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Low temperature electron transport studies of Bi nanowires ZUXIN YE, HONG ZHANG, HAIDONG LIU, WENHAO WU, Texas A&M University — We report the electron transport studies of Bi nanowires at sub-Kelvin temperatures. Bi nanowiers with a nominal diameter $\sim$ 80nm and a length $\sim$ 10 μm were electrochemically deposited into the pores of ion track etched polycarbonate membranes. Electric contacts of single Bi nanowires were *in-situ* formed on the on-membrane macroscopic electrodes during the electrochemical deposition. Electron transport properties were measured at temperatures from 60mK to 20K. The temperature dependence of resistance showed a quick drop when the samples were cooled below 0.6K, resembling a superconducting transition. The samples had a finite resistance at low temperature far below the transition, instead of having a zero resistance as regular superconductors. I-V curves showed a zero-bias resistance valley and multiple non-zero-bias peaks symmetrically distributed on both sides of the central valley at T $<$ 0.6K. The magnetic field dependence of resistance showed an unusual hysteresis loop with a butterfly shape when the magnetic field was swept along a close cycle between -0.6T and +0.6T. All these features gradually vanished when an applied magnetic field was increased to 0.6T. We will discuss the origin of this unusual low temperature behavior of Bi nanowires and its relation with the microscopic structures.

Zuxin Ye
Texas A&M University

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