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Scanning Tunneling Microscopy Measurements of Superconductivity in $Cu_xBi_2Se_3$ NIV LEVY, Center for Nanoscale Science and Technology, NIST and Maryland NanoCenter, UMD, TONG ZHANG, CNST, NIST and Maryland NanoCenter, UMD, JEONGHOON HA, CNST, NIST, Maryland NanoCenter, UMD and Dept. of Phys. and Astro. SNU, FRED SHARIFI, A. ALEC TALIN, CNST, NIST, YOUNG KUK, Dept. of Phys. and Astro. SNU, JOSEPH A. STROSCIO, CNST, NIST — The discovery of topological insulators has triggered the search for new topological states of matter. A Topological superconductor (TSC) is one such state, characterized by the existence of an unconventional superconducting gap in the bulk, and gapless Andreev bound states on the surface. Recently, Cu intercalated Bi_2Se_3 was found to be superconducting with $T_C \sim 3.8$ K, and was considered a prime TSC candidate due to its band structure and strong spin-orbit coupling. A recent point contact measurement observed zero-bias conductance peaks, claiming these as evidence of surface Andreev bound states, and angle resolved photoemission spectroscopy has revealed the preservation of the topological surface states at the Fermi level. In this work we report scanning tunneling microscopy measurements of a cleaved $Cu_{0.2}Bi_2Se_3$ crystal. The measured tunneling spectrum is fully gapped and is well described by the classical s-wave BCS theory. In addition, spatially resolved measurements of the superconducting gap under an applied magnetic field found no bound states in the vortex cores. Both of these results suggest that $Cu_{0.2}Bi_2Se_3$ is a classical s-wave superconductor contrary to previous expectations and measurements. We will discuss current work examining the Cu concentration dependence.

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