

SPRING 2007 SEMINAR SERIES

Date: June 5, 2007
Time: 11:00 am – 12:00 pm
Room: SL 165

Everyone is invited

**Phase-Field Modeling on Guided Self-Assembly of
Surface Nanostructures**

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Abstract. Manufacturing of nano-devices requires the assembly of vast numbers of small units in near perfect arrangements. Yet the development of "tooling" methods to cope with such high-precision manufacturing is at its infancy. One area of recent interest is the self-assembly of nanostructures (e.g. quantum dots, wires) fabricated by atom deposition on atomically-flat substrates. We present here a phase field model for adatoms as one phase and vacancies as the second phase. The model is based on a reduction of statistical mechanics formulation to its continuum thermodynamic limit, and includes the influence of elastic interactions between adatoms, and between the substrate and adatoms. Results will be presented for the conditions of formation of self-assembled quantum dots/wires configurations as a result of two types of interactions: (1) interactions between adatoms themselves, and (2) interactions between adatoms and imposed external fields. One specific example will illustrate the results of this competition on the wave-length and pattern of the most stable quantum dot/wire configurations. Promising applications will also be discussed in the talk.

About the Speaker. Dr. Hu is a post-doc research fellow working in Nano- & Micro-mechanics laboratory in Mechanical & Aerospace Engineering (MAE) Department at the University of California, Los Angeles. He is doing research in multi-scale modeling on mechanical behavior of metallic and semiconductor materials using both continuum and atomistic simulations. He got his B.S. and M.S. degrees from Tsinghua University (Beijing, China), and his Ph.D. degree from MAE Dept. at UCLA.