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Low-energy electron irradiation on multi-layers graphene JOHN FEMI-OYETORO, Department of Physics, University of North Texas, Denton, Texas 76203, USA., RUNTIAN TANG, Department of Mechanical and Energy Engineering, University of North Texas, Denton, Texas 76203, USA., ASHLEY MHLANGA, Department of Biological Sciences, University of North Texas, Denton, Texas 76203, USA., PHILLIP ECTON, Department of Physics, University of North Texas, Denton, Texas 76203, USA., GUIDO VERBECK, Department of Chemistry, University of North Texas, Denton, Texas 76203, USA., JOSE PEREZ, Department of Physics, University of North Texas, Denton, Texas 76203, USA. — We performed low-energy (about 60 eV) electron irradiation experiments on exfoliated samples from highly-oriented-pyrolytic graphite onto 300nm thick SiO_2 /Si substrates, using a plasma system. After irradiation, the few-layers disappeared and intermediate thickness regions appeared lighter. Optical contrast microscopy and atomic force microscopy images taken before and after irradiation, show that the surface of the multi-layers appears rough with etch features. This experiment ascertains that etching is not from the oxygen dissociated from the graphene/SiO_2 interface due to secondary electrons in the graphene. Our observations indicate that etching proceeds from the top surface of the multi-layer graphene downwards instead of upwards from the graphene/SiO_2 interface. We observed similar results with samples that were pre-annealed at 400C at about 5 10^{-6} Torr for 1hr. to remove adsorbates. We conclude that the etching observed is due to oxygen dissociated from bare SiO_2 regions of the substrate instead of SiO_2 at the graphene/SiO_2 interface.

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