QUANTIZED ACCUMULATION LAYER AT Bi/InAs INTERFACE

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Abstract

The electronic properties of low dimensional systems have long been at the frontier of condensed matter physics. The interface between some semiconductors can to support a quasitwo-dimensional electron gas (2DEG), in which the electrons move freely parallel to the interface, but are otherwise confined. Such 2DEGs have shows a multitude of fascinating fundamental phenomena, for example, the integer and the fractional quantum Hall effect or two-dimensional superconductivity.It is also of enormous technological importanceand has promoted the use of low-dimensional structures in components such as lasers thin film field effect transistors, optical modulators.

A surface accumulation of electrons can be generated by applying a voltage, for example, in a metal-oxide-semiconductor system. However, interfaces where the accumulation is an inherent property of the material are of special interest. If unoccupiedsurface statesare present, the bands will bend downward relative to theFermi level leading to an accumulation of electrons at thesurface. InAs(111) surface and some of its interfaces also support a surface accumulation of electrons.

The angle resolved photoemission (ARPES) is a major technique to characterize the electronic structure of solids. It allows direct measurement of the electronic structure of a surface 2DEG. Here we present such studies on the Bi/InAs(111) interface.