University of Pittsburgh

Petersen Institute of NanoScience and Engineering Seminar

Speaker: **Professor Ron Naaman**
Department of Chemical Physics, Weizmann Institute

Title: ***Cooperative Molecular Field Effect - The Source for Surprising Electronic and Magnetic Properties of Interfaces***

Time/Date: **12:00 noon, Friday, March 28, 2008**
(refreshments at 12:00noon - 12:15pm)

Place: **307 Eberly Hall**

An electrostatic potential can be created by two dimensional closed packed organized organic layers. This potential can produce similar effects as those produced by the gate in a field effect transistor. We relate to this effect as the *cooperative molecular field effect* (COMFE). As will be shown, in order to produce a COMFE, specially shaped molecular structures must be formed, characterized by a pseudo-two-dimensional shape, i.e., their length and width are much larger than their thickness. The COMFE can be used for combining the properties of organic molecules with those of semiconductors. One of the manifestations of the COMFE is a new type of magnetism. While most magnetic phenomena are related to spins of unpaired electrons, recently, a new type of magnetism has been identified that is related to interfaces of diamagnetic materials, "interface magnetism". This new "interface magnetism" will be discussed as well as other new phenomena resulting from COMFE and applications resulting from the ability to combine organic and inorganic materials in new type of devices, the Molecular Controlled Semiconductor Resistors (MOCSER).[1]

[1] D. Cahen, R. Naaman, Z. Vager, *Advanced Functional Materials*, **15**, 1571 (2005).

Biographical Sketch

Dr. Ron Naaman is the Aryeh and Mintzi Katzman Professor of Chemical Physics Department of the Weizmann Institute, Israel. The Naaman group is investigating electron and information transmission through organized organic thin films using Low Energy Photoelectron Spectroscopy (LEPS). Photoelectrons are ejected from a metal or semiconductor substrates coated with the thin organic films. The velocity (speed and angular) distribution of the electrons is measured after they passed through the thin film into the ultra high vacuum chamber. Various lasers (Excimer, Nd:YAG pumped dye lasers and femtosecond lasers) are used for ejecting the photoelectrons. Specifically the research involves: 1) transmission of spin polarized electron through film made of chiral molecules. 2) electron transmission through electronically excited films. 3) effect of magnetic field on electron transmission through polypeptide films. 4) electron transmission through organized thin films of DNA. 5) using photoelectron spectroscopy to probe electron transfer and spin dependant electron transfer.