

הטכניון - מכון טכנולוגי לישראל

TECHNION - ISRAEL INSTITUTE OF TECHNOLOGY



הפקולטה להנדסה כימית
ע"ש וולפסון
The Wolfson Department of Chemical
Engineering

Wolfson Department of Chemical Engineering Seminar
Lecture Hall 6, Wolfson Department of Chemical Engineering,
Wednesday June 5th at 1:30pm

Memorial lecture in honor of Prof. Eli Rubin

Prof. Ilya Zharov

Department of Chemistry, University of Utah
Salt Lake City, UT

Functional nanoporous materials from “hairy” nanoparticle building blocks

We developed a new approach for the preparation of functional membranes using polymer brush nanoparticles (“hairy” nanoparticles, HNPs). We design these membranes with molecular and ionic transport controlled by the pore size, polymer structure and environmental conditions. Our approach provides novel types of functional membrane materials with applications in separations, fuel cells and lithium batteries.

In this talk, I will describe the preparation and properties of several responsive membranes, including gated silica membranes pore-filled with temperature-responsive poly(N-isopropylacrylamide) brushes and pH-responsive poly(2-dimethylaminoethyl methacrylate) brushes, and ultrafiltration membranes reversibly assembled from HNPs carrying poly(2-hydroxyethyl methacrylate) brushes. I will then focus on our latest results in developing charged responsive nanoporous membranes assembled using HNPs carrying polyelectrolyte brushes. I will describe the different mechanisms of transport selectivity in charged HNP membranes as well as polymer-polymer interactions in these materials that lead to their formation and stability. Finally, I will discuss our current work towards the preparation of pH- and temperature-gated HNP membranes.

Refreshments will be served at 1:15pm