

## סמינריון

הנדך מוזמנ/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות שתתקיים ביום ג' 7.12.21  
<https://technion.zoom.us/j/92374743179> : באמצעות הזום : 15:00 בשעה (תשפ"ב),

מרצה: אמרי אטלס

מנחה: פרופ' חבר מתי סאס

על הנושא:

### **Pushing boundaries in the theory of water desalination by electrodialysis: cells driven by chemical energy and pH effects**

The seminar will be given in English

תקציר ההרצאה :

Electrodialysis (ED) is a well-established water desalination technology, applied mainly to brackish water desalination. In typical ED stacks, desalination is driven by an applied electric field, which results in salt ion electromigration through alternating cation and anion exchange membranes. Recently, classical ED cells have been modified by driving them via chemical energy supplied by spontaneous redox reactions occurring at the electrodes. Such a cell is distinct from classical ED as it does not require electricity, but rather outputs both desalted water and electricity simultaneously.

In this work, we extend ED theory in two ways: i) to include water dissociation and pH variations in a classical ED stack, and ii) to capture an ED cell driven by spontaneous electrode reactions. Our models account for non-ideal membranes which permit co-ion crossover, as well as electric potential, counterion, and coion concentration variations within the channels and membranes. Furthermore, we develop a thermodynamic framework which, for the first time, allows for predicting maximum available energy output in such chemical-energy driven desalination processes. Using this framework we provide the first evaluations of the thermodynamic energy efficiency of ED cells driven by redox reactions and desalination fuel cells (DFC).

בברכה,

פּרופ' מתי סאס

מרכז הסמינרים