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Influence of Subsurface Hydrogen on the Structural Properties of Graphene Templates Grown on Ru(0001)[1] MAXWELL GRADY, Univ of New Hampshire, BOGDAN DIACONESCU, Sandia National Laboratories, DARREN VALOVCIN, Univ of New Hampshire, FRANK HAGELBERG, East Tennessee State University, KARSTEN POHL, Univ of New Hampshire — Graphene has aroused tremendous interest due to its remarkable electronic and mechanical properties. Graphene's optical properties and conductance make it an ideal candidate for use in nanoelectronic devices and organic photoelectric devices. We will present a STM/LEED/DFT study of the single layer graphene on Ru(0001) system grown via a novel growth mechanism that co-adsorbs atomic hydrogen and carbon vapor to the ruthenium surface while simultaneously segregating carbon from the crystal bulk to the surface. Structural studies show a wide array of moire superlattices sizes ranging from 0.9 to 3.0 nm. DFT calculations help explain the appearance of these graphene reconstructions driven by the H presence at the Ru interface. A LEED I(V) study guided by DFT calculations will accompany the STM investigation to provide insight into the graphene layer thickness. The structural polymorphism displayed by this system is of interest for the study of directed self-assembly. Control over moire superstructure size can aid in future work using graphene as a nanotemplate for self-assembled growth of nanoelectronic and organic photovoltaic devices based on pentacenes and fullerenes. Finally the impact of the structural changes on the electronic properties of the system will be studied.

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