Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Improving the electrical characteristics of graphene field effect transistors by hexamethyldisilazane interaction SK. CHOWDHURY, SOMAYYEH RAHIMI, SUSHANT SONDE, LI TAO, SANJAY BANERJEE, DEJI AKINWANDE, Univ of Texas, Austin — We report the improvement of the electrical characteristics of graphene field effect transistors (FET) by hexamethyldisilazane (HMDS) passivation. Sample is left in liquid HMDS after complete back gated FET fabrication. Both electron and hole field effect mobilities are improved by 1.5X - 2X, accompanied by effective residual carrier concentration reduction. Dirac voltage also moves closer to zero. Various techniques for HMDS application are investigated. Time evolution of mobility data shows that mobility improvement saturates after a few hours of HMDS dosing. Temperature-dependent transport measurements show small mobility variation between 77K and room temperature (295K) before HMDS application. But mobility at 77K is almost 2 times higher than mobility at 295K after HMDS application. The best CVD devices achieve a mobility of $\sim$ 20,000 cm2/V-s at 77K. Performance improvement is observed for FETs made with exfoliated graphene and for FETs made on hydrophobic substrate- an HMDS-graphene-HMDS sandwich structure. Raman spectroscopic analysis shows that G peak width is increased, G peak position is down shifted and intensity ratios between 2D and G peak is increased after HMDS application. AFM data shows increased RMS roughness after HMDS application.

Sk. Chowdhury
Univ of Texas, Austin

Date submitted: 15 Nov 2013 Electronic form version 1.4