

Abstract Submitted  
for the TSF12 Meeting of  
The American Physical Society

**Thermal conductivity and specific heat of metallic micro and nanowires** DENIS MYASISHCHEV, JOSEF CEPÁK, MARK HOLTZ, JORDAN BERG, Texas Tech University — Thermal conductivity drops dramatically at the nanoscale. Effective power dissipation is crucial for solid state devices, but thermal conductivity decreasing with size complicates miniaturization efforts. There are few direct measurements of thermal conductivity of nanoscale structures. We report fabrication and characterization of nickel nanowires. The data analysis used by previous authors neglects time-varying and higher-order terms in a series expansion of the one-dimensional transient heat equation. This approximation is inaccurate at “high” currents, restricting the attainable signal-to-noise ratio. We remove this source of estimation error with a transient electrothermal finite element model. The approach has been validated on a  $25\mu\text{m}$  diameter platinum wire over a broad temperature range and extension to the nickel nanowires will be discussed.

Denis Myasishchev  
Texas Tech University

Date submitted: 17 Sep 2012

Electronic form version 1.4