Tunneling and Transport in Nanowires

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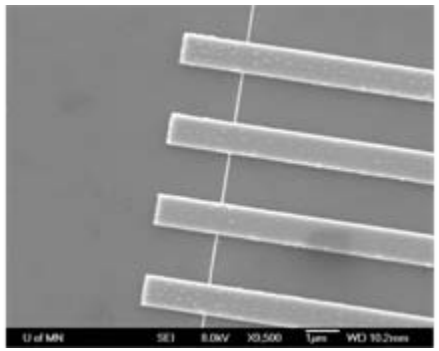
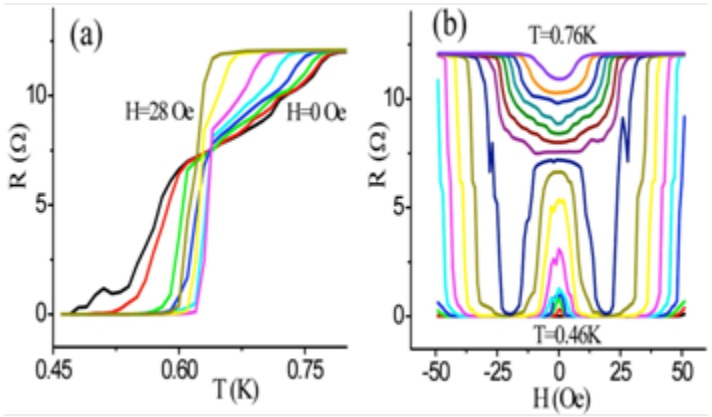
NNIN Facilities utilized: Characterization Facility & Nanofabrication Center

- DESCRIPTION OF WORK
  - Superconducting Zn Nanowires were fabricated using electron beam lithography
  - These were cooled below the transition temperature of Zn.
  - Resistance as a function of temperature, magnetic field and transport current was measured



Scanning Electron Microscope (SEM) image of a Zn nanowire sample. The white scale bar is 1μm long. The wire is 1500 nm long, 80 nm wide and 150 nm thick.

- MAJOR OBSERVATIONS
  - In a resistive state produced by current, the application of small magnetic fields resulted in reentrance into the superconducting state.
  - This was found for both in-plane and out of plane magnetic fields.



(a) Temperature dependence of the wire resistance, at I = 4.4 μA, with varying applied magnetic fields from 0 Oe to 28 Oe, every 4 Oe.
(b) Magnetic field dependence of the wire resistance, at I = 4.4μA, with temperatures ranging from 0.46K to 0.76K, every 0.02K.

- Publications

"Magnetic Field Induced Superconductivity in Out-of-Equilibrium Nanowires," arXiv:0901.3519v1, Submitted to *Physical Review Letters*