Contribution (Poster)

Work function shifts of monolayer and few layers of graphene under metal electrodes

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Due to the exceptionally ultimate properties of graphene, it is expected to be utilized for the various electronic applications including flexible and transparent electrodes, high transport channel materials, photo- or bio-sensitive detectors and so on.[1] Most of those devices inevitably need metal contact to graphene in order to measure the electronic characteristics or supply energy to operate. The properties of contact between graphene and metal is therefore one of the crucial factors determining the device performances. In terms of the device engineering, work function of material is fundamental information to tailor the device characteristics. Even though there have been a few of results related to work function of the exposed graphene, a research on work function change of graphene under metal is rare and the systematic study is required. Here, we report the work function shift of graphene under metal by measuring capacitance-voltage of metal-graphene-oxide-silicon capacitors. To verify the work function shift of monolayer graphene under various metal species, four deferent metals of Cr/Au, Ni, Au and Pd were formed on graphene. In contrast to the high work function of the bare graphene of 4.89~5.16 *e*V,[2] metal contacted graphene is found to have different work function and it shows metal dependency. The work function of graphene under Cr/Au or Ni coincides with the corresponding metals but it is found to be pinned to be a certain value for the Pd or Au contact. The work function shift of multi-layer graphene was also investigated with Cr/Au contact. Monolayer graphene was transferred repeatedly to form 2~4 layers of graphene. Interestingly, the influence of metal is found to decrease with the number of graphene layers. These results are believed to give important clues for the development of the advanced graphene devices and the understanding of the deeper analysis.

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References

[1] K. S. Novoselov, V. I. Falko, L. Colombo, P. R. Gellert, M. G. Schwab, and K. Kim, Nature 490 (2012) 192-200.
[2] J. K. Park, S. M. Song, J. H. Mun, and B. J. Cho, Nano Letters 11 (2011) 5383-5386.

Figures

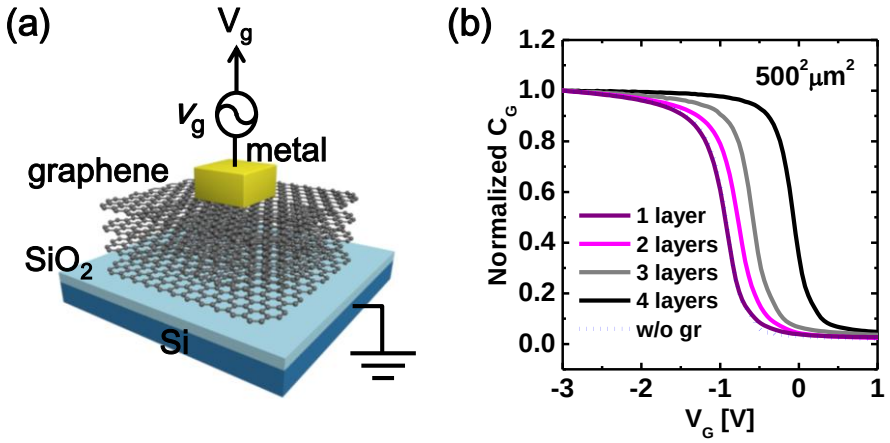

Figure 1. (a) Illustration of metal-graphene-oxide-silicon capacitors with four layers of graphene. (b) The capacitance-voltage measurement result of the capacitors with different number of graphene layers when metal fully covers the graphene.