**Edge effect of Graphene Adsorbed on the ZnO Surface   
: A First Principles Study**

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Due to its attractive electrical properties, Graphene materials can extend its applications such as graphene based field-effect transistor (FET). Recently, Yang et al.[1] found graphene-based barrister, a device with tunable Schottky barrier. It is important to modulation of Schottky barrier height (SBH) between graphene and substrates to improve device performance of graphene in device application. It is well known that strong Fermi level pinning effect at metal-semiconductor can control SBH.

To study the effects of contact structures, we investigate the several graphene/ZnO contact models using density functional theory calculations. In order to understand interaction between the graphene or graphene nanoribbon (GNR) and ZnO surfaces, we investigate electronic structures of graphene/ZnO and GNR/ZnO systems. Then, we consider the different properties between the electronic structures of top- and edge-contact models. On the basis of the theoretical results, we can explain the experimental data and discuss the Fermi-level pinning effect for high device performance of the graphene-based structure.

1. H. Yang, J. Heo, S. Park, H. J. Song, D. H. Seo, K.-E. Byun, P. Kim, I. Yoo, H.-J. Chung and K. Kim, Science **336**, 1140 (2012).