IEEE Photonics Society (Formerly IEEE Lasers and Electro-Optics Society)
French Chapter/Chapitre Français
Seminar announcement/Annonce de séminaire

Title/Titre: **Nanoscale opto thermo electric energy conversion devices**

Speaker/Orateur: **Professor Ali Shakouri**
Baskin School of Engineering
University of California Santa Cruz

Date : **Vendredi 20 mars 2009 à 11h/Friday March 20th, 2009 at 11 a.m.**

Location/Lieu:

TELECOM ParisTech
Ecole Nationale Supérieure des Télécommunications, CNRS/LTCI
46 rue Barrault, 75634 Paris Cedex 13
Room/Pièce : B559
Getting there: http://www.enst.fr/en/tools/address/
Comment s'y rendre : http://www.enst.fr/outils/adresse/

Abstract/Résumé:

Mutual interaction of heat, light and electricity in nanostructured materials will be reviewed. We will focus on two applications: microrefrigeration on a chip and direct conversion of heat into electricity. We will describe thermo-reflectance technique used to characterize hot spots in electronic and optoelectronic devices with submicron spatial, nanosecond temporal and milliKelvin temperature resolution. Fast thermal modeling using image processing algorithms will also be introduced. Next, we discuss the possibility to engineer the Peltier effect to cool hot spot in devices. Novel nanocomposites are developed that allow selective emission of hot electrons and a significant scattering of phonons without reducing electrical conductivity. Localized cooling with high power density exceeding 500W/cm2 has been achieved. Similar principles can be used to make thermoelectric materials that allow direct conversion of wast heat into electricity. Potential to reach energy conversion efficiencies exceeding 15-20% is discussed.

Biographie/Biography

Ali Shakouri is a professor of electrical engineering at University of California Santa Cruz. He received engineering degree from Ecole Nationale Supérieure des Télécommunications de Paris, France in 1990 and Ph.D. from California Institute of Technology in 1995. His current research is on nanoscale and ultrafast heat and current transport in semiconductor devices, high resolution thermal imaging, micro refrigerators on a chip and waste heat recovery. He has initiated an international summer school on renewable energy sources in practice. He is the director of the Thermionic Energy Conversion center, a multi university research initiative aiming to improve direct thermal to electric energy conversion technologies. He is the author or co-author of more than 200 journal and conference papers. He received the Packard Fellowship in 1999, the NSF CAREER award in 2000 and the UCSC School of Engineering FIRST Professor Award in 2004.

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