Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Structural and electronic properties of 2D Si layers formed by deposition of Si on silicene / ZrB_2 CYRUS F. HIRJIBEHEDIN, TOBIAS G. GILL, BEN WARNER, HENNING PRUESER, UCL, UK, KOHEI AOYAGI, RAINER FRIEDLEIN, ANTOINE FLEURENCE, JAIST, Japan, JERZY SADOWSKI, Brookhaven National Laboratory, USA, YUKIKO YAMADA-TAKAMURA, JAIST, Japan — Silicene has been predicted to share many interesting properties with graphene. These are significantly modified by interactions with the metallic substrates in existing epitaxial silicene systems [1]. For many 2D layered materials, like graphene and MoS_2, these properties can change dramatically when going from the mono- to multi-layer regime. Recent experiments studying multiple Si layers on Ag(111) have shown that, remarkably, the multilayers are more metallic than the monolayer [2]. Here we report studies of 2D layers formed by depositing Si on silicene/ZrB_2. Using LEED, STM, and ARPES, we find that the deposition of very small amounts of Si cause structural changes to the silicene monolayer without strongly modifying its electronic properties. Additional deposition of Si, however, results in the formation of a second Si layer that has substantially different structural domains and is more metallic. This trend continues for 3 ML up to the deposition of 10 ML. These result illustrate the rich array of properties that can be manifested in novel 2D Si nanostructures and highlight the dramatic variation in Si phases that can be seen on different substrates. [1] A. Fleurence et al., PRL 108, 245501 (2012) [2] P. Vogt et al., APL 104, 021602 (2014)

Cyrus F. Hirjibehedin
London Centre for Nanotechnology, UCL

Date submitted: 14 Nov 2014 Electronic form version 1.4