

Supplementary Materials

# A Highly Sensitive Electrochemical Glucose Sensor Based on Room Temperature Exfoliated Graphite-Derived Film Decorated with Dendritic Copper

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**Citation:** Tang, J.; Wei, L.; He, S.; Li, J.-H.; Nan, D.; Ma, L.; Shen, W.; Kang, F.; Lv, R.; Huang, Z.-H. A Highly Sensitive Electrochemical Glucose Sensor Based on Room Temperature Exfoliated Graphite-Derived Film Decorated with Dendritic Copper. *Materials* **2021**, *14*, 5067. <https://doi.org/10.3390/ma14175067>

Academic Editor: Enrico Negro

Received: 8 July 2021

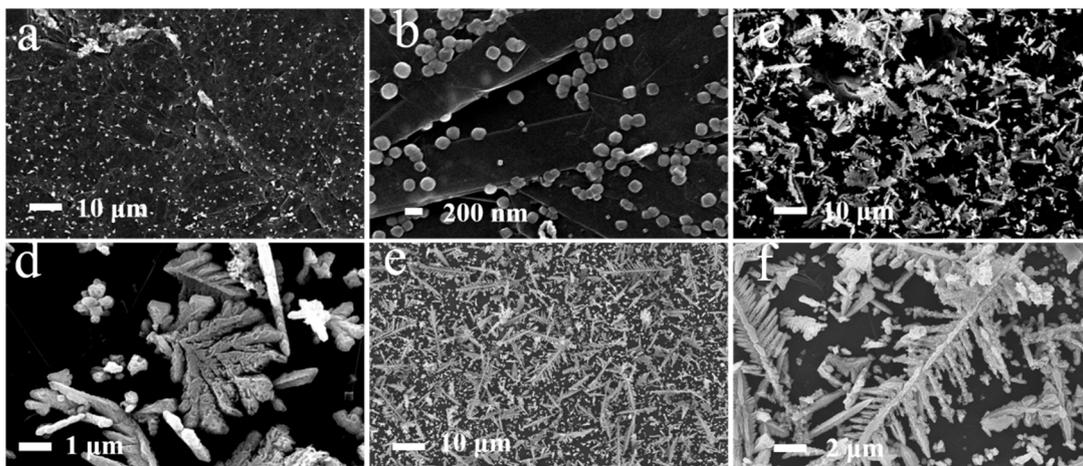
Accepted: 2 September 2021

Published: 4 September 2021

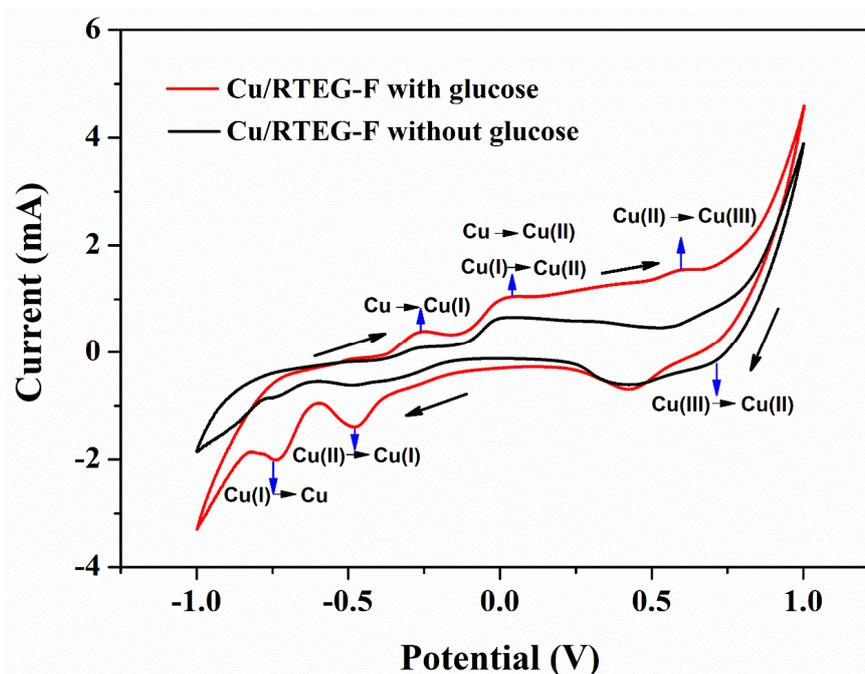
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**Figure S1.** SEM images of Cu/RTEG-F at different deposition time: 6 min (a,b), 10 min (c,d), 12 min (e,f).

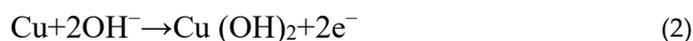


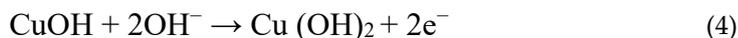
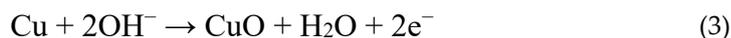
**Figure S2.** CV curves of Cu/RTEG-F electrode existence (red line) or nonexistence (black line) glucose in 0.1 M NaOH solution with potential -1.0 V to 1.0 V.

Figure S2 shows CV curves of Cu/RTEG-F electrodes existence (red line) or nonexistence (black line) glucose in 0.1 M NaOH solution at potential from -1.0 V to 1.0 V. According to previous reports[1–4], Cu on RTEG-F substrate was oxidized to Cu ( I ), such as CuOH at about -0.3 V.

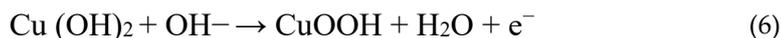
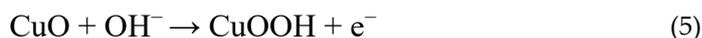


Cu or Cu ( I ) was oxidized to Cu (II) ( $\text{Cu}(\text{OH})_2$  or  $\text{CuO}$ ) due to the exist of  $\text{OH}^-$  at about -0.15 V.





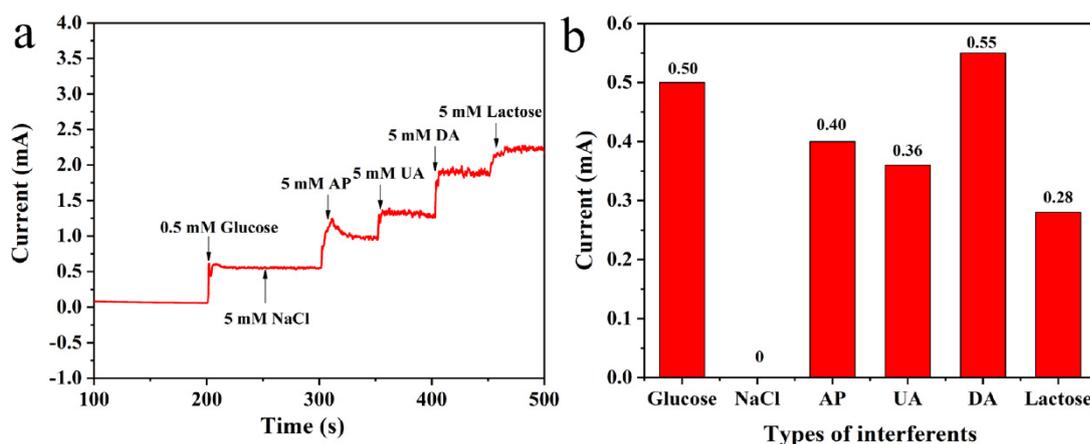
The exact mechanism of glucose catalyzed and oxidized by copper-based electrode in alkaline medium is not clear. The most widely accepted mechanism is Cu (II) was further oxidized to Cu (III) such as CuOOH, and Cu (III) acted as an electronic medium to catalyze glucose at about 0.6 V–0.8 V.



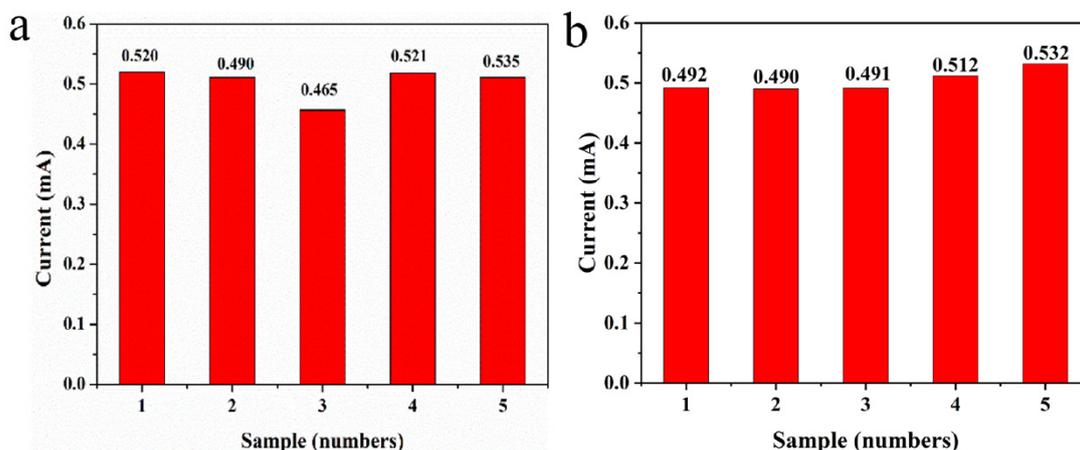
Glucose was catalyzed by Cu (III) become glucoselactone, while the Cu (III) was reduced to Cu (II) at about 0.55 V.



The reduction peaks at  $-0.5$  V and  $-0.75$  V of the reverse scanning correspond to Cu (II)  $\rightarrow$  Cu (I) and Cu (I)  $\rightarrow$  Cu, respectively. In addition, in the presence of glucose, there is no peak of Cu (III)  $\rightarrow$  Cu (II) conversion, indicating that Cu (III) catalyzes the oxidation of glucose to gluconic acid, which is consumed at the same time. This phenomenon also proves that the oxidation of glucose by copper-based glucose sensor is irreversible.



**Figure S3.** (a) The current response of the Cu/RTEG-F electrode by the addition of 0.5 mM glucose, 5.0 mM NaCl, AP, UA, DA and Lactose into 0.1 M NaOH solution. (b) Increased current value after adding different interferences.



**Figure S4.** (a) The reproducibility of Cu/RTEG-F electrode, (b) The repeatability of Cu/RTEG-F electrode.

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