

## **Thermal Characterization of One-Dimensional Micro/Nanostructures by Transient Self Electro-thermal Sensing**

Xinwei Wang<sup>C, S</sup>

*Department of Mechanical Engineering, Iowa State University, Ames, IA, U.S.A.*

The extremely small size (thickness and length) of one-dimensional micro/nanostructures places great challenges on characterizing their thermal behavior and thermophysical properties. This talk focus on various self electro-thermal sensing techniques developed in our laboratory to characterize the thermal conductivity/diffusivity of nanowires and nanotubes. Periodical, step laser, and pulsed laser thermal excitation, as well as step-current heating are used in these techniques to elevate the sample's temperature. The thermal dissipation in these micro/nanoscale materials is probed by measuring the electrical resistance variation. Emphasis will be placed on our recent work on characterizing the thermophysical properties of sub-micron to nanoscale semiconductive, conductive, and non-conductive one-dimensional nanostructures. These self electro-thermal sensing techniques show great advantages of measurement, including superior signal-to-noise ratio, high measurement accuracy, ease of measurement implementation, and significantly reduced measurement time (less 1 second).