

Dirac Electrons in Silicene on Ag(111): Do they exist?

Chi-Ruei Pan¹ and Mei-Yin Chou^{1,2}

¹School of Physics, Georgia Institute of Technology, Atlanta, Georgia, USA

²Institute of Atomic and Molecular Sciences, Academia Sinica, Taipei, Taiwan

There have been quite a few experimental attempts to grow silicene on Ag(111) in the past two years. However, there are controversies about whether a silicene layer with mass Dirac fermions actually exists on Ag(111). Chen *et al.* [1] measured the interference patterns in the differential conductance map by scanning tunneling spectroscopy and found a linear dispersion relation as the evidence for massless Dirac fermions. On the other hand, Lin *et al.* [2] found no Landau level sequences appearing in the tunneling spectra under a magnetic field, concluding that the Si-Ag interaction is strong enough to break the symmetry of silicene. In order to resolve these conflicting experimental findings, we have studied various Si/Ag configurations on the surface and their related electronic structures using first-principles density-functional calculations. Comparisons with experimental results will be discussed.

[1] Chen et al. Phys. Rev. Lett. 109, 056804 (2012).

[2] Lin et al., Phys. Rev. Lett. 110, 076801 (2013).