Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

STM Studies of Graphene Grown on Non-Polar Surfaces of SiC[1]

DEJUN QI, PENG XU, JOSH THOMPSON, MATTHEW ACKERMAN, STEVEN BARBER, KEVIN SCHOELZ, PAUL THIBADO, Univ of Arkansas-Fayetteville, V.D. WHEELER, U.S. Naval Research Laboratory, L.O. NYAKITI, Texas A&M University, R.L. MYERS-WARD, C.R. EDDY, JR., D.K. GASKILL, U.S. Naval Research Laboratory — The unconventional electronic properties of graphene make it a highly promising candidate for the realization of nano-electronic circuits. Large-area epitaxial graphene (EG) grown by thermal decomposition of a SiC surface is a very promising candidate in this respect. So far the focus of the EG on SiC surfaces is mainly on the polar surfaces of SiC(0001) and SiC(000-1). In order to further understand the properties of EG on SiC and to correlate differences between surfaces of SiC, it is essential to study EG grown on non-polar surfaces SiC as well and to characterize them in detail. Here we present our studies of EG grown on the non-traditional, non-polar 6H-SiC(1-100) surface (m-plane) and (11-20) surface (a-plane) using scanning tunneling microscopy (STM). We show that there are regions of few layer and twisted multilayer graphene. Our STM images display the characteristic moire pattern corresponding to a twist angle of the top layer relative to the layer underneath. Combining the STM images and ball-and-stick model, we also determine the location of the graphene grain boundary and the manner in which the grains with different tilted angles patch together.

[1]Acknowledgment to the financial support of ONR under grant N00014-10-1-0181 and NSF under grant DMR-0855358

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Date submitted: 10 Nov 2013 Electronic form version 1.4