

# MRSEC SEMINAR SERIES

## Four-Probe STM Studies of Electron Transport at the Nanoscale: Nanowires and Graphene

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**Date:** Tuesday, November 13, 2012

**Time:** 3:00 PM

**Location:** Marcus Nanotechnology Building, Room 1116

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### Abstract:

Electron transport at the nanoscale is the key to the novel applications of nanomaterials in electronic and energy technologies. Due to the restricted dimensionality, one distinctive character of nano-systems is that the transport properties are critically dependent on the structural details. Therefore, an important requirement for transport research of a specific nanomaterial system is to examine its structures and properties in a coherent manner. As a “nano” version of a four-probe station, ORNL *Four-probe STM* combines STM local imaging and spectroscopy functions with four-point electrical transport capability in a well-controlled sample environment to allow for simultaneous measurements of transport and local structures on the same nanomaterials. This talk will give a brief overview on this unique facility, and then present a few examples to demonstrate how we use this platform to study the electron transport properties and the structure relationships over multiple length scales, from individual atoms, molecules, to nanowires and mesoscopic graphene systems [1-4]. A focus will be on the measurements of structure-dependent grain boundary resistance in copper interconnect nanowires and the spatially resolved conductance around individual defects (grain boundaries, step edges, and change in thickness) in graphene. This research was sponsored by the Office of Basic Energy Sciences, U.S. Department of Energy.

### References:

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