Talk Title: *Trends in the Thermoelectric Power Factor of Semiconducting Nanowires*

**Host:** Prof. Jerry Floro  
**Date:** Monday, February 28, 2011  
**Time:** 4:00 to 5:00  
**Refreshments:** 3:30 to 4:00  
**Room:** Wilsdorf 101

**Abstract:**

Current research efforts in Thermoelectricity are focused on exploiting nanostructures for high efficiency conversion of waste heat into electrical energy. Theoretical predictions of enhanced thermoelectric power factor values in low dimensional structures have found limited support in experimental data. In this talk, we will present our detailed studies of thermoelectric transport models in nanostructures paying particular attention to the density of states function. Size and dimensionality effects clearly manifest themselves in modifications of the density of states function; however, these effects are not necessarily beneficial for improving the thermoelectric efficiency as previously thought. The detrimental changes to the density of states function due to confinement will be pointed out, and guidelines for identifying superior thermoelectric nanoscale systems will be outlined. Finally, a simple numerical method for estimating the thermoelectric power factor in semiconducting nanowires (circumventing the full solution of the Boltzmann transport equation) will be presented.

**Bio:**

Oded Rabin, Assistant Professor, University of Maryland  

Dr. Rabin graduated from the Technion – Haifa, Israel in 1996, and received a M.Sc degree in Chemistry from the Weizmann Institute of Science – Rehovot, Israel in 1998. He worked on his dissertation on bismuth-antimony nanowires with Prof. Mildred Dresselhaus at MIT and received his Ph.D. in Physical Chemistry in 2004. Dr. Rabin took postdoctoral positions at Harvard Medical School applying nanotechnology materials in medical imaging research and at UC-Berkeley studying thermoelectric properties of materials. He joined the faculty of UMD in 2007. In its research, Dr. Rabin’s group explores the new physics that emerges from shrinking the dimensions of materials to the nanoscale. Current efforts focus on thermoelectricity in nanowires and quantum wells, and on SERS in shape controlled nanoparticle aggregates.