

The IEEE SFBA Nanotechnology Council would like to bring to your attention the following seminar brought to you by the IEEE EDS Chapter on an important nanotechnology enabled topic.

Tuesday, Sept. 8, 2009  
IEEE SCV Electron Devices Chapter (EDS),

**"Combining Dissimilar Materials at Nanometer-scale for Energy Harvesting"**

**Speaker:** Prof. Nobuhiko Kobayashi, Electrical Engineering Dept., UC Santa Cruz.

**Time:** 6:00 PM - Pizza , 6:15 PM - Lecture

**Cost:** Free

**Location:** National Semiconductor, Building E1, Conference Center ,  
2900 Semiconductor Drive , Santa Clara , CA 95051 .

See the NSC Building <http://www.ewh.ieee.org/r6/scv/eds/images/NSC-BldgE-Auditorium.jpg>

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**Web link:** <http://www.ewh.ieee.org/r6/scv/eds/>

**Two-line Summary:**

Energy can be efficiently harvested from light and heat by using semiconductor nanowires or metallic nanoparticles coupled to micro-semiconductor structures.

**Abstract:**

Development of next-generation energy resources that are reliable and economically/ environmentally acceptable is a key to harnessing and providing the resources essential for the life of mankind. Our research focuses on the development of novel semiconductor platforms that would significantly benefit energy harvesting, in particular, from light and heat. In these critical application fields, traditional semiconductor solid-state devices, such as photovoltaic (PV) and thermoelectric (TE) devices based on a stack of single-crystal semiconductor thin films or single-crystal bulk semiconductor have several drawbacks, for instance; Scalability-limits when ultra-large-scale implementation is envisioned for PV devices and Performance-limits for TE devices in which the interplay of both electronic and phonon systems is important. In our research, various types of nanometer-scale semiconductor structures (e.g., nanowires and nanoparticles) coupled to or embedded within a micrometer-scale semiconductor structure (i.e., semiconductor nano-micrometer hybrid platforms) are explored to build a variety of non-conventional PV and TE devices. Two core projects are to develop semiconductor nano-micrometer hybrid platforms based on (1) semiconductor nanowires electrically connected to an array of micrometer-scale semiconductor pillars or thin films and (2) metallic nanoparticles embedded within a micrometer-scale semiconductor thick film. The semiconductor nano-micrometer hybrid platforms are studied within the context of their basic electronic, optical, thermal properties, and their dependence on chemical interactions with environment, which will be further assessed and validated by comparison with theoretical approaches to draw comprehensive pictures of physicochemical properties of these semiconductor platforms.