Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Examining CVD graphene quality using hexagonal boron nitride substrates[1] WILL GANNETT, WILLIAM REGAN, Dept of Physics, University of California, Berkeley and Materials Sciences Division, LBNL, KENJI WATANABE, TAKASHI TANIGUCHI, Advanced Material Laboratory, National Institute for Materials Science, Tsukuba, Japan, MICHAEL CROMMIE, ALEX ZETTL, Dept of Physics, University of California, Berkeley and Materials Sciences Division, LBNL — Chemical vapor deposition (CVD) of graphene has proven to be the most inexpensive and scalable synthesis technique for continuous graphene monolayers. However, CVD graphene typically has a lower mobility than that from exfoliation. This is likely due to a combination of intrinsic (defect and grain boundary) and extrinsic (substrate and contamination) effects. By fabricating CVD graphene transistors on hexagonal boron nitride (h-BN) substrates, we are able to reduce the extrinsic substrate interactions that otherwise occur with silicon dioxide layers. This greatly improves the mobility in our devices (up to 29000 cm^2/Vs). While such improvements from h-BN have been previously observed in exfoliated graphene devices, its success with CVD graphene is particularly notable because it shows that the low mobilities observed in CVD graphene are not from intrinsic effects, and that current synthesis techniques are more than sufficient to consistently produce graphene with >10000 cm^2/Vs. Furthermore, our research reveals that characterization of CVD growth recipes by measuring mobilities on silicon dioxide is insufficient, as scattering from the oxide will dominate, revealing little information about intrinsic graphene quality.

[1]This research was supported in part by the U.S. Department of Energy, the National Science Foundation, and the Office of Naval Research.

Will Gannett
University of California, Berkeley

Date submitted: 10 Nov 2011 Electronic form version 1.4