

Electronic and atomic structure control of epitaxial graphene

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Graphene comes into the spotlight as an emergent device material on account of its high carrier mobility reflecting its massless Dirac fermion behavior. Chemical technique to control reversibly the carrier concentration of semiconducting graphene for the achievement of a large-area graphene device has been strongly required. Here we show that the adsorptions of a metal and a molecule can manipulate the carrier concentration of single-layer graphene, epitaxially grown on SiC, which was directly observed using angle-resolve photoemission spectroscopy. These results will shed light on the researches for the very large scale integration of a graphene device. Furthermore, the carrier concentration changes can be applied to a highly sensitive gas sensor or a detector for an specific binding between an antigen and an antibody.