectra (XPS) on an ES-300 photoelectron spectrometer with an  $\text{Al K}\alpha$  source (1486.6 eV). With  $\text{BaSO}_4$  serving as the background, the optical performances of as-prepared samples were carried out by diffuse reflectance ultraviolet-visible spectra (UV-Vis DRS) from A Thermo Scientific Evolution 220 spectrophotometer (the wavelength range is 300-700 nm). All photoelectrochemical tests were performed by the CHI660E electrochemical workstation (Shanghai ChenHua Instrument Co., Ltd.) and it was outfitted with a 300 W Xenon light (the wavelength range is 300-700 nm) (CEL-HXF200-T3, Beijing Zhongjiao Jinyuan Technology Co., Ltd).