Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

**Unsaturated drift velocity of monolayer graphene** SEONG CHU LIM, Sungkyunkwan University, HEE JUN SHIN, University of Seoul, JAESU KIM, Sungkyunkwan University, SUNG HO KIM, IBS Center for Integrated Nanostructure Physics (CINAP), Institute for Basic Science, Sungkyunkwan University, HOMIN CHOI, SAHNGHYUB LEE, Sungkyunkwan University, YOUNG HEE LEE, IBS Center for Integrated Nanostructure Physics (CINAP), Institute for Basic Science, Sungkyunkwan University, JOO-HIUK SON, University of Seoul — Despite terahertz (THz) high electric field $E_{THz}$ >70 kV/cm, at which optical phonons can be emitted by hot electrons, graphene heating by energetic carriers can be controlled by adjusting the electrostatic doping concentration or $E_F$. For $E_F >> k_{BT}$, where $k_B$ is the Boltzmann constant and T is the temperature, the electron–phonon scattering is enhanced because of large available phase space, resulting in a significant increase in the optical phonon temperature. However, for $E_F << k_{BT}$, electron–phonon scattering is suppressed because of the diminishing density of states at the Dirac point. Therefore, the carriers are kept accelerating by $E_{THz}$ without losing their energy. This contributes to the drift velocity of the carriers at the concentration n = 7.3 $10^{11}$ $cm^{-2}$ comparable to the Fermi velocity without heating the graphene lattice on Si substrate at 300 K.

seong chu Lim
Sungkyunkwan University

Date submitted: 14 Nov 2016 Electronic form version 1.4