ΠΑΝΕΠΙΣΤΗΜΙΟ ΚΡΗΤΗΣ
ΤΜΗΜΑ ΦΥΣΙΚΗΣ

ΓΕΝΙΚΟ ΣΕΜΙΝΑΡΙΟ ΤΜΗΜΑΤΟΣ ΦΥΣΙΚΗΣ

SPECIAL PHYSICS COLLOQUIUM

Wednesday, 28 April 2010
13:00-14:00

3rd Floor Seminar Room

"Nano/Micro-Electro-Mechanical Systems (NEMS/MEMS): Cantilevers"

Panos G. Datskos
Oak Ridge National Lab

Abstract

The recent developments in micro-electro-mechanical systems (MEMS) and nano-electro-mechanical systems (NEMS) have enabled the use of new transduction modes that are based primarily on mechanical phenomena and involve mechanical energy conversion. This presentation will focus on: (i) early history of MEMS/NEMS; (ii) principles and models; (ii) microfabrication; (iii) noise mechanisms and figures of merit; and (iv) applications of cantilevers. While MEMS/NEMS can encompass a diverse family of designs, devices with simple cantilever configurations are especially attractive as transducers for physical, chemical and biological sensing. A cantilever device converts physical or chemical changes into a mechanical response. More specifically a chemical interaction with a MEMS surface will result in changes in the Gibbs surface free energy, which, in turn, will produce a mechanical response. The functionality of MEMS/NEMS depends on both the shape (geometry) of the device as well as on the material. For example, when quantum well microcantilevers are fabricated the energy states can be manipulated in real-time using external stress thereby providing photon wavelength tunability. As the scale of these devices shrinks further to the nanoscale higher mechanical frequencies can be achieved. All these phenomena provide us with the tools to investigate a variety of interactions at the nanoscale, provide us with new insights, and make possible devices with more desirable functionalities.