Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Plasmon Heat Transport Between Vertical Carbon Nanotube Forest and Different Substrates[1] ANDREI NEMILENTSAU, SLAVA ROTKIN, Department of Physics, Lehigh University — Near-field radiative heat transfer between vertical forest of carbon nanotubes and different metallic and dielectric substrates has been studied using the formalism of the fluctuational electrodynamics. Proper matching between surface plasmons in nanotubes and surface polaritons in the substrate was demonstrated to be crucial for the efficient thermal coupling across the interface. Particularly, thermal Kapitza conductance between nanotubes and such polar dielectrics as quartz, sapphire and GaAs (with surface phonon-polariton energies $\sim$ 30-50 meV) is substantially higher than that between nanotubes and BN and SiC (with polartion energies $>$ 100 meV), or metals (with plasmon-polaritons in the visible range). Further optimization of heat transport can be achieved by tweaking nanotube length.

[1]This work was supported by DoD (AFOSR FA9550- 11-1-0185) and Lehigh University (Faculty Innovation Grant).

Andrei Nemilentsau
Department of Physics, Lehigh University

Date submitted: 13 Nov 2012 Electronic form version 1.4