

Probing intrinsic transport properties of single metal nanowires: Direct-write contact formation using a focused-ion beam

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ABSTRACT

Transport characteristics of 70 nm diameter platinum nanowires (NWs) fabricated using pore-templated electrodeposition and individually contacted using a focused ion beam (FIB) method are reported. This approach yields nanowire devices with low contact resistances ($\sim 400 \Omega$) and linear current-voltage characteristics for current densities up to 65 kAcm^{-2} . The intrinsic nanowire resistivity ($33 \pm 5 \mu\Omega\text{cm}$) indicates significant contributions from surface and grain boundary scattering mechanisms. Fits to the temperature dependence of the intrinsic NW resistance confirm that grain boundary scattering dominates surface scattering (by more than a factor two) at all temperatures. Our results demonstrate that FIB presents a rapid and flexible method for formation of low-resistance ohmic contacts to individual metal NWs, allowing intrinsic NW transport properties to be probed.