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Modification of Electronic Surface States by Graphene Islands on Cu(111)[1] GRADY GAMBREL, The Ohio State University, SHAWNA HOLLEN, University of New Hampshire, STEVEN TJUNG, NANCY SANTA-GATA, EZEKIEL JOHNSTON-HALPERIN, JAY GUPTA, The Ohio State University — The interaction of graphene with copper is of interest for graphene applications due to the frequent use of copper in the chemical vapor deposition (CVD) growth of graphene. We grew pristine graphene islands on Cu(111) by dissociating ethylene gas in an ultra high vacuum environment. In situ low-temperature scanning tunneling microscopy (STM) was used to measure the physical and electronic structure of the surface with atomic resolution, enabling us to compare the graphene-covered regions to bare Cu(111). We observed a shift of the Rydberg-like series of images potential states (IPS) to lower energies and a decrease in linewidth in graphene-covered regions, indicating a decrease in local work function and reduced coupling to the copper bulk states. In some cases, the first of these states were split, which may correspond to the dual Rydberg series which has been predicted for graphene. By measuring the dispersion of the Shockley surface state, we found that the band edge and effective mass are influenced by the graphene layer. We will extend these findings [SM Hollen, et al. Phys. Rev B 91, 195425 (2015)] to our study of in situ graphene devices and present preliminary STM and transport data with respect to gate voltage.

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