Nanoscale Manipulation, Heating, and Welding of Nanowires

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The manipulation and welding of metal and semiconductor nanowires is conducted with tungsten probes in a scanning electron microscope (JEOL 6701F). Probe movement is controlled with an Attocube Systems ANC150 piezo step controller to allow movement in nanometer up to millimeter distances. Nanowires are deposited on a metal grid then picked up with the probes. A voltage bias applied to the probes using an Agilent Technologies B1500A Semiconductor Device Analyzer results in current flowing through the nanowire and probes. Localized melting occurs at the junction between the nanowire and probe due to high contact resistance. The probes can also weld nanowires into device electrodes.

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