Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

High-resolution measurement of SiO2 surface potential using scanning Kelvin-probe microscopy[1] WILLIAM CULLEN, KRISTEN BURSON, MAHITO YAMAMOTO, MICHAEL FUHRER, University of Maryland — It is now widely recognized that the dominant contribution to disorder in SiO_2-supported graphene is due to scattering from charged impurities. These charged impurities give rise to a conductivity which is linear in carrier density, and create electron-hole puddles in graphene. The screened potential variation produced in graphene has been imaged using scanning tunneling microscopy/spectroscopy (STM/STS) by spatially mapping the variation in the Dirac point, revealing a length scale of 20 nm for the charge puddles. However, there is a substantial gap in resolution between the STM measurements and previous measurements with much greater potential sensitivity but limited spatial resolution. Here we attempt to bridge this gap using scanning Kelvin-probe microscopy (SKPM) of SiO_2 in ultrahigh vacuum. Our measurement takes advantage of the high spatial resolution allowed by UHV non-contact AFM while maintaining UHV control of the sample environment.

[1] Y. Zhang et al., Nature Physics 5, 722 (2009)
[2] J. Martin et al., Nature Physics 4, 144 (2008)

[1]Supported by UMD-NSF-MRSEC grant #DMR 0520471 and the Center for Nanophysics and Advanced Materials.

William Cullen
University of Maryland

Date submitted: 30 Dec 2010 Electronic form version 1.4