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, January 19th, 2026 at 13:30

Room 6

In Situ Surface Impedance Evaluation of Dynamic Polymer-Modified Surfaces

Prof. Jeffrey M. Halpern

Department of Chemical Engineering and Bioengineering and Department of Chemistry, University of New Hampshire

The SEEDS (**S**urface **E**nhanced **E**lectrochemical **D**iagnostic **S**ensors) laboratory is developing new sensor platforms for a range of applications including disease diagnosis and process analytical technology. Electrochemical biosensors are typically limited in selectivity or sensitivity due to inadequate surface interactions between the analyte and sensor. Our lab monitors surface interactions with Electrochemical Impedance Spectroscopy (EIS), a highly sensitive electrochemical technique used to passively monitor surface changes and interactions. Our lab also focuses on improving the stability, reproducibility, and reusability of sensors.

We have primarily been using EIS without redox mediators to evaluate dynamic changes of surface polymers over long periods of time. We will present the rationale of moving to non-redox mediated solutions, and our progress towards interpreting these signals.

We will present several test cases. One test case, we will look at cyclodextrin mediated sensors as a cross-reactive platform. Another test case, we will look at surface-bound elastin-like polymers as a stimuli-responsive biosensor. We will report our progress towards using these surface, reproducible modification protocols, and the electrochemical response of the stimulus behavior.

Finally, we will briefly discuss future directions of the SEEDS lab in an effort to discover new collaborations. New directions can include different uses of the above paradigms. We are also interested in engineering educational research, specifically inclusive undergraduate mentoring practices across neurodiversity.

Refreshments will be served at 13:15.