Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Mechanical Responses of a Polymer Graphene-sheet Nano-sandwich[1] XIGUANG LI, JULIUSZ WARZYWODA, GREGORY MCKENNA, Texas Tech University — The interfacial mechanics and reinforcement by graphene sheets in polymer matrix nanocomposites are important to their understanding. However, the methods available for their investigation remain a challenge. Here we report on a novel study in which the mechanical responses of a nano-sandwich model structure made of a single graphene sheet sandwiched between ultrathin polymer layers are determined using a nano-bubble inflation method. The stress-strain behavior of the graphene nano-sandwich shows that significant reinforcement is obtained at small strains and that the method also provides a measurement of the interfacial shear strength. In addition, the study provides data related to internal stresses that develop between the graphene layer and the polymer sandwich faces.

[1]The authors thank the National Science Foundation under grant DMR-1207070 and the John R. Bradford Endowment at Texas Tech University, each for partial financial support of this work.

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Date submitted: 13 Nov 2014 Electronic form version 1.4