Electronic Supplementary Information

One-pot synthesis of $Cd_xZn_{1-x}S$/reduced graphene oxide nanocomposites with improved photoelectrochemical performance for selective determination of Cu^{2+}

Jiajia Yan, Kun Wang,* Qian Liu, Jing Qian, Xiaoya Dong, Wei Liu and Baijing Qiu

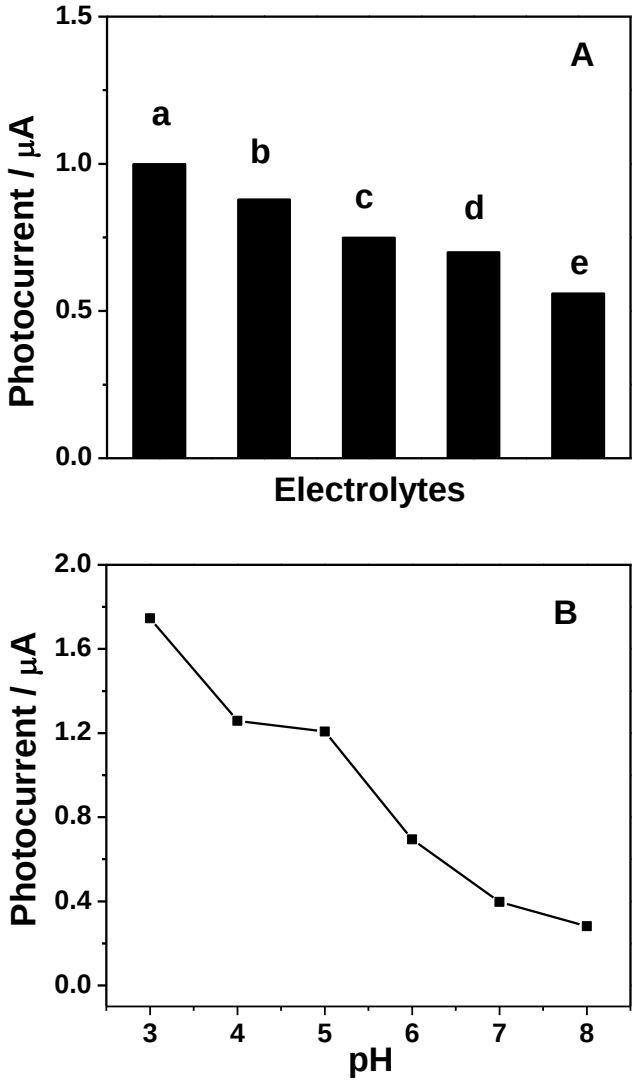

Fig. S1. (A) The photocurrent response of $Cd_{0.5}Zn_{0.5}S$/rGO/GCE in different buffer solution (0.1 M, pH 5.0): (a) PBS, (b) HAc-NaAc, (c) B-R, (d) Mcilvaine and (e) Tris-HCl. (B) The photocurrent response of $Cd_{0.5}Zn_{0.5}S$/rGO/GCE in 0.1 M PBS with different pH values.

PBS was selected according to the PEC performance of $Cd_{0.5}Zn_{0.5}S$/rGO/GCE in different buffer solution. As shown in Fig. S1A, the $Cd_{0.5}Zn_{0.5}S$/rGO/GCE showed the optimum PEC performance in 0.1 M PBS than the other electrolytes. Thus, 0.1 M PBS was chosen as the electrolyte in our work.

In addition, the photocurrent intensity of $Cd_{0.5}Zn_{0.5}S$/rGO/GCE in 0.1 M PBS with different pH values was discussed and showed in Fig. S1B. Under the alkaline condition, the photocurrent intensity of $Cd_{0.5}Zn_{0.5}S$/rGO/GCE was very week. While in the acidic solution, the photocurrent intensity of $Cd_{0.5}Zn_{0.5}S$/rGO/GCE was much higher than that under alkaline condition. When the pH value was 3.0, the photocurrent intensity of $Cd_{0.5}Zn_{0.5}S$/rGO/GCE achieved 1.7 μA, which was only 0.4 μA higher than that in the PBS with a pH value of 5.0. In order to obtain a moderate experimental condition and acceptable photocurrent intensity, the PBS with a pH value of 5.0 was chosen to conduct the PEC measurements.

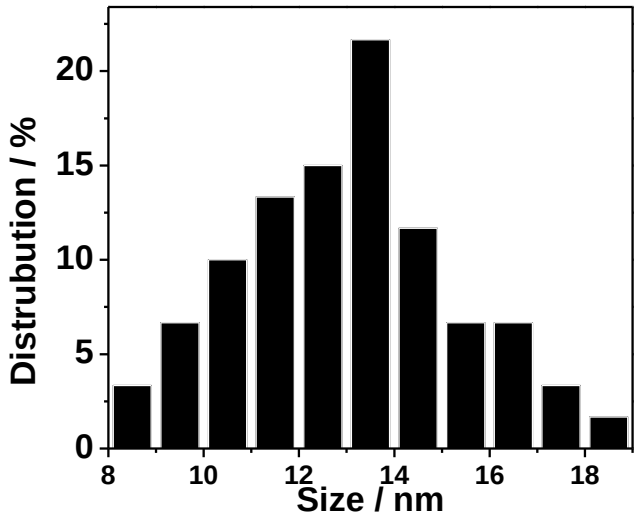

Fig. S2. The histogram of size distribution of $Cd_{0.5}Zn_{0.5}S$ in the $Cd_{0.5}Zn_{0.5}S$/rGO nanocomposite.

Table S1. The photocurrent response of different semiconducting materials.

Modified Materials	Photocurrent Intensity / μA	Reference
$Cd_{0.5}Zn_{0.5}S$/rGO	1.0	This work
CdS QDs	0.7	34
CdTe QDs	0.1	35
CdSe/ZnS QDs	0.008	36
CdS	0.25	37
ZnS	0.55	37
ZnO	0.6	38

Table S2. Performance comparison of the PEC method for the determination of Cu^{2+} with other methods.

Method	Linear Range μM	Detection Limit μM	Reference
Photoelectrochemical Analysis	0.02-20	0.0067	This work
Photoelectrochemical Analysis	0.08-100	0.0059	35
Photoelectrochemical Analysis	0.02-40	0.01	39
Fluorescence Resonance Energy Transfer	0.16-2.87	0.16	40
Voltammetry	0.075-2.5	0.031	41
Atomic Absorption Spectra	0.2-10	0.2	42
Potentiometric Method	0.1-10000	0.08	43