Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Optical Properties of Graphene Nanoribbons HUGEN YAN, TONY LOW, WENJUAN ZHU, YANQING WU, IBM T. J. Watson Research Center, FRANCISCO GUINEA, Instituto de Ciencia de Materiales de Madrid. CSIC, FENGNIAN XIA, PHAEDON AVOURIS, IBM T. J. Watson Research Center — The electrical transport properties of graphene nanoribbons have been extensively studied. However, the experimental investigation of the optical properties is still lacking. In this paper, we present the infrared (IR) absorption measurement of graphene nanoribbons with width down to 50 nm. The optical response is dominated by plasmonic resonances in the mid-IR when the incident light polarization is perpendicular to the ribbon axis. By varying the width of the ribbons, we were able to determine the plasmon dispersion in graphene. Meanwhile, we revealed the important role of surface polar phonons and graphene intrinsic optical phonons in the plasmon dispersion and damping. In conjunction with theoretical analysis, we found that graphene plasmons are severely damped through the emission of an optical phonon together with an intraband electron-hole pair. Our study paves the way for graphene applications in infrared photonics and opto-electronics.

Hugen Yan
IBM T. J. Watson Research Center

Date submitted: 14 Nov 2012 Electronic form version 1.4