3-2013

Towards in situ correlation of atomic structure and device functionality in graphene-based devices

Shawna M. Hollen
University of New Hampshire - Main Campus

N M. Santagata
Ohio State University - Main Campus

Justin R. Young
University of New Hampshire - Main Campus, Justin.Young@unh.edu

Jay A. Gupta
Ohio State University - Main Campus

Ezekiel Johnston-Halperin
Ohio State University - Main Campus

Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Towards *in situ* correlation of atomic structure and device functionality in graphene-based devices S. M. HOLLEN, NANCY SANTAGATA, JUSTIN YOUNG, JAY GUPTA, EZEKIEL JOHNSTON-HALPERIN, Ohio State University, CENTER FOR EMERGENT MATERIALS TEAM — The use of scanned probe microscopy to study atomic-scale phenomena is well established; however, there is a gap in our understanding of how atomistic studies connect to macroscopic measurements such as electron and spin transport. This gap is of particular importance to 2D materials such as graphene, germanane and MoS_2 due to the extreme sensitivity to defects, adatoms, and local electronic inhomogeneities. We present work towards the integration of low temperature scanning tunneling microscopy (STM) with *in situ* transport measurements on nanoscale graphene devices in ultrahigh vacuum. Challenges we are addressing include (i) fabricating devices small enough that a sufficient fraction of the surface can be modified within the small scan range typical of STM, (ii) design of alignment electrodes for locating the devices with STM, and (iii) modification of the STM hardware to integrate electron transport measurements. We anticipate that being able to correlate device transport measurements with atomic scale characterization and modification of the graphene surface will allow us to address the importance of the local environment to device functionality.

Shawna Hollen
Ohio State University

Date submitted: 09 Nov 2012 Electronic form version 1.4