Abstract
Charge transport across metal-semiconductor interfaces at the nanoscale is a crucial issue in nanoelectronics, and semiconductor nanorod chains linked by Au particles are an ideal model system in this respect. We investigated the electrical properties of networks in which CdSe nanorods were connected ("nanowelded") by Au nanoparticles with well-defined metal-semiconductor interfaces. As deposited networks frequently manifested small Au domains at the lateral facets of the nanorods. Thermal annealing removed these lateral Au domains and resulted in larger Au particles within the nanorod junctions, which also increased the cross section of the Au-CdSe interface. The networks were positioned on interdigitated electrodes by dielectrophoresis, and the conduction of the devices was investigated at room and cryogenic temperatures. We will report on the impact of the annealing on the current-voltage curves and discuss our room temperature data in terms of the Schottky-Richardson model that describes thermionic emission over a metal-semiconductor interface. The network devices showed an increased conductivity at low temperature after annealing, and the current voltage curves could be described by charge tunneling.

Keywords: metal-semiconductor nanojunction, self-assembly, networks, charge transport, Schottky-Richardson model, thermionic emission

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