



**Wolfson Department of Chemical Engineering Seminar**

**Tuesday, June 3<sup>rd</sup>, 2025 at 13:30**

**Room 6**

**Identification and Intervention in Intercellular Communication of  
Apoptosis by Means of Volatile Markers**

**Yael Hershkovitz-Pollak**

**PhD final Seminar**

Advisor: Prof. Hossam Haick

Department of Chemical Engineering, Technion-Israel Institute for Technology

Cell communication is essential for initiating and regulating apoptosis, which plays a critical role in maintaining the health of humans. Intercellular communication has been researched based on proteomic and genomic approaches, however, these approaches do not provide comprehensive information on all the molecules involved in intercellular communication, such as volatile metabolites. In this research, we explore the notion of volatile organic compounds (VOCs) serving as communication molecules for apoptosis and their impact on normal and cancer cell behavior.

We conducted experiments using the human lung epithelial BEAS-2B and the monocytic THP-1 cell lines. Techniques employed included fluorescence microscopy, gas chromatography-mass spectrometry (GC-MS), and tandem mass spectrometry (MS/MS). Volatile analysis discovered specific VOC patterns of apoptotic and normal cells, and different patterns that change due to intercellular communication. Proteomics analysis revealed varying protein profiles depending on the neighboring cells for apoptotic cells, BEAS-2B cells, and THP-1 cells. Based on the VOCs identified, we focused on specific VOCs associated with apoptosis and BEAS-2B cells to examine their effect on THP-1 cells.

Identifying specific VOC patterns that play a role in intercellular communication can add new biological pathway biomarkers based on VOCs. This can significantly contribute to our understanding of biochemical processes related to apoptosis and its interaction with cancer cells. By establishing a VOC-based communication pathway, we can develop new techniques to intervene and influence this communication and the behavior of the cancer cells.

Refreshments will be served at 13:15.