Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Borophene synthesis on Au(111) NATHAN GUISINGER, Argonne National Laboratory, BRIAN KIRALY, Radboud University, ZHUHUA ZHANG, Rice University, ANDREW MANNIX, MARK C. HERSAM, Northwestern University, BORIS I. YAKOBSON, Rice University — The recent experimental discovery of borophene, the metallic 2-dimensional allotrope of boron, has sparked tremendous interest in further exploration of this unique material. The initial synthesis of borophene was accomplished on Ag substrates and serves as a quintessential example of predictive modeling to experimental realization. In this talk, we expand the phase-space of borophene synthesis to Au. Borophene synthesis was accomplished by evaporating elemental boron onto a Au(111) substrate. The synthesized borophene retains its metallic character on Au as verified with scanning tunneling spectroscopy. Most fascinating is the difference in growth dynamics on the Au(111) substrate where the reconstructed surface presents a unique energy landscape for borophene nucleation and growth. We find that the initial low-coverage growth of borophene modifies the herringbone reconstruction into a "trigonal" network, where the 2D boron islands are uniformly templated across the surface. Increasing coverage results in the increasing size of the templated borophene islands until they coalesce into larger sheets. The observed growth dynamics are supported by the computational modeling of boron nucleation on Au.

Nathan Guisinger
Argonne National Laboratory

Date submitted: 12 Nov 2016 Electronic form version 1.4