Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Electrical quality improvement of thin Y_2O_3 topgates in graphene FETs by high-pressure O_2 post-deposition annealing KOSUKE NAGASHIO, KAORU KANAYAMA, TOMONORI NISHIMURA, AKIRA TORIUMI, Univ of Tokyo — Although extensive research effort has focused on equivalent oxide thickness scaling by the deposition of ultrathin high-k dielectrics on graphene, these dielectrics still suffer from leakage currents under high electric fields. This leakage is a critical concern for the increase in the on-current. Here, we demonstrate a considerable suppression of the gate leakage current by using Y_2O_3 film annealed in high-pressure O_2 at 100 atm (HP-PDA) in top-gated graphene FETs. Consequently, the quantum capacitance measurement for the monolayer graphene reveals the highest Fermi energy modulation ($E_F = \sim 0.52$ eV, i.e., the carrier density of $\sim 2 \times 10^{13}$ cm^{-2}) in the solid-state topgate insulators reported so far. HP-PDA of Y_2O_3 enables to realize the robust and reproducible top-gated graphene FETs.

Kosuke Nagashio
Univ of Tokyo

Date submitted: 14 Nov 2013 Electronic form version 1.4