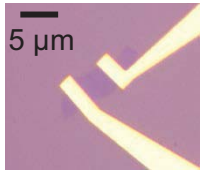
Faculty of Engineering
Tokushima University

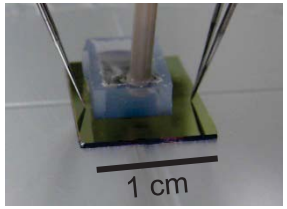
Biosensors based on nano-carbon devices

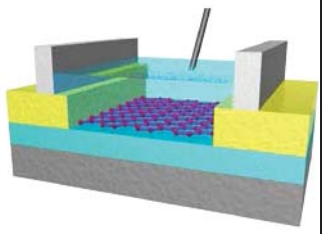
Associate Professor Yasuhide Ohno

Graphene device fabrication



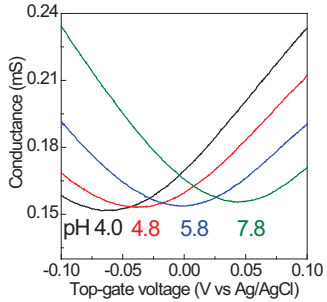
Graphene FET

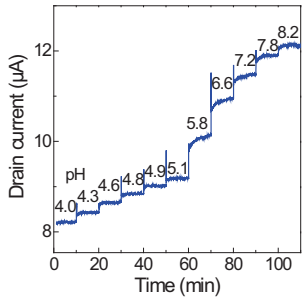




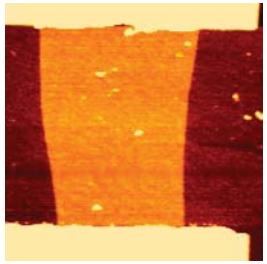
Graphene-FET based biosensors

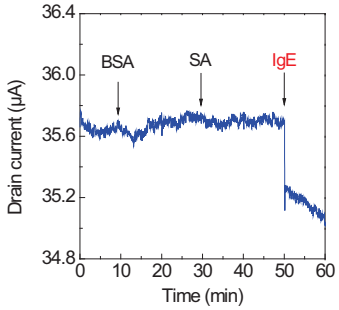
Sensing results





Detection of solution pH





Receptor functionalization and specific protein detection

Since the electrical characteristics of graphene field-effect transistors (FETs) are very sensitive for their environmental condition, the graphene FETs have high potential for chemical and biological sensors. In our laboratory, various sensors based on graphene FETs are investigated. The graphene FETs can be operated in the buffer solution by top-gated operation from a reference electrode without any passivation film owing to their large potential window. And their transconductance was more than 200 times larger than that of the conventional back-gated operation in vacuum. The drain current increased with increasing the solution pH. And the graphene FETs detected the charges in proteins. To detect the specific protein, aptamers were functionalized on the graphene surface. As a result, Aptamer-modified graphene FETs detected the target molecule, and their sensitivity was comparable for other aptamer-based biosensors.

Keywords : graphene, device, biosensor

E-mail: ohno@ee.tokushima-u.ac.jp
Tel. +81-88-656-7439
Fax: +81-88-656-7439
HP : http://graphene.ee.tokushima-u.ac.jp/