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I-V studies of proximity-induced superconductivity in long nanowires[1] HAIDONG LIU, ZUXIN YE, K.D.D. RATHNAYAKA, WENHAO WU, Texas A&M University, DEPARTMENT OF PHYSICS TEAM — Recently we have observed an anomalous long-range superconducting proximity effect in superconducting Zn and Sn nanowires in contact with bulk film electrodes of Au, Sn, or Pb. With electrodes having a higher transition temperature, nanowires up to 60 micron in length are observed to superconduct at the transition temperature of the electrodes. With Au electrodes, superconductivity in the nanowires is largely suppressed. These samples are fabricated by electroplating nanowires into porous membranes where the electrode-nanowire contacts were made via a self-contacting technique. In this talk, measurements of the I-V characteristics at various temperatures and magnetic fields will be discussed to further understand the observed proximity effect. The most striking feature observed in the dc I-V characteristics is a reproducible step-like feature, identical to that observed in superconducting whiskers and micro-bridges. Such multiple steps are attributed to the successive establishment of localized phase slip centers (PSCs) along a nanowire since some sections of a nanowire have smaller critical currents. With our data, we estimate that the length of a typical PSC is 5-10 microns. These results suggest that the observed proximity effect occurs along the entire length of a nanowire, rather than only at the nanowire-electrode interfaces

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