

Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Optical Separation of Mechanical Strain from Charge Doping in Graphene SUNMIN RYU, JI EUN LEE, GWANGHYUN AHN, Kyung Hee University — Graphene, due to its superior stretchability, exhibits rich structural deformation behaviors and its strain-engineering has proven useful in modifying its electronic and magnetic properties. Despite the strain-sensitivity of the Raman G and 2D modes, the optical characterization of the native strain in graphene on silica substrates has been hampered by excess charges interfering with both modes. Here we show that the effects of strain and charges can be optically separated from each other by correlation analysis of the two modes, enabling simple quantification of both. Graphene with in-plane strain randomly occurring between -0.2% and 0.4% undergoes modest compression (-0.3%) and significant hole doping upon thermal treatments. This study suggests that substrate-mediated mechanical strain is a ubiquitous phenomenon in two-dimensional materials. The proposed analysis will be of great use in characterizing graphene-based materials and devices.

Sunmin Ryu
Kyung Hee University

Date submitted: 06 Nov 2012

Electronic form version 1.4