Abstract Submitted
for the MAS14 Meeting of
The American Physical Society

Transport determination of tunable band gap in bilayer graphene

J. LI, J. TODD, Department of Physics, Penn State University, University Park, USA, K. WATANABE, T. TANIGUCHI, National Institute for Material Science, 1-1 Namiki, Tsukuba, Japan, J. ZHU, Department of Physics, Penn State University, University Park, USA — Bernal stacked bilayer graphene is a unique two-dimensional material with a tunable band gap. A perpendicular electric field can break the inversion symmetry of the two graphene layers and open up a field-dependent band gap Δ (E) up to 0.25 eV. Although Δ (E) have been measured by optical spectroscopy [1], transport determination is hindered by stronger disorder in oxide- supported samples [2]. By using high-quality dual hexagonal boron nitride gated samples, we measure the temperature dependence of the charge neutrality point resistance, from which Δ (E) is determined. We find Δ (E) to increase approximately linearly with the applied displacement field D and reach $\sim$ 0.2 eV at D=1.6V/nm. The transport results are close to previous optical measurements but with much higher accuracy. Comparisons to theory and measurements in oxide-supported samples are made. An electric field tunable clean band gap in high quality bilayer graphene can be potentially useful in near and mid-infrared light detection.

[1] Y. Zhang, et. al., Nature 459, 820-823, (2009).
[2] K. Zou and J. Zhu, PRB 82, 081407 (R) (2010).

Jing Li
Penn State University

Date submitted: 29 Aug 2014 Electronic form version 1.4