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Influence of Metal Contacts on Graphene Transport Characteristics and Its Removal with Nano-carbon Interfacial Layer AKINOBU KANDA, YU ITO, KENTA KATAKURA, HIROKI SONODA, SHOMA HIGUCHI, University of Tsukuba, HIKARI TOMORI, PRESTO-JST and University of Tsukuba, YOUITI OOTUKA, University of Tsukuba — Graphene is a promising candidate for the next-generation electronic material. While considerable effort has been devoted to achieve higher mobility in graphene films, relatively little attention has been paid to the effect of metal contacts, which are indispensable to the electric devices. At a graphene/metal interface, mainly due to the difference in work functions, carriers are injected from the metal to graphene. The resulting shift of local Dirac point is not limited at the graphene/metal interface but extends into the graphene channel. This carrier doping affects more significantly the performance of graphene field effect devices with shorter channel, as well as may conceal Dirac physics at the graphene/metal interface. Here, we experimentally investigate the channel length dependence of graphene transport properties in a wide gate-voltage range and extract the effect of metal contact. Several metal species are investigated. We reveal the origin of electron-hole asymmetry and the effect of the chemical interaction between graphene and metal, and derive the effective work function of graphene (4.93 eV). Furthermore, we succeed in reducing the influence of metal contact by inserting a thin nano-carbon layer (amorphous carbon or multilayer graphene (MLG)) at the interface.

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