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Exploring the mini-gap state and magnetoresistance in platinum nanowires[1] DANIEL SLOTCAVAGE, MEENAKSHI SINGH, THOMAS MALLOUK, MOSES CHAN, The Pennsylvania State University — Periodic oscillations in differential magnetoresistance and a superconducting mini-gap state were found in single-crystal gold nanowires [Wang et al., PRL 102, 247003 (2009)]. The oscillations were attributed to motion of individual vortices in the nanowire. We have studied proximity-induced superconductivity in polycrystalline platinum nanowires grown using template-based electrodeposition. Systematic studies of the dependence of the mini-gap state on temperature, magnetic field, and sample morphology and geometry were conducted. We found the mini-gap state to persist in polycrystalline samples. The presence of the mini-gap state in polycrystalline samples demonstrates its robustness with respect to sample morphology. On the other hand, the differential magnetoresistance oscillations was not found in these wires. Future work will focus on determining the conditions required for the occurrence of these oscillations.

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