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Silicene-type Surface Reconstruction on C40 Hexagonal Silicides

CAMERON VOLDERS, PETRA REINKE, Univ of Virginia — Silicene has emerged as the next two-dimensional material possessing a Dirac type electronic structure making it a prime candidate for integration in electronic devices. The study of silicene is relatively new and many aspects have yet to be fully understood. Here we present a scanning tunneling microscopy (STM) study of a Silicene-type surface reconstruction observed on nanometer scale hexagonal-MoSi2 crystallites. This surface reconstruction is specific to the C40 structure of h-MoSi2 and can initially be defined as a geometric silicene while the coupling between the silicene surface and the silicide bulk is under investigation. The lateral dimensions correspond to a superstructure where the silicene hexagons are slightly buckled and two of the six Si atoms are visible in the STM images creating a honeycomb pattern. The local electronic structure of the silicene is currently being studied with ST spectroscopy and the impact of confinement will be addressed. These results open an alternative route to Silicene growth by using surface reconstructions on metallic and semiconducting C40 silicide structures, which is promising for direct device integration on Si-platforms.

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