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Scanned probe studies of dielectric screening and charge puddles in epitaxial graphene on SiC(0001) A.E. CURTIN, A. IMTIAZ, T.M. WALLIS, P. KABOS, National Institute of Standards and Technology, Boulder, CO, R.L. MYERS-WARD, C.R. EDDY, JR., L.O. NYAKITI, V.D. WHEELER, D.K. GASKILL, U.S. Naval Research Laboratory, Code 6880, Washington, DC 20375 — Epitaxial growth of graphene on SiC(0001) produces wafer-scale monolayer films suitable for large scale device applications. However, the presence of the buffer layer beneath the graphene produces n-doping of 10^{12}-10^{13} cm^{-2} and limits mobility to $\sim 10^3$ cm^2/Vs. Recently H intercalation has produced p-doped samples with similar carrier density and improved mobility. Transport measurements on processed devices show evidence of charge impurity scattering, but these measurements cannot show whether the transport behavior is due to top gate dielectrics or intrinsic to the as-grown graphene. Here we use scanning microwave microscopy to look at graphene samples and bare SiC substrates to extract information about the screening role of the buffer layer. This data is complemented by earlier results suggesting charge puddles due to random impurities to not exist in epitaxial samples.

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