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Laser–SARPES study of spin-texture of Sn atomic layer at graphene/SiC(0001) interface

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Tin (Sn) atomic layers attract considerable interest owing to their spin-dependent physical properties caused by their strong spin–orbit interaction. We have studied the spin-dependent band structure in a Sn atomic layer that is intercalated into the graphene/SiC(0001) interface [1] using laser-based spin- and angle-resolved photoemission spectroscopy (laser-SARPES) . We can not only obtain high energy-resolution spectra but also observe spin-dependent quantum interference in the photoemission process [2] with the use of the newly-developed laser-SARPES[3]. In the atomic layer, the Sn atoms occupy on-top sites of the Si-terminated SiC(0001) surface with in-plane Sn–Sn bonding. The graphene overlayer ensures little oxidation upon exposure to air in the Sn atomic layer at the interface. This is useful for *ex situ* characterization and device fabrication. We find spin-split Sn bands due to the spin-orbit interaction. At K point, two kinds of spin splitting, Rashba and Zeemann types, appear while the crystal symmetry indicates only the Zeemann type [4]. The experimental results are attributed to a novel symmetry of the Sn wave function on the basis of first-principles calculations.

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