Proximity effect in crystalline nanowires and topological insulators

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On a single crystal individual Au nanowire contacted by superconducting electrodes, the proximity effect induced superconductivity was found to appear in two distinct steps. Furthermore, we observed clear periodic differential magnetoresistance oscillations in the superconducting to normal transition region [1]. In crystalline Co nanowires contacted by superconducting electrodes, unexpected long-range proximity effect was observed. Additionally, we observed a large and sharp resistance peak around Tc [2]. We studied transport properties in single crystal topological insulators (TIs) nanowires and nanoribbons. Proximity effect and periodic quantum magnetoresistance oscillations were observed. We also found interesting phenomena in TI films [3] contacted by different superconducting/normal electrodes.
References:
1. Jian Wang et al., Physical Review Letters 102, 247003 (2009);
2. Jian Wang et al., Nature Physics 6, 389 (2010);
3. Jian Wang et al., arXiv:1012.0271v2 [cond-mat.mes-hall] (2011).