סמינריון

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות, שתתקיים ביום ד' 31.08.16 (כז' באב, תשע"ו), בבניין דן-קאהן, קומה 0, אודיטוריום 1, 13:30.

יוצר: לאון רוזנצביט

מנחה: פרופ'/ח גלעד יוסיפון

על הנושא:

The Effect of Geometrical Symmetry Breaking and Advection on Concentration-Polarization Phenomenon in Micro/Nano-Fluidic Devices

The seminar will be given in Hebrew

להלן תקציר ההרצאה:

Understanding ion transport processes through ion-permselective nanoporous membranes or nanochannels with overlapping Debye layers is of great importance in realizing optimal designs of desalination, bimolecular sensor, lab-on-a-chip and fuel cell devices. In such systems, under the application of an external electric field, the ion-permselectivity symmetry breaking phenomenon results in ionic concentration-polarization (ICP), i.e., the formation of ionic concentration gradients. Various effects may influence ICP in our systems and we investigated two such interactions. Ion current rectification inversion was observed in a symmetry-broken funnel-shaped nanochannel geometry above a threshold voltage roughly corresponding to the under-limiting to over-limiting current transition. Previous experimental studies have examined rectification at either low voltage (under-limiting current region) for conical nanopores/funnel-shaped nanochannels or at high voltage (over-limiting region) for straight nanochannels with asymmetric entrances or asymmetric interfacing microchannels. The observed rectification inversion occurs because the system resistance is shifted, beyond a threshold voltage, from being controlled by intra-channel ICP to being controlled by external ICP. Additionally, strong hysteresis effects, due to residual ICP, manifest themselves through the dependence of the transient current rectification on voltage scan rate. In addition we studied the effect of advection on the transient ICP phenomenon in microchannel-membrane systems. Specifically, the temporal evolution of the depletion layer, in systems supporting a net flow rate with various Péclet numbers, was of interest. An analytical one-dimensional semi-infinite model was developed, along with numerical simulations and compared to experiments. Of particular interest was the third-species fluorescent dye concentration behavior.

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בברכה,

פרופ'/א אמיר שמן

מרכז הסמינרים