Department of Materials Science and Engineering

Iby and Aladar Fleischman Faculty of Engineering
Tel Aviv University

הפקולטה להנדסה ע"ש איבי ואלדר פליישמן
אוניברסיטת תל אביב

המחלקה למדע והנדסה של חומרים

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

***Tuesday, May 8th, 15:00***

***Room 206, Wolfson Mechanical Engineering Building***

# Understanding and Controlling 3D Nanostructures: From Block Copolymers to Selective Inorganic Materials Growth

**Dr. Tamar Segal-Peretz**

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Nanostructures are the fundamentals building blocks for many technological applications such as photovoltaic, energy storage, membranes, and semiconductor devices. To meet the demands of these applications, precise control over the nanoscale dimensions and tailored functionality of the nanostructure is needed. Self-assembly of block copolymers is known for its nanoscale ordered morphology and scalable manufacturing processes and is therefore considered a promising pathway for nanostructure formation. Among the challenges to realize this promise are: (1) the ability to control the assembly in three dimensions, and (2) engineering the nanostructure functionality and improving its performance.

In this talk I will discuss methods for controlling the three-dimensional assembly of block-copolymers (BCP) using guiding chemical pre-patterns and will demonstrate how better understanding of the 3D structure can be achieved through transmission electron microscopy (TEM) tomography. Functionalization of the BCP nanostructure was performed by selective growth of metal oxides in one microdomain of the BCP using sequential infiltration synthesis (SIS) process. The SIS growth was utilized as a new staining technique for BCP imaging as well as building material in BCP-templated metal oxide ultrafiltration membranes. 3D characterization, using scanning TEM tomography, enabled us to probe hidden structures and to analyze the through-film morphology, changes in feature's roughness with depth, and the formation of defects in directed self-assembled lamellae for nanofabrication as well as in cylindrical structure in separation membranes. SIS mechanism and applications in functional nanostructures will be discussed.

***Tamar Segal-Peretz*** is an Assistant Professor at the Wolfson Department of Chemical Engineering, Technion- Israel Institute of Technology. Her group- the Functional Nanostructure and Advanced Imaging (FNAI) group focuses on understanding and developing new functional nanostructures for nanofabrication processes, membranes, and optical materials using polymer self-assembly and inorganic materials growth within polymers. Her group uses advanced electron microscopy, including 3D characterization, to probe and understand these functional nanostructures.

Dr. Segal-Peretz received her undergraduate degree in Chemical Engineering in 2006 and her PhD from the Multidisciplinary Program for Nanoscience & Nanotechnology in 2013, both from the Technion- Israel Institute for Technology. Dr. Segal-Peretz worked as a Director's Fellow in Argonne National Laboratory and in the Institute for Molecular Engineering in the University of Chicago before joining the Technion faculty in 2016.