The Iby and Aladar Fleischman
Faculty of Engineering
Department of Materials Science and Engineering

אוניברסיטת תל-אביב
TEL AVIV UNIVERSITY

הפקולטה להנדסה
ע"ש איבי ואלדר פליישמן
המחלקה למדע והנדסה של חומרים

You are cordially invited to attend this seminar to be held on

Wednesday, November 4th, 16:00
Room 103, Engineering Class (Kitot) Building

Nanoscale Mapping of Electrostatic and Magnetic Fields by Electron Holography

Prof. Amit Kohn

Department of Materials Science and Engineering, Tel-Aviv University

Holography in the transmission electron microscope (TEM) can achieve quantitative mapping of electrostatic and magnetic fields with nanometer scale spatial resolution.

I will review holography methodologies in the TEM of 'off-axis' and 'in-line' and then ilustrate applications of silicon nanostructures and magnetic elements, respectively:

Using off-axis electron holography, we examined quantitative dopant mapping of silicon PN nanostructures in the form of implanted junctions and nanowires with unique vertical doping. For the microelectronics industry, ongoing reduction of device dimensions, 3D device geometry, and failure analysis of specific devices require mapping of electrically active dopants in thin TEM samples prepared by focused ion beam.

For magnetic mapping, we applied the 'transport-of-intensity' equation (TIE), to Lorentz TEM using Fresnel-contrast images. Our experimental study of sub-micrometer sized elements tested the application of the TIE demonstrating quantitative mapping of magnetic fields in structures sized down to approximately 100nm wide and 5nm thick.

Finally, I will describe future plans for applying electron holography to the study of magnetic and electronic materials.

Biosketch

Prof. Amit Kohn joined the new Department of Materials Science and Engineering at Tel Aviv University this October. Amit's research projects are in the field of magnetic and electronic materials used for information storage devices. The contribution of the research is to relate between structure and composition of these materials to the magneto-transport properties of the devices. The objective is therefore to improve on, or design new so-called 'spin-electronic' devices.
Structural and chemical characterization is mostly achieved by analytical transmission electron microscopy, which probes the properties of the materials at the nanoscale and up to the atomic level. In addition, Amit applies and develops Lorentz electron microscopy and electron holography in order to image magnetic and electrostatic fields in materials and devices at the nanometre scale.

Prof. Kohn holds a PhD in Materials Engineering from the Technion – Israel Institute of Technology. He was a research fellow at the University of Oxford followed by a faculty position at Ben-Gurion University.