

Supporting Information (SI) for
Ternary cooperative Au-CdS-rGO hetero-nanostructures:
synthesis with multi-interfaces control and their
photoelectrochemical sensor applications

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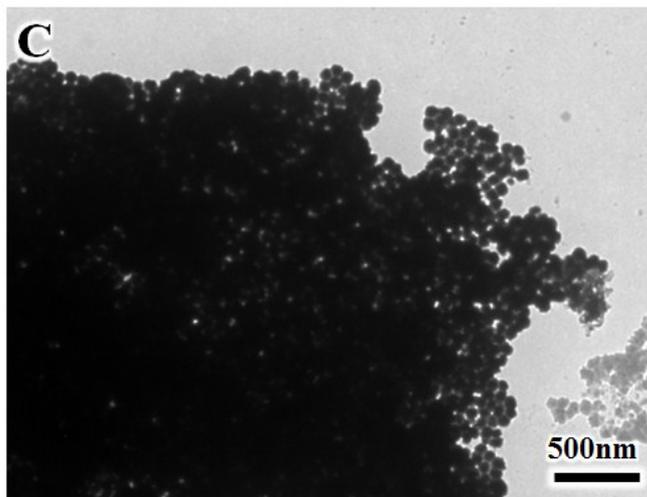
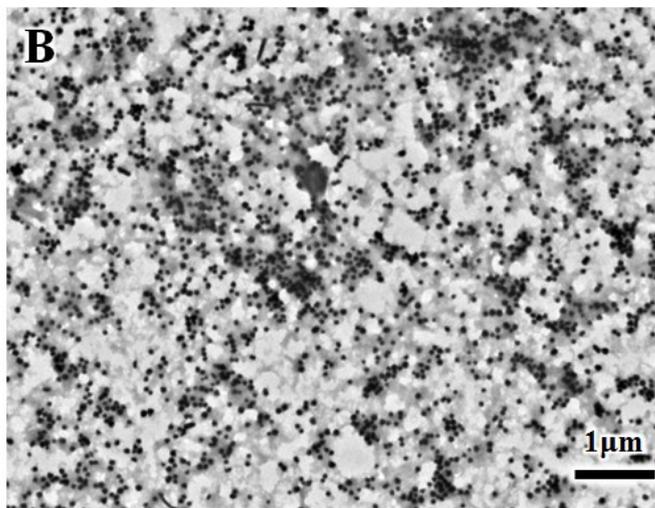
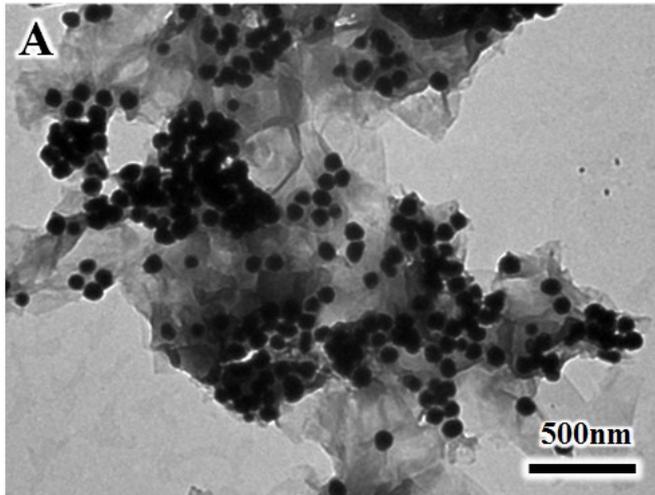


Figure S1 TEM image of A) Au-CdS-GO composite, B) Au-CdS-GO-Cys composite and C) calcined Au-CdS. It can be seen the aggregation occurred without the Cys modification (A), the morphology of the composite did not change before and after electrode calcination under 400 °C (B), without the graphene protection, the Au-CdS

NPs structures did not change but aggregation occurred after calcination (C).

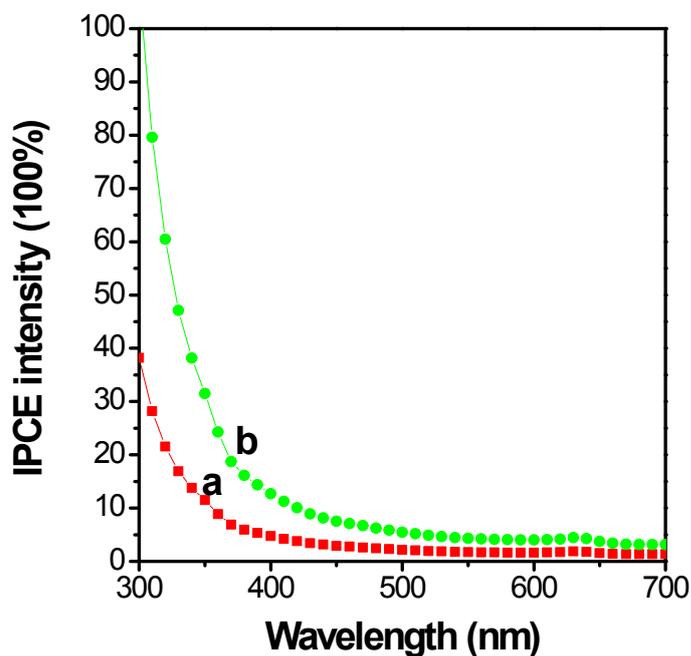


Figure S2 Incident-photon-to-electron conversion efficiency (IPCE) of a) Au-CdS modified ITO b) Au-CdS-rGO modified ITO in the wavelength of 300-700 nm at a potential of 1.23V vs. Ag/AgCl.

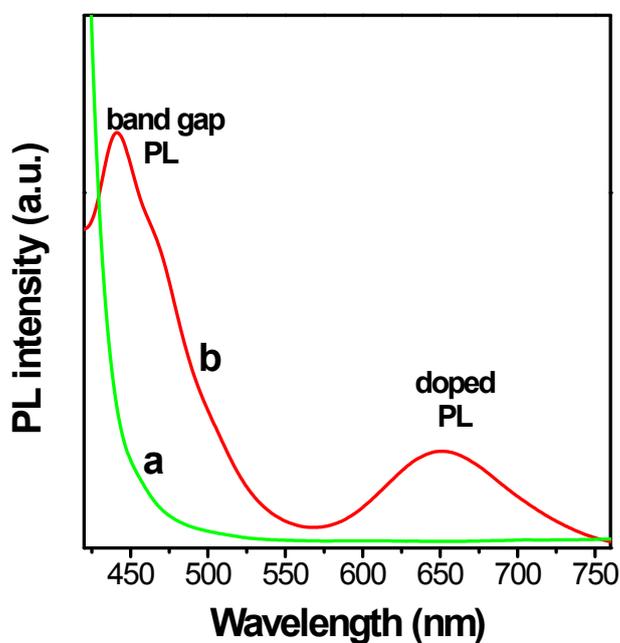


Figure S3 Photoluminescence spectra of a) Au-CdS-rGO composite, b) CdS ($\lambda_{\text{ex}} = 390$ nm).

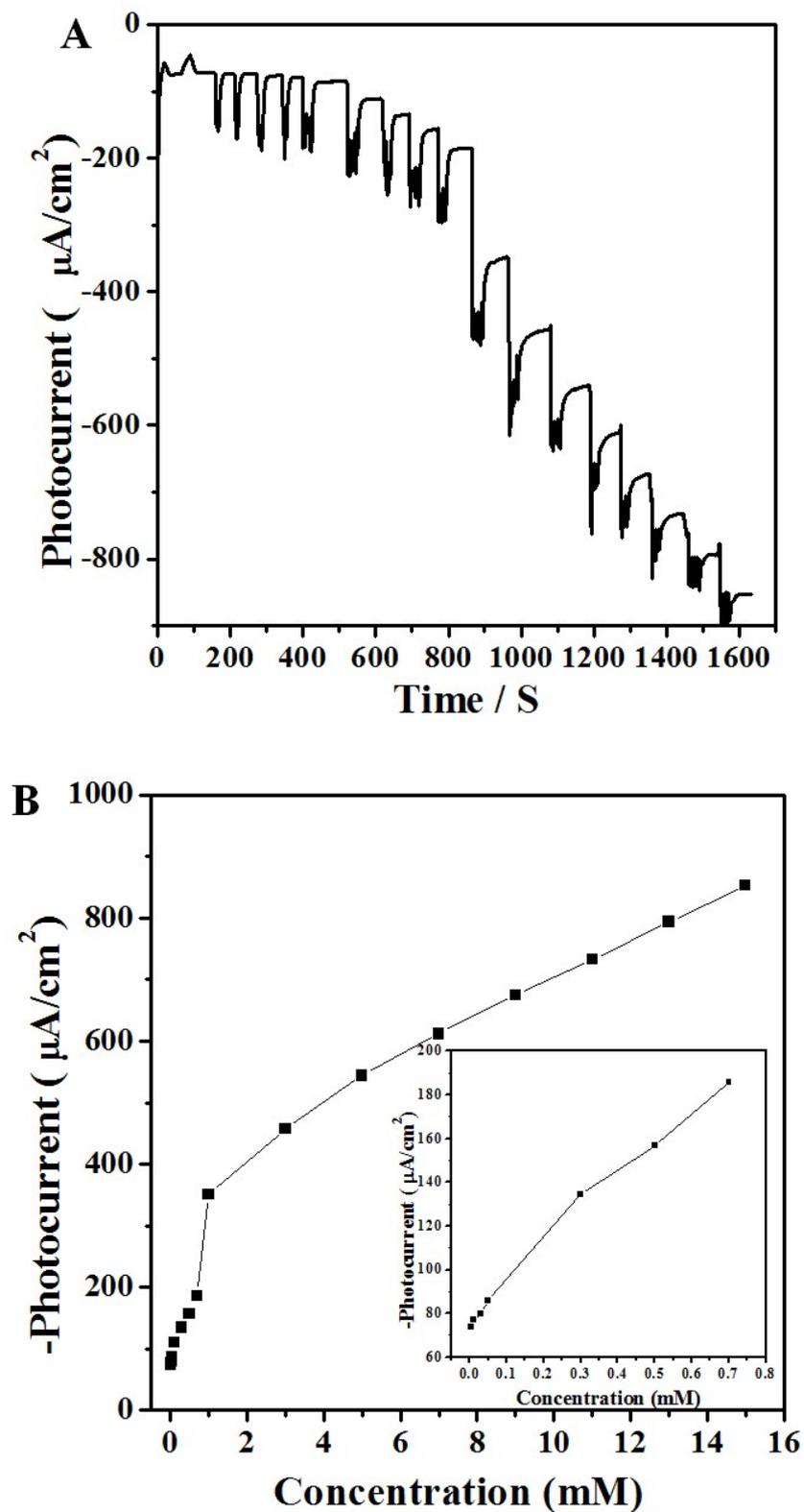


Figure S4 A) Photocurrent responses Au-CdS-rGO modified ITO and B) Linear relationship of -Photocurrent vs. solution H_2O_2 concentration. Photo electrochemical measurements were performed using a home-built system that included a Xe lamp (CEL-HXF 300W), and a CHI 660E electrochemical workstation (CHI Instruments, Shanghai, China). The distance between the light source and the photo electrode was

fixed at 7cm. All photo electrochemical performances were carried out in a conventional three-electrode system at a basis potential -0.3: a modified ITO electrode with an area of 3 cm² as the working electrode, a Pt wire as the counter electrode and a saturated calomel electrode (SCE) as reference electrodes. In a typical experiment, a 3 cm² area working Au-CdS-rGO electrode was made by thermal evaporation of approximately 200 μ L of solution onto an ITO-coated glass slide. 0.1 M phosphate buffer solution (PBS, pH 7.0) was prepared with NaH₂PO₄ and Na₂HPO₄, used as the blank solution for photocurrent measurements, which was degassed by highly pure nitrogen before electrochemical experiments but left open to air during measurements. It can be seen the modified electrode had a good response for the 0.005 to 15 mM concentration of H₂O₂. Inset figure in B showed the low concentration H₂O₂ response from 0.005 to 0.7 mM.