

MECHANICAL ENGINEERING SEMINAR

Monday, July 24, 2023 at 14:30, D. Dan and Betty Kahn Building, Auditorium 1.

Revisiting Airflows and Aerosol Transport in the Deep Lungs

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Hosted by: Prof. Alon Wolf

Resolving respiratory airflows and the transport determinants of inhaled aerosols in the deep regions of the lungs has been traditionally challenging, yet of broad interest towards assessing both pulmonary health risks and inhalation therapy outcomes. In the present talk, I will discuss progress in our current understanding of such transport phenomena that take place within the complex anatomical environment of the deep lungs, characterized by intrinsic 3D alveolated airspaces and nominally slow resident airflows, known as low-Reynolds-number flows. I will exemplify advances brought forward by experimental efforts, in conjunction with numerical simulations, to revisit past mechanistic theories of respiratory airflow and particle transport in the distal lung regions. I will highlight how microfluidics spanning the past decade have accelerated opportunities to deliver anatomically inspired *in vitro* solutions that capture with sufficient realism and accuracy the leading mechanisms governing both respiratory airflow and aerosol transport at true scale. Such efforts have provided previously unattainable *in vitro* quantifications on the local transport properties in the deep pulmonary acinar airways, with new paths to resolve mechanistic interactions between airborne particulate carriers and respiratory airflows at the pulmonary microscales.

Josué Sznitman is a Full Professor of Biomedical Engineering at the Technion and a Swiss, French and Israeli national, with degrees from MIT and ETH Zurich. Prior to joining the Technion (2010) he was a Postdoctoral Fellow at UPenn and a Lecturer and Research Associate at Princeton University. Sznitman has established himself as a leading figure in respiratory biomechanics and transport phenomena, with a focus on drug delivery to the lungs including inhalation therapy. Notably, he currently serves as an associate editor for the *Journal of Biomechanics* and *Clinical Biomechanics* and is as a member of the Editorial Board of *Biomicrofluidics* and the *European Journal of Pharmaceutical Sciences*. Among his accolades, Sznitman was awarded the Young Investigator Award (2015) by the International Society of Aerosols in Medicine (ISAM) for a researcher under 40 and the 2018 Emerging Scientist Award in Drug Delivery to the Lungs (The Aerosol Society, UK).

