



Wolfson Department of Chemical Engineering Seminar

Monday, August 17th, 2026 at 13:30

Room 6

Autonomous Sensing Platform for Controlled Release of Chemotherapeutic Drugs

Vivian Darsa Maidantchik
PhD Seminar

Advisor: Prof. Hossam Haick

Department of Chemical Engineering, Technion-Israel Institute for Technology

In recent years, Chemosensitivity and Resistance Assays (CSRAs), such as MTT and ChemoFx, have been used to predict tumor response to therapy and guide treatment decisions. However, these *in vitro* methods require substantial tissue, have long turnaround times, and fail to fully recapitulate the *in vivo* tumor microenvironment. Therefore, a more physiologically relevant assessment may be achieved by monitoring cancer-related Volatile Organic Compounds (VOCs) *in vivo* using biocompatible sensing technologies. A volatilomic analysis of healthy and cancerous biological specimens, including patient-derived tissues, organoids, and tissue-engineered scaffolds, was performed using Gas Chromatography-Mass Spectrometry (GC-MS), and sensor arrays. Two sensor platforms were evaluated: a novel hierarchical stacked geometrical configuration (HSGC) device composed of functionalized graphene oxide-based sensors printed on free-standing cellulose films, and a zinc nanoparticle-based chemiresistor array integrated into a xylitol-based porous polymeric platform containing chemotherapeutic drugs for real-time VOC detection. GC-MS identified VOCs that distinguished between sample types and treatment conditions. The HSGC device generated VOC response profiles from healthy and cancerous tissues and from organoids at different stages of malignancy within 1–2 minutes, offering a rapid alternative to conventional cryo-section analysis (45–60 minutes) and potential as a wearable spectrometer. Meanwhile, the Zn–xylitol-based platform enabled controlled drug release while simultaneously monitoring VOCs in real time. By providing continuous VOC analysis during therapy selection and the treatment itself, this approach may improve treatment monitoring and support faster and more informed therapeutic decisions than conventional biopsy-based methods.

Refreshments will be served at 13:15.