Pairing Symmetry and Magnetic Relaxation in Topological Superconductor $Cu_xBi_2Se_3$

Pradip Das, Yusuke Suzuki, Masashi Tachiki, and Kazuo Kadowaki

Institute of Materials Science and Graduate School of Pure and Applied Sciences, WPI-MANA and CREST-JST, University of Tsukuba, Japan

Topological insulators are materials with a bulk-insulating gap, exibiting quantum-Hall-effect-like behavior in the absence of a magnetic field. The experimental as well as theoretical study show Bi_2Se_3 has a single surface Dirac cone associated with the topologically protected surface state. $Cu_xBi_2Se_3$ is of particular interest because of the signature of superconductivity found at low temperatures. Here we report the growth and the observation of bulk superconductivity from dc magnetization measurements in a cylindrical single crystal of $Cu_xBi_2Se_3$. The magnitude of the magnetization in the Meissner state is very small and the magnetic field dependence of the magnetization just above the lower critical field H_{c1} is very different from those of usual type II superconductors. We belive superconductivity observed in $Cu_xBi_2Se_3$ is consistent with the spin-triplet pairing superconductivity with odd parity. We also observed a rapid relaxation phenomenon of the diamagnetic magnetization, indicating the flexible motion of the vortices in that temperature and field regime.