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Growth and electronic properties of monolayer and multilayer silicene BAOJIE FENG, LAN CHEN, KEHUI WU, Institute of Physics, Chinese Academy of Sciences — Silicene, in which Si atoms replace C atoms in a two-dimensional honeycomb lattice in analogue with graphene, has been experimentally realized recently. In this work we report a systematic study of superstructures formed by sub- monolayer and multiple layer silicon grown on Ag(111), by scanning tunneling microscopy (STM) and spectroscopy (STS). We found that, depending on the substrate temperature and silicon coverage, several monolayer superstructures can form on Ag(111). At proper temperature and Si coverage, monolayer and multilayer silicene films were grown [1]. STS at 4K revealed quasiparticle interference (QPI) patterns suggesting intervalley and intravalley scattering of charge carriers, and a linear energy-momentum dispersion relation and a large Fermi velocity were derived [2]. These results unambiguously prove the existence of Dirac fermions in silicene, and provide a solid basis for further studies on the electronic property and device applications of silicene. [1] Nano Letters 12, 3507 (2012), [2]Physical Review Letters 109, 056804 (2012).

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