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Planar tunneling spectroscopy of topological insulators and superconductors[1] WAN KYU PARK, C. JONES, L. SUN, M. WOREK, R. TAPPING, L.H. GREENE, University of Illinois at Urbana-Champaign, J. SCHNEELOCH, R.D. ZHONG, Z.J. XU, G. GU, Brookhaven National Laboratory — Tunneling spectroscopy has been widely adopted for the study of electronic density of states. Using this technique, we investigate topological surface states and superconducting proximity effect in topological insulators and superconductors. Planar tunnel junctions are prepared via sputter deposition of Nb and/or AlO_x tunnel barrier onto cleaved or polished (& ion-beam cleaned) surfaces of these materials. Interplay between superconducting pair potential in Nb and spin-momentum locking in the surface states of $(Bi,Sb)_2Se_3$, a confirmed topological insulator, is studied as a function of the Nb layer thickness. Our results have shown that tunneling conductance does not reveal any new features down to 150 Å of Nb. Further investigations are under way to clarify the influence of interface cleanliness as well as the location of the chemical potential. Measurements of tunneling conductance into the surface states of some known and candidate topological insulators will also be discussed.

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