Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Modulated Nanoindentation (MoNI) – a novel characterization tool of two-dimensional materials and nanotubes[1] YANG GAO, CUNY Advanced Science Research Center, SUENNE KIM, Hanyang University, SI ZHOU, Georgia Institute of Technology, HSIANG-CHIH CHIU, National Taiwan Normal University, DANIEL NELIAS, Universit de Lyon, CNRS, INSA-Lyon, LaMCoS, CLAIRE BERGER, Institut Nel, Universit Grenoble Alpes-CNRS, WALT DE HEER, Georgia Institute of Technology, LAURA POLLONI, ROMAN SORDAN, L-NESS, Politecnico di Milano, CHRISTIAN KLINKE, University of Hamburg, ANGELO BONGIORNO, College of Staten Island, CUNY, ELISA RIEDO, CUNY Advanced Science Research Center — We report on a novel Atomic Force Microscopy (AFM) based technique with sub-angstrom vertical resolution – Modulated Nanoindentation (MoNI). MoNI has been applied to measure the radial elasticity of multiwalled nanotubes. Recently the interlayer coupling of two-dimensional materials (such as graphene and MoS_2) characterized by strong in-plane bonds and weak interlayer interactions has been studied by MoNI combined with semi-analytical methods (SAM) and DFT calculations. The out-of-plane stiffness of varied 2D materials and its dependence on number of layers and intercalated water has been investigated in different environmental conditions. This non-destructive technique provides a new path to study the interlayer elastic coupling and the Van der Waals forces in few-layer-thick 2D materials, offering the possibility to understand how interlayer coupling is related to the electronic, phononic, and thermal properties of 2D materials.

[1]Y. Gao et al., Nature Materials 14, 714-720 (2015)

Yang Gao
CUNY Advanced Science Research Center

Date submitted: 30 Nov 2015 Electronic form version 1.4