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Electronic properties of epitaxial silicene: a LT-STM/STS study ANTOINE FLEURENCE, CHI-CHENG LEE, TAISUKE OZAKI, YUKIKO YAMADA-TAKAMURA, JAIST, YASUO YOSHIDA, YUKIO HASEGAWA, The Univ. of Tokyo — The astonishing properties of silicene, the Si-counterpart of graphene, together with pioneering experimental observations, triggered in the very recent years, an exponentially increasing interest for this atom-thick material, both at fundamental level and for applications in high-speed electronic devices. We demonstrated, that the spontaneous segregation of silicon on (0001) surface of zirconium diboride (ZrB_2) thin films epitaxied on Si(111) wafers gives rise to a wide-scale uniform two-dimensional silicene sheet [1]. The silicene nature of the honeycomb structure imaged by scanning tunneling microscopy is evidenced by the observation of gap-opened π-electronic bands. The band gap opening is primarily due the specifically imprinted buckling. Here, we present the results of a low-temperature scanning tunneling spectroscopy investigation, which evidences the n-doped nature of silicene. The mapping of the local density of states, together with density functional theory give precious insights into the microscopic origin of the electronic bands of silicene. In particular, it shows the correlation between the degree of sp^2 hybridization of different Si atoms in the internal structure and the character of the electronic bands.

[1] A. Fleurence *et al.*, Phys. Rev. Lett. 108, 245501 (2012).

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