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Single Step Growth and Low Resistance Interconnecting of Metallic Nanowires BRET FLANDERS, BIROL OZTURK, Oklahoma State University — We present an innovative approach to nanowire growth and interconnecting with external circuitry. Depositing salt-solution over a pair of on-chip electrodes and applying an alternating voltage induces the growth of metallic nanowires between the electrode tips. The voltage-signal provides sensitive control over the metal deposition process. For example, precise specification of the nanowire-diameter is attained through the frequency ω of the alternating voltage that induces the wire-growth process. For indium wires, increasing ω from 0.5 to 3.5 MHz increases the growth velocity of the wires from 11 to 78 μm/s and reduces their diameter from 770 to 114 nm. Gold wires exhibit diameter-tunability that extends below 100 nm. By the feedback-controlled application of the alternating voltage, it becomes possible to produce electrode-nanowire-electrode assemblies with contact-resistances of less than 25 Ω, which would not be possible were the voltage terminated manually. This combination of capabilities enables study of the intrinsic transport properties of metallic nanowires. An area of particular interest is the contribution of electron-surface scattering to the total resistivity, an effect that is expected to increase with decreasing diameter.

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