Energy-Gap Opening in a Bi(110) Nanoribbon Induced by Edge Reconstruction

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Bismuth (Bi) is a group-V semimetal with a charge carrier concentration far less than normal metals, has a small effective electron mass and long Fermi wavelength (~40 nm at room temperature). Due to quantum and finite size effects, Bi nanostructures exhibit interesting physical properties, such as semimetal to semiconductor transition, high thermoelectric efficiency, superconductivity, and strong spin-orbit coupling. In this work, the initial growth of Bi on epitaxial graphene (EG) on SiC(0001) is investigated using low temperature scanning tunneling microscopy (LT-STM) and synchrotron-based photoemission spectroscopy (PES). PES measurements reveal weak Bi/EG interfacial interactions. Scanning tunneling spectroscopy (STS) results interestingly reveal the semiconducting nature of such Bi nanoribbons.

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