

課題番号 : F-20-AT-0092
利用形態 : 機器利用
利用課題名(日本語) : グラフェンバイオセンサーの iv 特性測定
Program Title (English) : IV curve measurement of graphene biosensor
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キーワード/Keyword : 電気計測、グラフェン、バイオセンサー

1. 概要(Summary)

Graphene FET (GFET) is one kind of the field effect transistor (FET). But its semiconductor channel is exchanged into graphene. Graphene is only one atom thick, the channels in GFETs have unprecedented sensitivity, which can be exploited on a wide variety of sensing applications such as photosensing, gas sensing, and biosensing.

As an emerging detection platform, graphene FET biosensor has been extensively verified for its ultra-high sensitivity and specificity. Although the sensitivity cannot be further improved by amplification like PCR, it has the advantage of rapid detection. So I think it is particularly suitable for the preliminary screening of large-scale epidemics. Here I use equipment to measure the IV curve of graphene. as an important electricity method that can characteristic the graphene, the IV curve is usually used to monitor the position of the Dirac point.

2. 実験(Experimental)

【利用した主な装置】

マニュアルウェハープローバー(2F)

【実験方法】

- 1.The IV curve of the bare GFET is tested first.
2. The IV curve of the linker (1-pyrenebutyric acid n-hydroxysuccinimide ester (PBASE) or gold-nanoparticles (AuNPs)) modified GFET is tested secondly.
- 3.Comparing the position of the Dirac point between these two experiments.

3. 結果と考察(Results and Discussion)

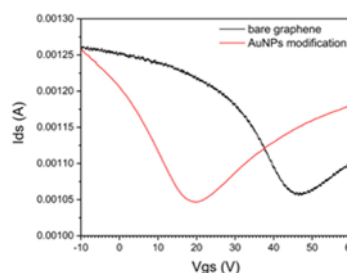


Fig.1 IV curve of the GFETs.

The Dirac point changed to the left after AuNPs modified based on the result of the Fig. 1.

4. その他・特記事項(Others)

なし。

5. 論文・学会発表(Publication/Presentation)

- (1) Wang, S.; Hossain, M. Z.; Shinozuka, K.; Shimizu, N.; Kitada, S.; Suzuki, T.; Ichige, R.; Kuwana, A.; Kobayashi, H. Graphene Field-Effect Transistor Biosensor for Detection of Biotin with Ultrahigh Sensitivity and Specificity. *Biosensors and Bioelectronics* 2020, 165, 112363. <https://doi.org/10.1016/j.bios.2020.112363>.
- (2) Wang, S.; Hossain, Md. Z.; Han, T.; Shinozuka, K.; Suzuki, T.; Kuwana, A.; Kobayashi, H. Avidin-Biotin Technology in Gold Nanoparticle-Decorated Graphene Field Effect Transistors for Detection of Biotinylated Macromolecules with Ultrahigh Sensitivity and Specificity. *ACS Omega* 2020, 5 (46), 30037–30046. <https://doi.org/10.1021/acsomega.0c04429>.

6. 関連特許(Patent)

なし。