

SILICENE GROWTH ON SILVER SUBSTRATES

H. Oughaddou

CEA, DSM-IRAMIS-SPCSI, Bât. 462, Saclay, 91191 Gif-sur-Yvette, France
Département de physique, Université de Cergy-Pontoise, 95000 Cergy-Pontoise, France

Scanning Tunneling Microscopy and Spectroscopy as well as High-Resolution Synchrotron Radiation Photoelectron Spectroscopy were used to study the growth of Si on Ag surfaces. On the (110) face, silicon self-organizes as a parallel array of straight 1.6 nm wide nano-ribbons (NRs). These NRs present a strong metallic character and show quantized electronic states. High resolution STM images (Fig. 1a) reveal that the Si atoms form a honeycomb arrangement (*silicene*), which is confirmed by *ab initio* calculations based on density functional theory (Fig. 1b). On the (100) face, after the formation of a (3x3) superstructure, Si NRs are also formed; they present locally a clear honeycomb arrangement. On the threefold symmetry Ag(111) surface, STM experiments reveal that a continuous silicene film is obtained.

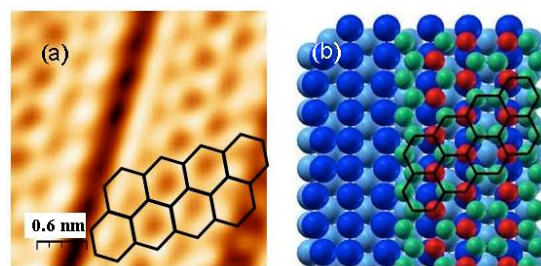


Figure 1: a) high resolution filled state STM image revealing a honeycomb arrangement, b) ball model of the corresponding calculated atomic structure (dark blue: first layer Ag atoms, light blue : second layer Ag atoms; topmost Si atoms are in red while other Si atoms forming hexagons are in green; few honeycombs are drawn in black).