Abstract Submitted
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Andreev Reflection Spectroscopy Study of Single-Crystal Bi_2Se_3 and Bi_2Te_3 Topological Insulators[1] C. R. GRANSTROM, I. FRIDMAN, University of Toronto, H.-C. LEI, C. PETROVIC, Brookhaven National Laboratory, J. Y. T. WEI, University of Toronto, Canadian Institute for Advanced Research — To understand the superconducting proximity effect that occurs across the c-axis of non-ideal three-dimensional topological insulators, we perform point-contact Andreev reflection (AR) spectroscopy on Bi_2X_3 (X=Se,Te) single crystals with Nb tips at 4.2 K. Robust AR spectra are observed, and analyzed with the Blonder-Tinkham-Klapwijk (BTK) theory. Non-BTK behavior is seen at low junction impedance and can be attributed to tip-induced Rashba spin-orbit coupling. However, the subgap enhancement seen in all the spectra is not consistent with the Fermi-surface mismatch between Nb and the topological surface states of Bi_2X_3. Rather, bulk band states with substantial k_z-dispersion are needed to explain the AR data, consistent with the Fermi level lying outside the bulk band gap as seen by scanning tunneling spectroscopy. We discuss the implications of our results on c-axis proximity effect experiments.

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