

Electronic Supplementary Information:

Insights into the effects of graphene oxide sheet on the conformation
and activity of glucose oxidase: towards developing a nanomaterial–
based protein conformation assay

Qian Shao, Ping Wu, Xiaoqing Xu, Hui Zhang and Chenxin Cai*

*Jiangsu Key Laboratory of New Power Batteries, College of Chemistry and Materials Science, Nanjing
Normal University, Nanjing 210097, China.*

* Corresponding author, E-mail: cxcai@njnu.edu.cn (C. Cai); Tel: 86-25-85891780; Fax: 86-25-85891767.

1. XPS spectrum of GO

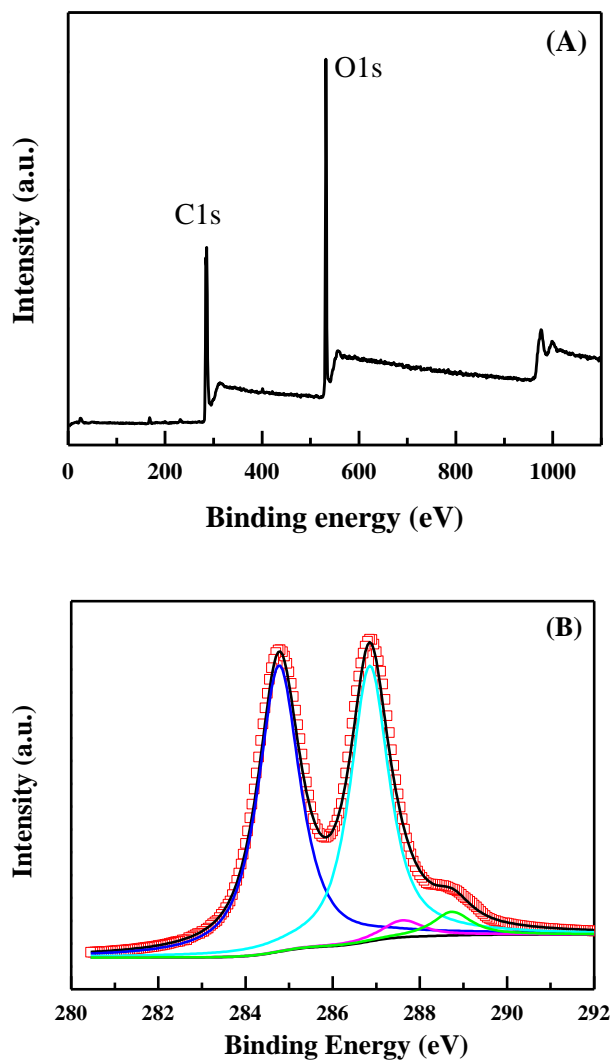


Fig. S1 (A) XPS spectrum of the prepared GO sheets; (B) is XPS spectra of C1s in GO and their related curve-fitted components.

2. FAD fluorescence emission spectra

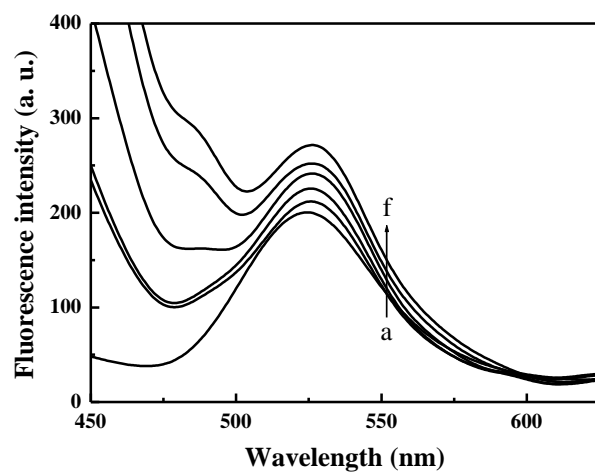


Fig. S2 The FAD fluorescence emission spectra of native GOx ($150 \mu\text{g mL}^{-1}$, a) and the GOx-GO bioconjugate system with GOx concentration fixed at $150 \mu\text{g mL}^{-1}$ and GO concentration of 2.5 (b), 5 (c), 10 (d), 20 (e), and $25 \mu\text{g mL}^{-1}$ (f) in 0.1 M PBS (pH 7.0). The excitation wavelength is 373 nm.

3. Fluorescence emission spectra of GO

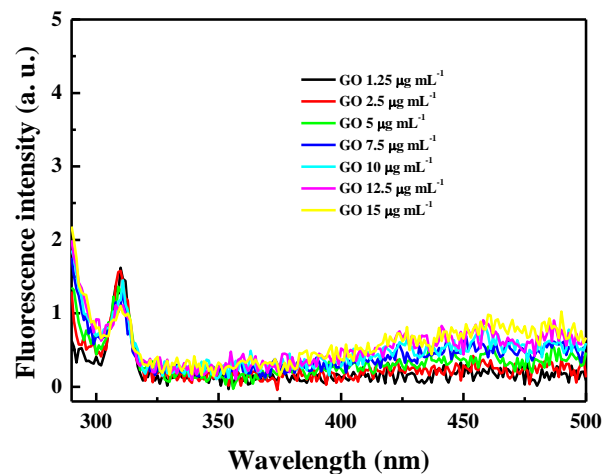


Fig. S3 The fluorescence emission spectra of GO in PBS at a concentration of 1.25, 2.5, 5, 7.5, 10, 12.5, and 15 $\mu\text{g mL}^{-1}$, respectively. The excitation wavelength is 279 nm.

4. CD spectra of the GO_x–GO bioconjugate system at different interaction time

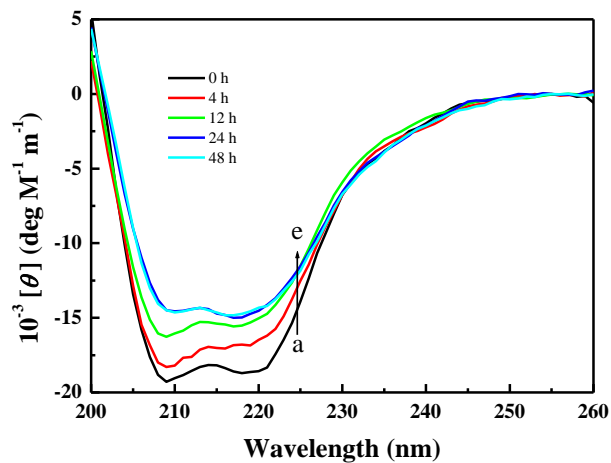


Fig. S4 Far-UV CD spectra of native GO_x ($300 \mu\text{g mL}^{-1}$, a) and GO_x–GO bioconjugate system with GO_x concentration at $300 \mu\text{g mL}^{-1}$ and GO concentration at $25 \mu\text{g mL}^{-1}$ in PBS (0.1 M, pH 7.0) for the interaction time of 4 (b), 12 (c), 24 (d), and 48 h (e), respectively.

5. CD spectra of native GOx and GOx–GO bioconjugate system at different solution pH

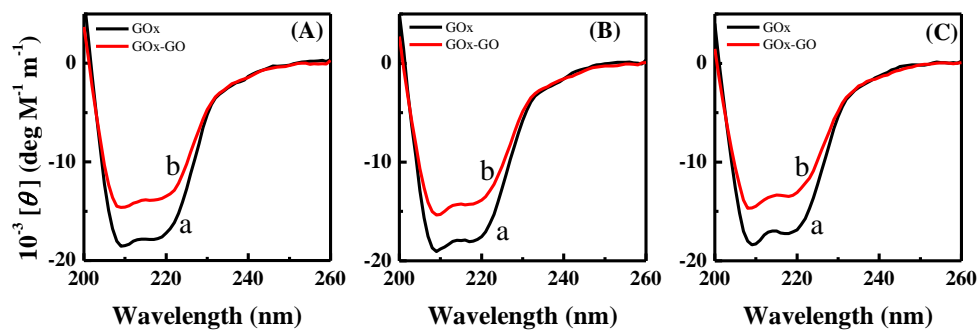


Fig. S5 Far-UV CD spectra of native GOx ($300 \mu\text{g mL}^{-1}$, a) and GOx–GO bioconjugate system with the GOx concentration at $300 \mu\text{g mL}^{-1}$ and GO concentration at $25 \mu\text{g mL}^{-1}$ in PBS (0.1 M) at pH of 6.0 (A), 7.0 (B), and 8.0 (C), respectively.

6. CD spectra of native GOx at different ionic strength

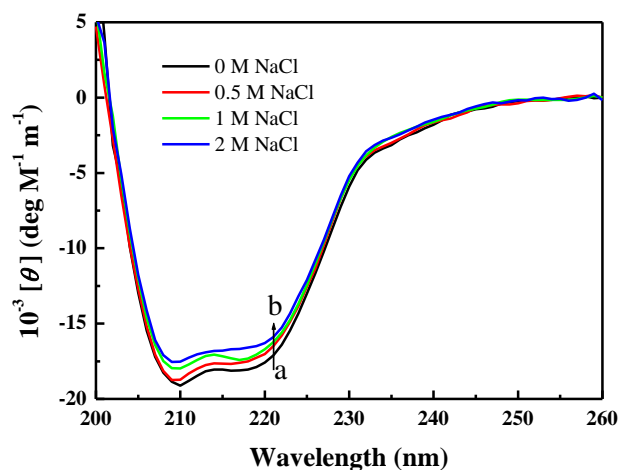


Fig. S6 Far-UV CD spectra of native GOx (300 $\mu\text{g mL}^{-1}$) in PBS (0.1 M, pH 7.0) under the presence of 0 (a), 0.5 (b), 1.0 (c), and 2.0 M NaCl (d), respectively.

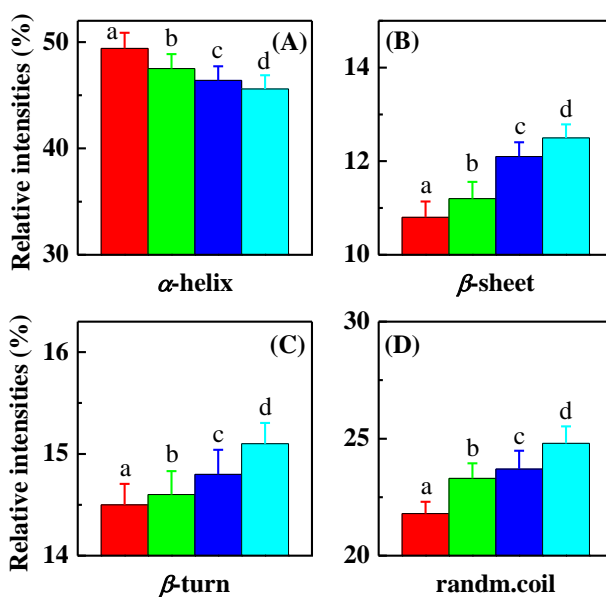


Fig. S7 Relative amount of α -helix (A), β -sheet (B), β -turn (C), and random coil (D) of native GOx in PBS (0.1 M, pH 7.0) under the presence of 0 (a), 0.5 (b), 1.0 (c), and 2.0 M NaCl (d), respectively. The data were obtained from CD spectra presented in Fig. S6 using a CDNN program. The data represented here are obtained by averaging the five independent measurements ($n = 5$). The error bar represents the standard deviation.

7. Effects of ionic strength on the disperse ability of GO and the GO_x–GO bioconjugates

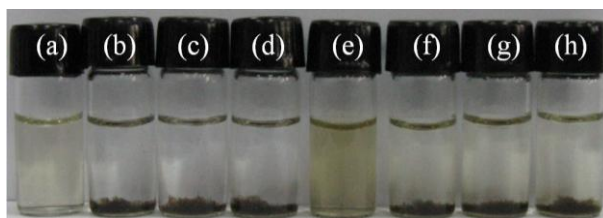


Fig. S8 Pictures of GO (a–d) and GO_x–GO bioconjugates (e–h) in PBS (0.1 M, pH 7.0) containing different concentration of NaCl. The concentration of NaCl is 0 (a, e), 0.5 (b, f), 1.0 (c, g), and 2.0 M (d, h). The concentration of GO in PBS is 25 $\mu\text{g mL}^{-1}$. The GO_x–GO bioconjugates were prepared with GO_x at 300 $\mu\text{g mL}^{-1}$ and GO at 25 $\mu\text{g mL}^{-1}$.

8. Dependent of absorbance of the enzymatic system on reaction time

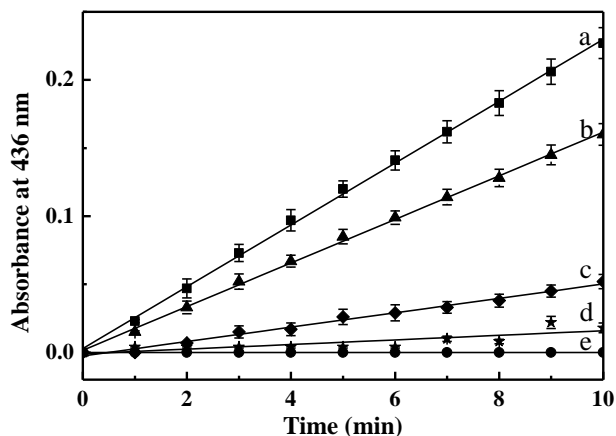


Fig. S9 Dependent of absorbance of oxidized form of *o*-dianisidine generating in the catalytic system at 436 nm on reaction time for native GOx ($0.6 \mu\text{g mL}^{-1}$, a) and GOx-GO bioconjugate system with the concentrations of GO of 2.5 (b), 5 (c), and $25 \mu\text{g mL}^{-1}$ (d) in PBS (0.1 M, pH 7.0). The catalytic system contains 16.7 mg mL^{-1} β -D-glucose, $8 \mu\text{g mL}^{-1}$ HRP, and $53 \mu\text{g mL}^{-1}$ *o*-dianisidine. The volume of the system is 3.1 mL. Curve (e) displays the absorbance of the system with native GOx being replaced by GO ($25 \mu\text{g mL}^{-1}$). The data represented here are obtained by averaging the five independent measurements ($n = 5$). The error bar represents the standard deviation.