



Friday, May 3, 2019

1:30pm-2:30pm (refreshments at 1:15pm)

Clark Conference Room ECAD 109 in the Engineering Center

University of Colorado, Boulder

Dynamic microscale flow patterning using chemical and electrical modulation of zeta potential

Moran Bercovici

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The ability to move fluids at the microscale is at the core of many scientific and technological advancements, including genetic sequencing, ink-jet printing, single cell analysis, tissue engineering and fuel cells. Despite its importance, microfluidic control remains highly limited, even primitive, using discrete channels and mechanical valves to manipulate fluids. One of the themes in my lab is leveraging the unique physicochemical processes at the microscale toward the creation of novel methods for manipulation of fluids and of elastic interfaces. Following a brief introduction to electroosmotic flows, I will present an analytical model and experimental demonstration for the use of non-uniform surface charge subjected on an electric field, to create desired flows at the microscale without the need for physical walls. I will demonstrate static implementations using chemical surface patterning, as well as dynamic zeta potential modification using field effect electrodes. Finally, I will demonstrate the use of spatial flow patterning as the basis for a new method for diffusion-based separation. Time permitting, I will also discuss our work on electro-viscous-elasticity - the interaction between such non-uniform electroosmotic flows and elastic surfaces, with the goal of realizing dynamically configurable microstructures.

Biography: Moran Bercovici is an Associate Professor of Mechanical Engineering at Technion – Israel Institute of Technology, and heads Technion’s Microfluidic Technologies laboratory. This academic year, he is a Donald D. Harrington Faculty Fellow at the University of Texas at Austin.

He received his B.Sc. (2001) and M.Sc. (2006) from the Faculty of Aerospace Engineering at Technion. Between 2001 and 2006 he worked as a research engineer in Industry, before pursuing a Ph.D. at Stanford University (2006-2011), and then spending a short postdoctoral period in the Department of Urology at Stanford School of Medicine. In 2011 he joined Technion as a faculty member in Mechanical Engineering.

Prof. Bercovici was elected among the “40 under 40 most promising individuals” in Israel by The Marker magazine, and has received numerous prestigious awards for his research and teaching, including the ERC starting grant awarded by the European Research Council to innovative high-risk / high-gain research, the Krill Prize for Excellence in Scientific Research from the Wolf Foundation, and the Yanai Prize – Technion’s highest recognition for a substantial and unique contribution to the advancement of academic education. He was recently announced the 2019 Blavatnik Laureate in Chemistry – considered one of the most prestigious awards to young scientists in Israel.

