Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Large area single and bilayer graphene with controlled orientation for each layer LOLA BROWN, EDWARD LOCHOCKI, Cornell University, CHRISTOPHER GUTIÉRREZ, ABHAY PASUPATHY, Columbia University, KYLE SHEN, JIWOONG PARK[1], Cornell University, CORNELL COLLABORATION, CORNELL-COLUMBIA COLLABORATION — The creation and exploration of artificial graphene structures has recently become the focus of great interest. In particular, controlling the interlayer twist angles in multilayer graphene stacks allows modulation of the overall band structure. However, producing such a structure remains difficult due to the random distribution of twist angles in as-grown samples. Here we report a novel way for creating large area graphene stacks with a pre-determined twist angle. We first grow single layer graphene whose orientation is aligned over a few cm length scale on copper foil. The overall angle alignment of the graphene is confirmed using low energy electron microscopy (LEED) and transmission electron microscopy techniques. Since the graphene is well aligned over a few centimeters, we can create large area graphene stacks with known twist angle by transferring these graphene layers while controlling the orientation of each layer during transfer. We confirm that the layers are coupled by probing the resulting band structure using angle resolved photoemission spectroscopy (ARPES), and examining their interlayer optical resonance features using spatially resolved hyperspectral (DUV-Vis-NIR wavelengths). This new method is scalable, and controllable and thus paves the way to explore and exploit the novel properties of two-dimensional crystals in artificial stacks with controlled interlayer structures.

[1]Second affiliation: Kavli Institute at Cornell for Nanoscale Science

Lola Brown
Cornell University

Date submitted: 14 Nov 2013 Electronic form version 1.4