Electronic Supplementary Information (ESI) for

Controllable honeycomb-like amorphous cobalt sulfide architecture directly grown on the reduced graphene oxide-poly(3,4-ethylenedioxythiophene) composite through electrodeposition for non-enzyme glucose sensing

Alan Meng[1, 2], Liying Sheng[2], Kun Zhao[1], Zhenjiang Li[2]*

[1] State Key Laboratory Base of Eco-chemical Engineering, College of Chemistry and Molecular Engineering, Qingdao University of Science and Technology, Qingdao 266042, Shandong, P. R. China.

[2] Key Laboratory of Polymer Material Advanced Manufacturings Technology of Shandong Provincial, College of Electromechanical Engineering, College of Sino-German Science and Technology, Qingdao University of Science and Technology, Qingdao 266061, Shandong, P. R. China.

*Corresponding author, E-mail address: zhenjiangli@qust.edu.cn

Fax: +86 532 88956228. Tel: +86 532 88956228.

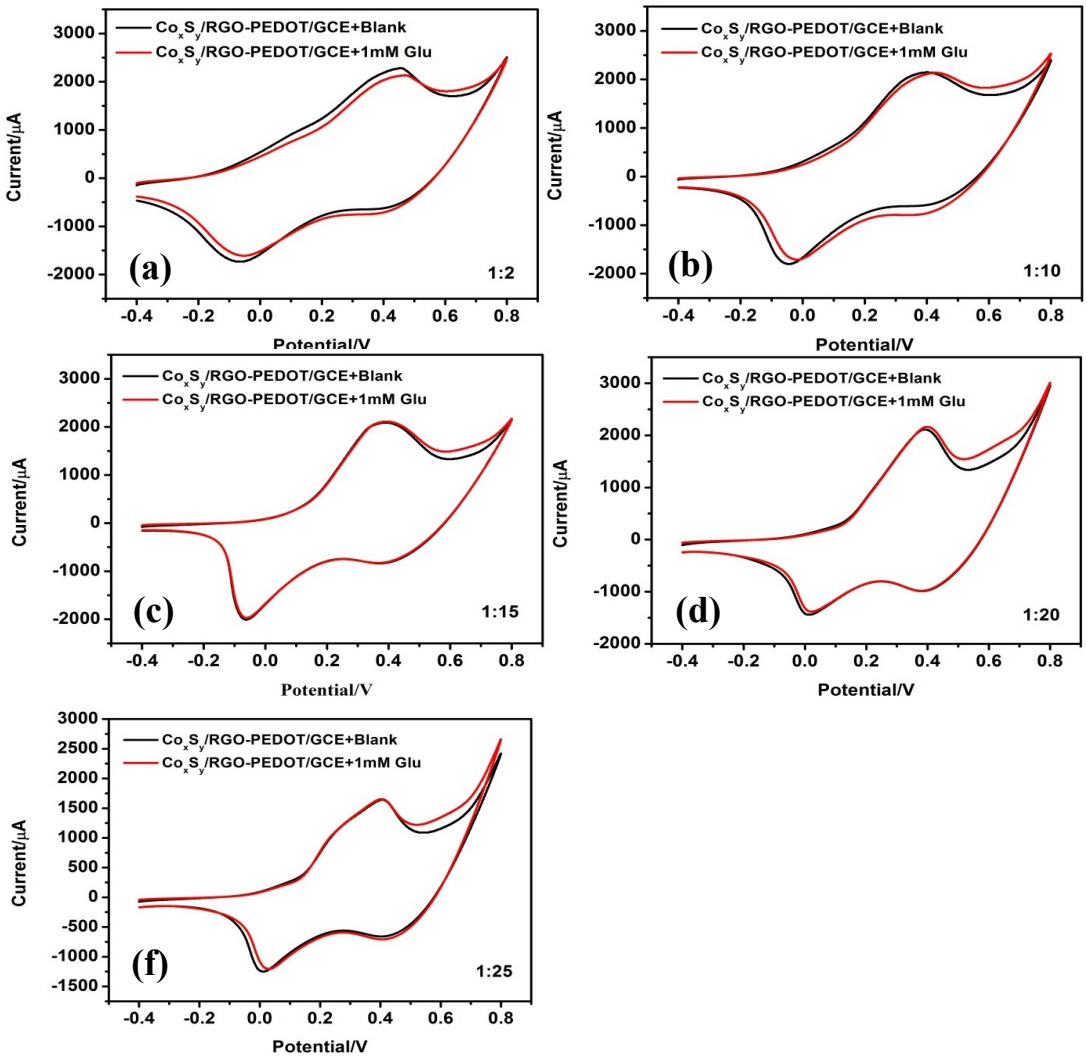

Fig. S1 CVs of Co_xS_y/rGO-PEDOT/GCE prepared with different concentration ratio between $CoCl_2 \cdot 6H_2O$ and thiourea in 0.1 M NaOH without (blank) and with (red) 1.0 mM glucose (a: 1:2, b: 1:10, c: 1:15, d: 1:20, e: 1:25).

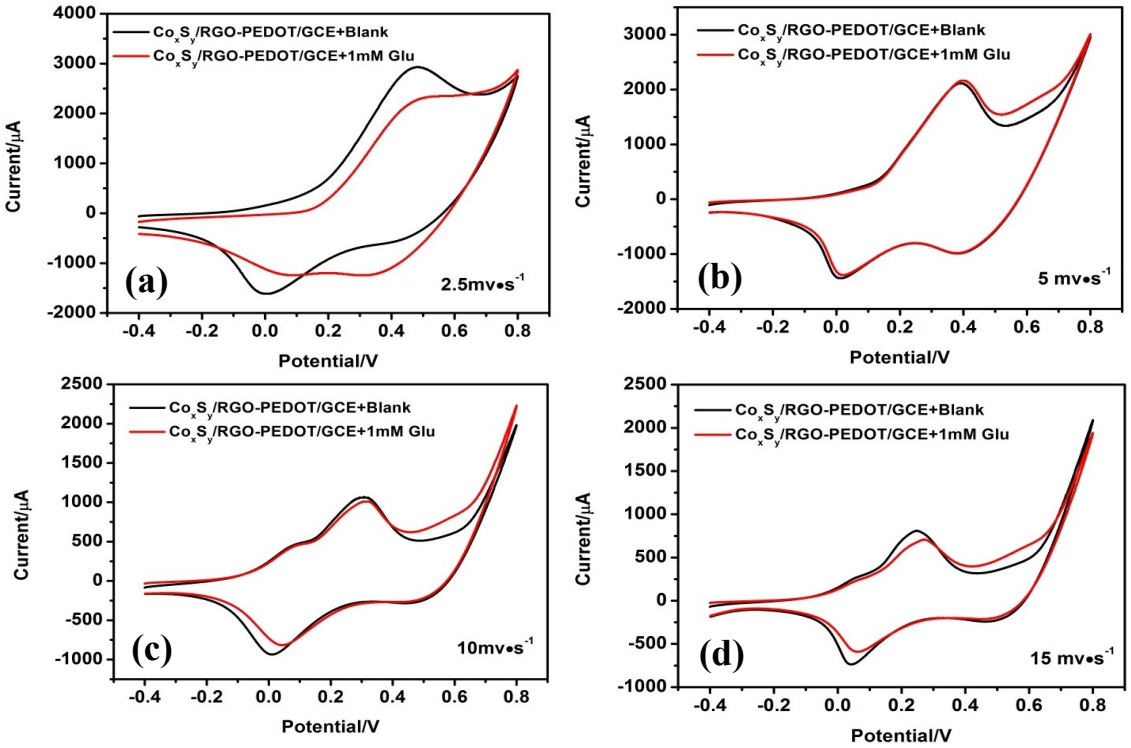

Fig. S2 CVs of Co_xS_y/rGO-PEDOT/GCE prepared with different deposition scan rates in 0.1 M NaOH without (blank) and with (red) 1.0 mM glucose (a: 2.5 mV s^{-1}, b: 5 mV s^{-1}, c: 10 mV s^{-1}, d: 15 mV s^{-1}).

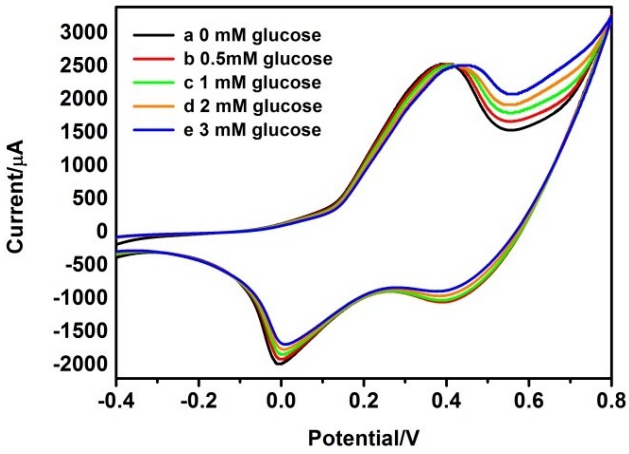

Fig. S3 CVs of Co_xS_y/rGO-PEDOT/GCE electrode in 0.1 M NaOH with different glucose concentrations

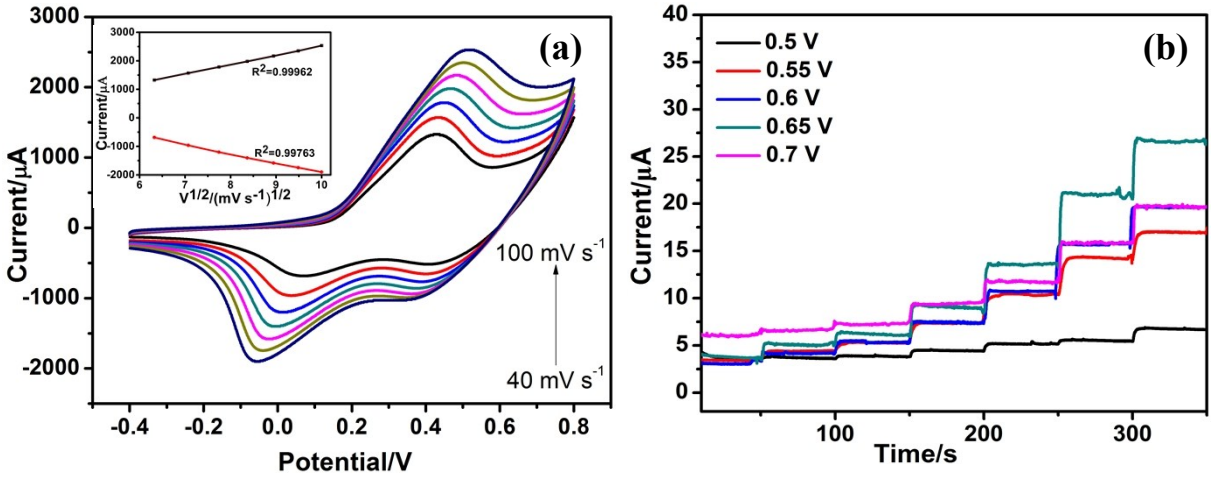

Fig. S4 CVs of Co_xS_y/rGO-PEDOT/GCE at various scan rates in 0.1 M NaOH with 1 mM glucose (a) (inset: calibration curves between peak currents and the square root of the scan rate, I_p vs. $v^{1/2}$). Amperometric responses of Co_xS_y/rGO-PEDOT/GCE upon the successive additions of glucose at different applied potentials (0.5 V, 0.55 V, 0.6 V, 0.65 V, 0.7 V) in 0.1 M NaOH (b).

To give further insight into the electrokinetics of the electrocatalytic oxidation of glucose system, CVs of Co_xS_y/rGO-PEDOT/GCE at various scan rates in 0.1 M NaOH with 1 mM glucose were investigated and the result was shown in Fig. S4a. Apparently, the current responses increased with an increase of the scan rates from 40 mV s^{-1} to 100 mV s^{-1}. It was discovered that the anodic current response peaks became more positive and the cathodic current response peaks became more

negative. According to the data of anodic current, cathodic current and the corresponding square root of the scan rate, the relationship between anodic current, cathodic current and the corresponding square root of the scan rate was acquired and the result was depicted in the inset of Fig. S4a. It could be evidently seen that the currents response was linearly proportional to the square root of the scan rate from 40 mV s^{-1} to 100 mV s^{-1} in 0.1 M NaOH solution, which suggested it was a diffusion-controlled process (correlation coefficient, R^2=0.9997 and 0.9976, respectively). In addition, due to the applied potential can strongly affect the current response of the sensor, the detection potential should be optimized by amperometry at different applied potentials to obtain the best current response towards glucose. Fig .S4b depicted the amperometric responses of Co_xS_y/rGO-PEDOT/GCE upon the successive additions of glucose at different applied potentials from 0.50 V to 0.70 V. It can be clearly seen that the current response increased correspondingly with the increase of the applied potential from 0.5 V to 0.65 V. When the applied potential was 0.65 V, the current response reached a maximum value. Then the current response decreased when the applied potential was more than 0.65 V. Therefore, 0.65 V was adopted as the optimum applied potential for detection of glucose in the following experiments.

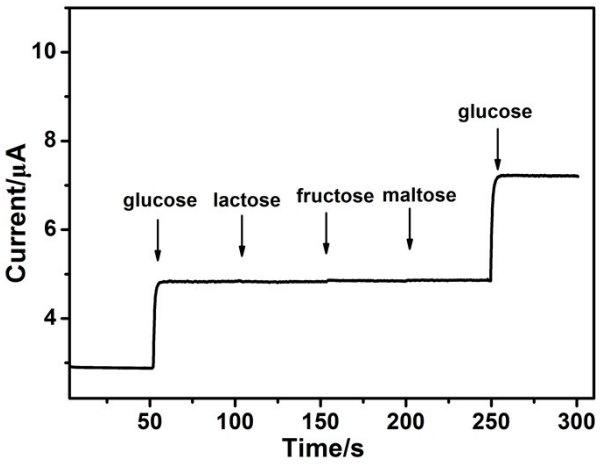

Fig. S5 Current results from an i-t test of Co_xS_y/rGO-PEDOT/GCE with various interferences.

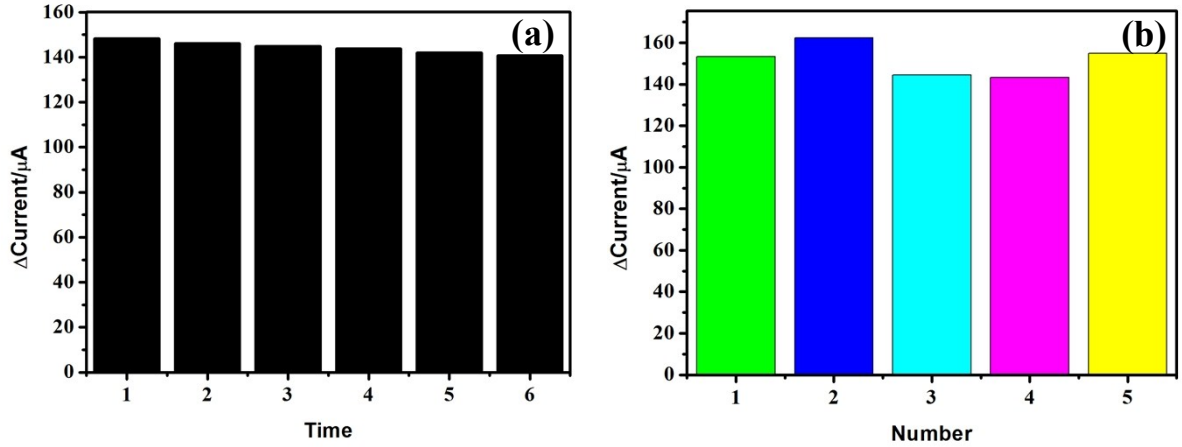

Fig. S6 (a) Repeatability of the same sensor towards 1 mM glucose measured 6 times; (b) Reproducibility of 5 different sensors towards 1 mM glucose in 0.1 M NaOH.