Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

DUV-Vis-NIR Structural and Compositional Imaging of Two-Dimensional Heterostructures ROBIN HAVENER, CHEOL-JOO KIM, LUJIE HUANG, ADAM TSEN, MARK LEVENDORF, JIWOONG PARK, Cornell University — Recent advances have allowed precise stacking and lateral stitching of various two-dimensional materials in complex geometries, but characterizing these structures remains a challenge. Here, we use a DUV-Vis-NIR ($<$ 200-1000 nm) hyperspectral microscope to image composition and structural features in graphene and hexagonal boron nitride (h-BN) heterostructures with micron-scale resolution. We provide high-contrast images of h-BN at its absorption peak (6.1 eV), and map the quantitative full optical functions of single-layer graphene and h-BN in a device geometry. Stacking these materials provides an additional rotational degree of freedom which can produce unique optical signatures, allowing all-optical structural imaging. We characterize the optical response of twisted bilayer graphene, which exhibits an absorption peak whose energy varies with relative rotation angle from the infrared to the DUV ($\sim$ 4.0 eV), by combining hyperspectral imaging with dark-field transmission electron microscopy. By establishing such structure-property relationships, we enable controlled device fabrication on silicon substrates.

Robin Havener
Cornell University

Date submitted: 27 Nov 2012 Electronic form version 1.4