Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Dynamics and energy dissipation of nano-graphite mechanical devices. ZHIPING XU, Rice University — Controllable mechanical motion of nano-structures holds great interests because of their applications in the nano-electromechanical systems (NEMS). One of the novel models proposed was the nano-graphitic materials based devices, where planar or cylindrical graphene layers act as moving parts and the motion is managed by the van der Waals force between them. Comparing with the multi-walled carbon nanotubes, nano-graphite flakes have an accessible scale for current techniques. Recent experiments using nano-mechanical manipulator have shown self-retraction motion of micrometer graphite layers after mechanical extrusion (Zheng et al. submitted to PRL). However, persistent oscillation as expected was not observed. The short lifetime implies severe energy dissipation. Analysis based on MD simulation show that the coupling with rotation and lattice vibration contribute significantly. Furthermore we have discussed the effects of edge instabilities, surface contamination and non-planar deformation, which also introduce complexities into the dynamics as approved by the experimental observation.

Zhiping Xu
Rice University

Date submitted: 26 Nov 2007 Electronic form version 1.4