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Superconductivity of nanowires in contact with bulk metals[1] H. LIU, Z. YE, H. ZHANG, W. WU, Texas A&M University — A counter-intuitive anti-proximity effect (APE) was recently reported for Zn nanowires in contact with two superconducting bulk electrodes (PRL **95**, 076802 (2005)). It was observed that the Zn nanowires were superconducting when the bulk electrodes were normal. When bulk electrodes were superconducting, superconductivity in Zn nanowires appeared to be partially or fully suppressed. However, the resistance of the extrinsic contacts between the Zn nanowires and the bulk electrodes has raised questions about these experiments. To address this issue, we have fabricated Sn, Pb, and Zn single nanowires of various diameters and lengths in contact with a number of different bulk materials using an in-situ contact method develop by our group (APL **84**, 6996 (2004)) which eliminates any extrinsic contact resistance. Transport properties of the nanowires have been measured using a Physical Property Measurement System (PPMS). We have found that long ($\sim$60μm) nanowires of Sn and Pb demonstrate superconductivity as expected with either superconducting or normal bulk electrodes. However, short ($<$10μm) Sn and Pb nanowires demonstrate superconductivity only when the bulk electrodes are superconducting, such as Sn and Pb. Other samples with similar structures are being studied and will be used to clarify these results. We will discuss these results in the context of the proximity effect.

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