Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Strain-Engineering of Giant Pseudo-Magnetic Fields in Graphene/Boron Nitride (BN) Periodic Nanostructures[1] CHEN-CHIH HSU, JIAQING WANG, MARCUS TEAGUE, CHIEN-CHANG CHEN, NAI-CHANG YEH, Caltech — Ideal graphene is strain-free whereas non-trivial strain can induce pseudo-magnetic fields as predicted theoretically and manifested experimentally. Here we employ nearly strain-free single-domain graphene, grown by plasma-enhanced chemical vapor deposition (PECVD) at low temperatures, to induce controlled strain by placing the PECVD-graphene on substrates containing engineered nanostructures. We fabricate periodic pyramid nanostructures (typically 100 $\sim$ 200 nm laterally and 10 $\sim$ 60 nm in height) on Si substrates by focused ion beam, and determine the topography of these nanostructures using atomic force microscopy and scanning electron microscopy after we transferred monolayer h-BN followed by PECVD-graphene onto these substrates. We find both layers conform well to the nanostructures so that we can control the size, arrangement, separation, and shape of the nanostructures to generate desirable pseudo-magnetic fields. We also employ molecular dynamics simulation to determine the displacement of carbon atoms under a given nanostructure. The pseudo-magnetic field thus obtained is $\sim$150T in the center, relatively homogeneous over 50% of the area, and drops off precipitously near the edge. These findings are extended to arrays of nanostructures and compared with topographic and spectroscopic studies by STM.

[1]Supported by NSF.

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Date submitted: 14 Nov 2014 Electronic form version 1.4