Carbon Nanotube Electrical Contact Interfaces for Thermoelectrics

Sponsor: Cooling Technologies Research Center

Student: Himanshu Mishra
Faculty: T. S. Fisher
T. D. Sands

Motivation and Goals

- To study the feasibility of using MWNT arrays to improve the performance of Peltier cooling devices
- Accurate characterization of contact resistance between mating arrays of MWNTs

Technical Challenges

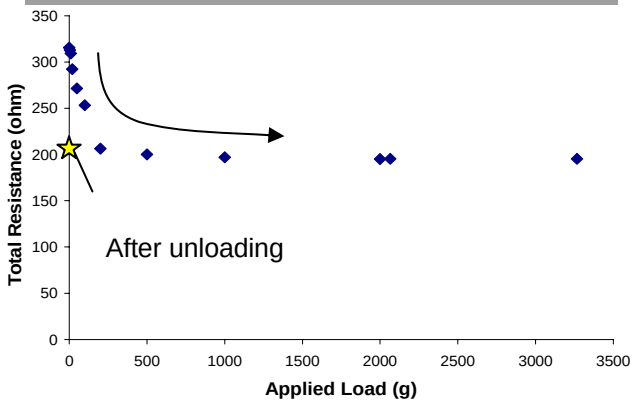
- Patterned Growth of MWNT arrays on various substrates
- Isolation of individual constituent resistances

Electrical contact resistance has become a major source of parasitic loss in new nanoscale thermoelectric devices. CNT arrays offer the promise of reducing this resistance dramatically.

Technical Approach

- Photolithographic tools (spinners, mask aligners, etc)
- Metal evaporation
- PECVD synthesis of CNT arrays
- Four-probe electrical characterization
- Scanning electron microscopy

Electrical Characterization of MWNT Array Interface



Selected Publications

- M. Park, B.A. Cola, T. Siegmund, J. Xu, M.R. Maschmann, T.S. Fisher, H. Kim, “Effects of a Carbon Nanotube Layer on Electrical Contact Resistance Between Copper Substrates,” Nanotechnology, Vol. 17, pp. 2294-2303, 2006.