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Scanning Tunneling Microscopy and Spectroscopy of Quasi-freestanding Graphene on SiC TIANSHUAI GUAN, ANDREAS SANDIN, J.E. (JACK) ROWE, DANIEL DOUGHERTY, Department of Physics, North Carolina State University — Epitaxial graphene on SiC(0001) is a promising approach for industrial-scale production of very high quality graphene. Recently, it has been demonstrated by angle-resolved photoelectron spectroscopy (Riedl et al., Phys. Rev. Lett 103, 246804 (2009)) that graphene can be prepared on SiC in almost undoped form by intercalating atomic hydrogen beneath the non-graphitic carbon-rich "buffer layer." We present scanning tunneling microscopy and spectroscopy measurements of quasi-free-standing monolayer graphene on SiC(0001) obtained by atomic hydrogen intercalation. Small hydrogen-intercalated domains formed at the initial stages of quasi-free graphene nucleation exhibit a $\left(\sqrt{3} \times \sqrt{3}\right)$ R30 corrugation due to the sub-surface hydrogen. Local image potential state spectroscopy on these domains is used to observe changes in local doping due to intercalation. These states show the energetic shift ($\approx$ 0.4 eV) with respect to the usual n-doped single-layer graphene on SiC(0001) that suggests that H-intercalated graphene is almost charge-neutral.

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