

Biosensors using graphene-based devices

Kenzo Maehashi

Takashi Ikuta

Institute of Engineering, Tokyo University of Agriculture and Technology, 2-24-16 Nakacho, Koganei, Tokyo 184-8588, Japan

maehashi@cc.tuat.ac.jp

Abstract

Rapid monitoring of biomolecules is required in various applications, including clinical diagnostics, environmental testing, food analysis, bioterrorism detection technologies, etc.

Since graphene has a perfect two-dimensional structure, electrical characteristics in graphene devices are very sensitive for modulation of surface potentials in graphene channels.

We will introduce highly sensitive electrical detection of biological molecules or gas based on graphene FETs [1-5]. Moreover, for development of highly sensitive influenza-virus sensors, glycan-modified graphene devices were also fabricated [6]. Then, to enhance the sensitivity of the biosensors, the randomly stacked CVD graphene was fabricated, which exhibited a very high mobility, which was ascribed to the maintenance of linear band dispersion and a reduction in the scattering of the carriers [7].

References

- [1] S. Okuda, T. Ono, Y. Kanai, T. Ikuta, M. Shimatani, S. Ogawa, K. Maehashi, K. Inoue, and K. Matsumoto, *ACS Sensors* 3 (2018) 200.
- [2] Y. Sakamoto, K. Uemura, T. Ikuta, and K. Maehashi, *Jpn. J. Appl. Phys.* 57 (2018) 04FP05.
- [3] S. Okamoto, Y. Ohno, K. Maehashi, K. Inoue, and K. Matsumoto, *Jpn. J. Appl. Phys.* 51 (2012) 06FD08.

- [4] K. Maehashi, Y. Sofue, S. Okamoto, Y. Ohno, K. Inoue and K. Matsumoto, *Sensors and Actuators B* 187 (2013) 45.
- [5] Y. Ohno, K. Maehashi, and K. Matsumoto, *J. Am. Chem. Soc.* 132 (2010) 18012.
- [6] T. Ono, T. Oe, Y. Kanai, T. Ikuta, Y. Ohno, K. Maehashi, K. Inoue, Y. Watanabe, S. Nakakita, Y. Suzuki, T. Kawahara, and K. Matsumoto, *Jpn. J. Appl. Phys.* 56 (2017) 030302.
- [7] K. Uemura, T. Ikuta, and K. Maehashi, *Jpn. J. Appl. Phys.* 57 (2018) 030311.

Figures

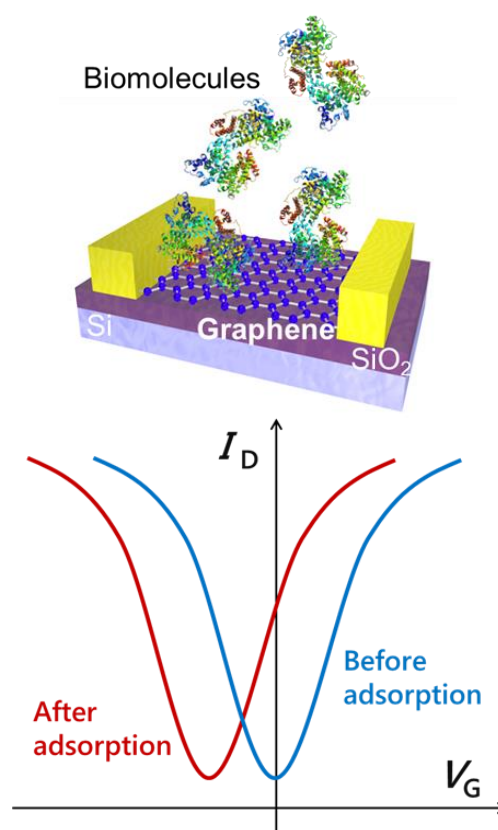


Figure 1: Biosensors using graphene-based devices.