Automated Characterization and Sorting of Nanowires by Solution-Based Electro-Orientation Spectroscopy CEVAT AKIN, JERRY SHAN, Rutgers University — The electrical conductivity and/or permittivity of nanowires and nanotubes are often poorly known and difficult to measure, requiring cleanroom-based microfabrication and precision positioning to measure directly. Traditional direct-characterization methods are also not compatible with further solution-based processing of nanowires. Electro-orientation spectroscopy, the rotation of nanowires in liquid suspension into alignment with external AC electric fields of different frequency, offers an alternative measurement technique that is simple and also compatible with further solution-based sorting and positioning of particles. We present the theory and our experimental results obtained by optical microscopy on the alignment rate of suspended nanowires of known conductivities under spatially uniform AC electric fields of different frequency. The deduced electrical conductivities of the nanowires are compared to direct 2-point-probe measurements. We demonstrate the compatibility of the electro-orientation method with further solution-based processing by implementing the technique in a novel microfluidic device capable of automated electrical characterization and sorting of nanowires.

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