Proximity-induced minigap state in a metallic nanowire

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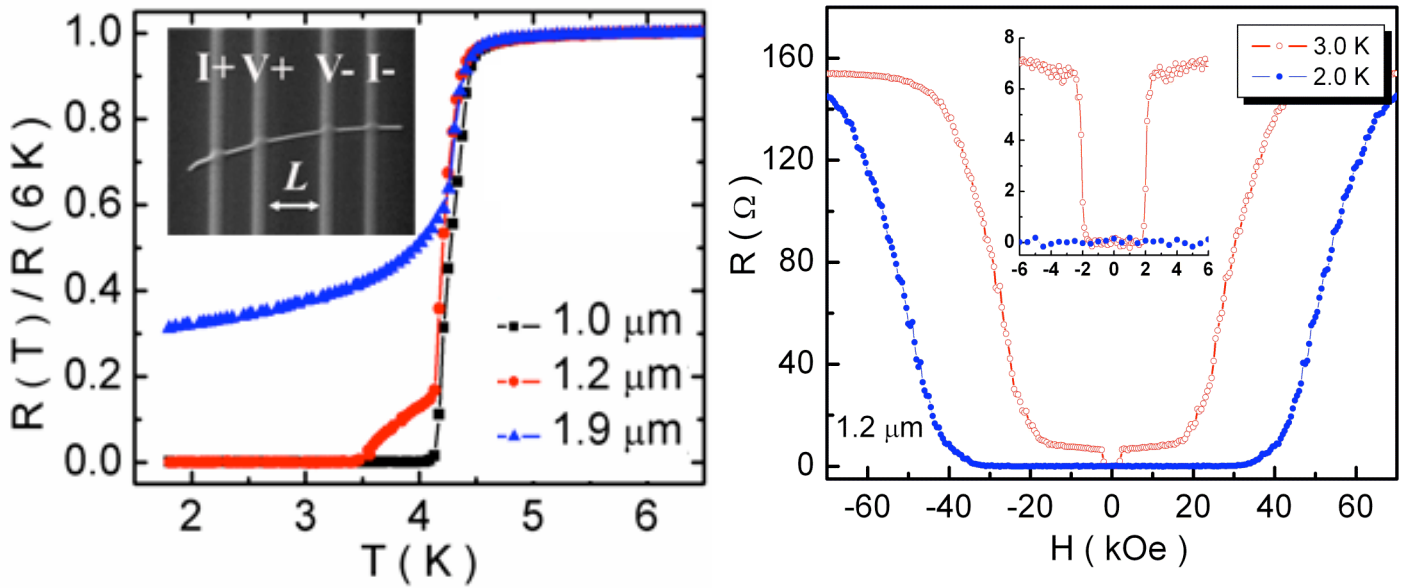

A normal metal acquires superconductivity when brought into contact with a superconductor. MRSEC researchers studied this so-called “proximity effect” in one dimension by contacting 80 nm gold wires of different lengths with four superconducting tungsten electrodes. At certain wire lengths (1.2 µm), an unusual two-step transition to the superconducting state is found (left). The resistance as a function of the magnetic field (right) highlights the presence of a mini-gap phase between 2.5 and 3.5 K. This novel intermediate phase provides crucial evidence towards the mechanism of the proximity effect in one-dimensional systems.