Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Bilayer graphene $p-i-n$ tunnel junction controlled by modulated top gate[1] HISAO MIYAZAKI, SONG-LIN LI, KAZUHITO TSUKAGOSHI, NIMS-MANA, JST-CREST, AKINOBU KANDA, Univ. of Tsukuba, JST-CREST — Ambipolar nature of graphene enables us to set charge polarity for electric transport to be p-type or n-type. We fabricated a bilayer graphene (BLG) with spatially modulated p-type and n-type regions. The spatial modulation was introduced by a pair of gate electrodes; a uniform back (substrate) gate and a top gate with stepwise geometry. The gate electric field between the top and back gate also induces band gap in the BLG. As a result, an insulating region is inserted between the p- and n-regions, realizing a $p-i-n$ junction. The current through the junction showed nonlinearity as a function of the source-drain bias. We identified that the origin of nonlinearity is the tunnel current between the p- and n-regions. The nonlinearity reflects the density of states singularity at the edge of the conduction and the valence band in BLG with the band gap. This observation appends another evidence for electric-field-induced band gap in BLG.

[1]This work was supported in part by a Grant-in-Aid for Scientific Research (No. 21241038) from MEXT of Japan, and by the FIRST Program JSPS.

Hisao Miyazaki
NIMS

Date submitted: 19 Nov 2010 Electronic form version 1.4