Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Solution-Based Electro-Orientation Spectroscopy for the Automated, Quantitative Characterization and Sorting of 1D Nanomaterials CEVAT AKIN, JERRY SHAN, JINGANG YI, LEONARD FELDMAN, Rutgers University, CORENTIN DURAND, AN-PING LI, Oak Ridge National Laboratory — The electrical-transport properties of 1D nanomaterials are often poorly known and vary with size and surface effects. Traditional quantitative characterization methods require specialized facilities and are usually slow, invasive and not suitable for the large number of measurements needed to statistically characterize samples with a heterogeneous distribution of properties. Here, we introduce a contactless, solution-based method to rapidly and quantitatively measure the electrical properties of 1D nanomaterials based on their transient alignment behavior in AC electric fields of different frequencies. The electro-orientation method can be automated and is compatible with further solution-based techniques for nanowire alignment and assembly, including electrophoresis, dielectrophoresis and flow control. We demonstrate the accuracy of the solution-based method using a variety of insulating, semiconducting and metallic nanowires, and show that electro-orientation spectroscopy can detect true nanoscale surface effects on the electrical conductivity of 1D nanomaterials. We further discuss our progress toward implementing the method in a microfluidic device capable of automated electrical characterization and sorting of nanowires and nanotubes.

Cevat Akin
Rutgers University

Date submitted: 01 Aug 2014 Electronic form version 1.4