

Josephson coupling across a long single-crystalline Cu nanowire

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Abstract

© 2017 Author(s). We report on a fabrication method and electron-transport measurements for submicron Josephson junctions formed by Cu nanowires coupling to superconducting planar Nb electrodes. The Cu nanowires with a resistivity of $\rho \approx 1 \mu\Omega \text{ cm}$ at low temperatures consisting of single-crystalline segments have been obtained by templated electrodeposition using anodic aluminum oxide as a porous matrix. The current-voltage characteristics of the devices have been studied as a function of temperature and magnetic field. For all junctions, the critical current monotonically decreases with a magnetic field. The measured temperature and magnetic field dependencies are consistent with the model for one-dimensional diffusive superconductor/normal metal/superconductor (SNS) Josephson junctions within the quasiclassical theory of superconductivity.

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