QUANTUM OSCILLATIONS IN Bi AND Bi-Sb NANOWIRES IN TRANSVERSE MAGNETIC FIELDS

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We report the results of studies of the transverse magnetoresistance (TMR) of single-crystal Bi and $Bi_{0.83}Sb_{0.17}$ nanowires with diameter $d < 100$ nm at low temperatures. Single-crystal nanowire samples were prepared by the Taylor-Ulitovsky technique; they were cylindrical single crystals with the (10$\underline{1}$1) orientation along the wire axis where the C_3 axis was inclined at an angle of 70^o to the wire axis. TMR oscillations equidistant in the magnetic field were observed in Bi and $Bi_{0.83}Sb_{0.17}$ nanowires with a period ΔB, which approximately coincides with the period of Aharonov - Bohm (AB) oscillations for longitudinal magnetoresistance. A Bi crystal can be viewed as a stacking of bilayers with a honeycomblike lattice structure along the [111] direction. In 45-nm Bi nanowire, the self-organization of helical edge states leads to series-connected stacks of bilayers, each of which contains a closed conducting loop in a transverse magnetic field, which leads to the appearance of AB oscillations [1,2]. Apparently, a similar interpretation can be applied to $Bi_{0.83}Sb_{0.17}$ nanowires [3].

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