Technion-Israel Institute of Technology
Faculty of Mechanical Engineering

הטכניון-מכון טכנולוגי לישראל
הפקולטה להנדסת מכונות

סמינריון

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות, שתתקיים ביום ה' 23.05.2019 (י"ח באייר, תשע"ט), בניין דן קאהן, אודיטוריום 1, 13:45.

מרצה: נטע זלמנוביץ

מנחה: פרופ'/ח גלעד יוסיפון

על הנושא:

Electrochemical characterization of the transient response of a microchannel-nanoslot fluidic devices

The seminar will be given in English

תקציר ההרצאה :

Experimental and numerical results reveal non-monotonic chronopotentiometric (galvanostatic operation) and chronoamperometric (potentiostatic operation) response of a microchannel-nanoslot system. In shallow microchannel (4μm depth) we reported evidence of variation in ion selectivity of a fabricated microchannel-nanochannel device resulting in the appearance of a distinct local maximum in the overlimiting chronopotentiometric response. In this system consisting of shallow microchannels joined by a nanochannel, viscous shear at the microchannel walls suppresses the electro-osmotic instability and prevents any associated contribution to the nonmonotonic response. Thus, this response is primarily electrodiffusive. Numerical simulations indicate that concentration polarization develops not only within the microchannel but also within the nanoslot itself, with a local voltage maximum in the chronopotentiometric response correlated with interfacial depletion. In contrast, in deep microchannel (95μm) we observed a distinct signature of electroconvective instability in the transient response for a microchannel-nanoslot system. We studied the development of the electroconvective instability from equilibrium during the transient chronopotentiometric/chronoamperometric responses at overlimiting current conditions and observe a distinct signature of nonmonotonic transient response resulting from the emergence of electroconvective instability. This stands in contrast to previously reported experimental non-monotonic transient responses in heterogeneous membrane systems associated with linear electroosmotic flow. Understanding the transient nonideal permselective response is essential for obtaining fundamental insight and for optimizing efficient operation of practical fabricated nanofluidic and membrane devices that are important for electrodialysis, sorting, preconcentration and biosensing.

בברכה,

פרופ"א אתי סאס
מרכז הסמינרים