Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Control Over the Adhesion and Strain on Graphene Using Arrays of Mesoscale Pyramids STEPHEN GILL, University of Illinois at Urbana-Champaign, SHUZE ZHU, University of Maryland, J. HENRY HINNEFELD, WILLIAM SWANSON, University of Illinois at Urbana-Champaign, TENG LI, University of Maryland, NADYA MASON, University of Illinois at Urbana-Champaign — Applying non-uniform shear strain to graphene can lead to new electronic states. For example, strain having triangular symmetry has been shown theoretically and experimentally to generate a nearly uniform pseudo-magnetic field [1,2]. However, the lack of methods to control non-uniform strain in graphene devices has limited the ability to explore transport phenomena tuned by strain. In this talk, we demonstrate that the adhesion and strain of graphene can be controlled by using arrays of mesoscale pyramids. By manipulating the arrangement of pyramids and the aspect ratio of the array, graphene's adhesion to the array ranges from conformal to suspended between pyramids. Strain in graphene adhered to pyramids is revealed by Raman spectroscopy, and the amount of strain experienced is shown to depend on the adhesion to the pyramids. Supporting calculations demonstrate the pseudo-magnetic field profile for graphene adhered to pyramids for different strains. These results indicate a potential route for exploring strain-controlled transport phenomena in graphene.

1. F. Guinea, M. I. Katsnelson, and A. K. Geim, Nat. Phys. **6,** 30 (2009).
2. L. Levy et al., Science **329**, 544 (2010).

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Date submitted: 14 Nov 2014 Electronic form version 1.4