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**Surface Charge Distribution on Hydrogen-Passivated Silicon Measured by UHV Kelvin Probe Microscopy** PAVEL NAGORNYKH, KRISTEN BURSON, WILLIAM CULLEN, BRUCE KANE, University of Maryland — A few years ago hydrogen-passivated silicon (H:Si) surfaces were used to observe high-mobility in FETs (100,000 cm2/Vs) [1]. This result is expected since chemical passivation of silicon produces an atomically flat surface with low density of defects. As chemical preparation can lead to creation of fixed charges on H:Si surface, one needs a method to get information about their distribution to further improve the quality of a process. This can be done by measuring electrostatic forces created by such charges with Kelvin Probe Microscopy (KPM), which obtains a voltage distribution map with a resolution of a few nm. We have used UHV KPM for our measurements, since UHV conditions are important for avoiding oxidation of H:Si surface as well as achieving its further depassivation/annealing. By annealing samples above depassivation temperature( 500C), we have obtained data that provides more information about depassivation effect on charges that come from chemical residue on hydrogen and silicon itself. Preliminary results show standard deviations of voltage much smaller (by an order of magnitude) than ones measured previously on silicon oxide, consistent with high quality expected from chemical preparation.

[1] Robert N. McFarland et al., Phys. Rev. B 80, 161310(R) (2009)

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