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Proximity-Induced High-Temperature Superconductivity in a Topological Insulator PARISA ZAREAPOUR, ALEX HAYAT, SHU YANG FRANK ZHAO, ANJAN REIJNDERS, MIKHAIL KRESHCHUK, ACHINT JAIN, Department of Physics and Institute for Optical Sciences, University of Toronto, DANIEL KWOK, NARA LEE, SANG-WOOK CHEONG, Rutgers Center for Emergent Materials and Department of Physics and Astronomy, Rutgers University, ZHIJUN XU, ALINA YANG, G.D. GU, CMP&MS Department, Brookhaven National Laboratory, KENNETH BURCH, Department of Physics and Institute for Optical Sciences, University of Toronto — New topological phases of matter have been proposed to exist at the surface of some materials with spin-orbit coupling called topological insulators. Among the different exotic features of topological insulators, the interface between a topological insulator and a superconductor is of great interest. It is predicted that combining these two materials would lead to the emergence of Majorana fermion excitations which enable several applications in spintronics and quantum computing. Towards this goal, we have investigated $Bi_2Sr_2CaCu_2O_{8+\delta}$(Bi-2212)- Bi_2Se_3 interface junctions made by a new mechanical-bonding technique. Current vs. voltage and differential conductance measurements have been performed in various temperatures ranging from room temperature to 5K. Several anomalies were observed in the Andreev spectra including a zero bias conductance peak appearing below the critical temperature of the superconductor Bi-2212 (85K), a reduced gap in Bi-2212 as well as the intrinsic gap of Bi-2212. These features suggest the induction of high-temperature superconductivity in the Bi_2Se_3 due to proximity to Bi-2212.

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