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

Monday, March 16th, 2026 at 13:30

Room 6

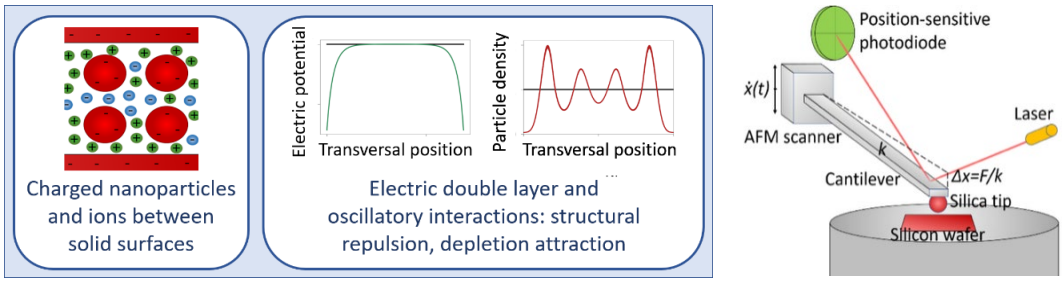
Classical density functional theory and applications: effect of complex solvent on colloidal interactions

Simone Riva

PhD Final Seminar

Advisor: Prof. Ofer Manor
Department of Chemical Engineering, Technion-Israel Institute for Technology

Oscillatory structural forces in suspensions of different-size particles and across particulate films are abundant in nature and technology due to their capacity to introduce both depletion attraction and structural repulsion between colloids. In this seminar, I present a free-energy variational approach to model an atomic force microscopy (AFM) measurement of structural and electrical double layer (EDL) forces across a nanoparticle suspension in electrolyte, which is confined between a flat solid substrate and a colloidal probe. The theory, devoid of fitting parameters, reproduces the measurement. I demonstrate the contributions of the electrolyte and charged nanoparticles to the repulsive EDL interaction across the suspension and the contributions of the nanoparticle hard cores, entangled with interparticle EDL repulsion, to the measured oscillatory force. The nanoparticle bulk concentration, size, and the inter-nanoparticle EDL repulsion intensity contribute to the force oscillation amplitude and explain the physics in the experiment. The theory captures the different coexisting colloidal interactions traversing nanometer to micrometer length scales that translate to the measured interaction force and identifies nanoparticle lattice structures in the confined suspension.



Refreshments will be served at 13:15.