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, April 13th, 16:00
Room 103, Engineering Class (Kitot) Building

Development of routine for solution of alluminide's structure basing on electron diffraction data

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Aluminides often crystallize in complex structures such as quasicrystals (QCs) or their corresponding 3D periodic phases (called approximants). Mostly these phases have large volume of the unit cell and appear as nano-sized particles dispersed in metallic matrices. Traditional X-ray diffraction methods cannot be used for characterization of their structure due to the lack of single crystals and overlapping and/or broadening of powder diffraction peaks. Thus, Electron Crystallography (which is a combination of electron imaging and diffraction methods used for solution of atomic structure of materials) is sometimes the only viable tool for this purpose due to stronger (than X rays) interaction with matter. This characteristic is both advantage (allows to work on smaller volumes, for instance) and disadvantage (dynamical scattering). Due to the dynamical scattering, electron diffraction (ED) as a method for structure solution have seen a limited use until 1994 when Precession ED (PED), which produces quasi-kinematical data, was invented [1]. Second milestone which introduced electron crystallography as a solid method for structure solution of novel materials was invention of Electron Diffraction Tomography (EDT) [2]. Since then, hundreds of structures were solved using these and other Electron Crystallography techniques. Only few of those structures are aluminides, since they do not have constant interatomic distances and angles. Thus, there is no chemical reasonability to rely on during verification of correctness of proposed atomic model. In current seminar, structure solution of complex ternary aluminides applying PED and EDT methods will be presented, underlining the step-by-step methodology developed in my group [3-8].

References

1) Vincent R., Midgley P.A., Ultramicroscopy 53 (1994) 271; 2) Kolb U., Gorelik T., Kübel C., Otten MT, Hubert D, Ultramicroscopy 107 (2007) 507; 3) Samuha S., Krimer Y., Meshi L., J. Appl. Cryst. 47 (2014) 1032; 4) Samuha S., Mugnaioli E., Grushko B., Kolb U., Meshi L., Acta Cryst. B70 (2014) 999; 5) Samuha S., Pavlyuchkov D., Zaikina O.V., Grushko B., Meshi L., J. of Alloys and Comp. 621 (2015) 47; 6) Rabkin A., Samuha S., Abutbul R.E., Ezersky V., Meshi L., Golan Y., Nano letters, 15(3) (2015) 2174; 7) Yaniv G., Meshi L., J. of Alloys and Comp. 660 (2016) 496; 8) Samuha S., Grushko B., Meshi L., J. of Alloys and Comp. (2016) DOI:10.1016/j.jallcom.2016.02.070

Biosketch

Prof. Louisa Meshi completed her Ph.D. in Ben Gurion University of the Negev, Israel, specializing on structure determination of intermetallic compounds using a combination of powder X-ray diffraction and electron crystallography methods. During her Ph.D. she received two prestigious awards: Margulis prize provided by the Israeli Society for Microscopy and Wolf prize (from Wolf foundation) for excellent doctoral research. Following postdoctoral research in Bristol University, UK, Prof. Meshi has specialized in study of structural defects using electron microscopy. In 2009 Prof. Meshi joined Department of Materials Engineering, at Ben Gurion University of the Negev, Israel, as a lecturer. In 2012 she was promoted to the rank of Assistant professor and since 2015 she is an Associate professor. In 2012, Prof. Meshi received Krill Award (from Wolf foundation) for excellence in scientific research. 2015-2016 Prof. Meshi was invited as a guest researcher to the Materials Engineering Division, at the National Institute of Standards and Technology, Gaithersburg, USA.
One of the major fields of interests of Prof. Meshi is determination of atomic structure of novel materials applying state of the art methods of electron crystallography. Review of her contribution to this field will be presented at the seminar.