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Determination of dominant scatterer in Graphene on SiO_2 using atomic hydrogen JYOTI KATOCH, Department of Physics and Nanoscience Center, University of Central Florida, Orlando, Fl, DUY LE, Department of Physics, University of Central Florida, Orlando, Fl, TALAT RAHMAN, Deparment of Physics, University of Central Florida, Orlando, Fl, MASA ISHIGAMI, Deparment of Physics and Nanoscience Center, University of Central Florida, Orlando, Fl —
We have measured the impact of low energy atomic hydrogen (< 250meV) on the transport property of graphene sheets as a function of hydrogen coverage and initial, pre-hydrogenation field-effect mobility. In order to understand the correlation between the field effect mobility and the apparent affinity of atomic hydrogen to graphene, we have performed a detailed temperature programmed desorption study on hydrogen-dosed graphene sheets. Atomic hydrogen is found to be desorbing with three different desorption energies. The physisorbed atomic hydrogen on graphene with desorption energy of 60 ± 30meV (consistent with our theoretical calculations), is found to be correlated to the native scatterers in graphene. The associated charge transfer expected for such small desorption energy indicates that atomic-scale defect sites are not responsible for determining the mobility of graphene on SiO_2 and that charged impurities, presumably in substrates, define the transport property of graphene on SiO_2.

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