You are invited to a Seminar in Biophysics

By:

Prof. Shalom J. Wind

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on:

Engineering Site-Selective Interactions at the Molecular Scale

The lecture will be given on

Tuesday, January 1st, at 14:00

Physics Building 202, Room 301 (3rd floor)

Abstract

Faithful devotion to Moore's Law has led to the scaling of transistor features to only a few tens of nanometers – about the size of large biomolecules. This has created new opportunities where the tools of micro- and nanofabrication can be used to address questions in biology and medicine, and, conversely, where biomaterials may play a role in a future nanoelectronics technology. We are presently developing new strategies which combine traditional lithographic patterning with new surface chemistries and biomolecular assembly to control the placement of individual molecules and functional nanostructures with high precision over macroscopic dimensions. These strategies are broadly applicable, and we are exploring their use in both biological and nanoengineering studies. In our biological studies, we create biomimetic surfaces which simulate specific aspects of the extracellular environment, such as matrix rigidity and geometry. By monitoring cellular response to variations of these factors, we can gain insight into their role in certain basic cellular functions, such as adhesion and spreading, as well as immune response in T-lymphocytes. Using a similar approach, we are able to study DNA-protein interactions at the single-molecule level in a massively parallel fashion. On the nanoengineering front, we have been exploring the combination of molecular-scale lithographic patterning and DNA-mediated assembly as a means toward integrating electronically and optically functional nanostructures. Such an approach, which combines precision engineering with selective biomolecular recognition, may lead to the development of complex new systems that exploit the best properties of natural and engineered materials.