הפקולטה למדע והנדסה של חומרים
Department of Materials Science and Engineering

הטכניון
מכון טכנולוגי
לישראל

SEMINAR סמינר

Alkaline and bipolar membrane electrolyzers: A route to scalable energy storage and conversion?

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Commercialized membrane electrolyzers use acidic proton exchange membranes (PEMs). These offer high performance but require precious-metal catalysts (IrO2 and Pt) that are stable under the acidic conditions. We are studying alternative electrolysis platforms. First, I will discuss alkaline-exchange-membrane (AEM) electrolyzers that in principle offer the performance of PEM electrolyzers with the new ability to use earth-abundant and inexpensive catalysts and cell materials. I will present fundamental work in understanding earth-abundant water-oxidation catalysts and progress in building AEM electrolyzers. Our best systems operate at 1 A·cm-2 in pure water feed at < 1.85 V at a moderate temperature of ~70 °C. These devices, however, degrade too fast (~ 1 mV/h). I will discuss the chemical changes to the anode and cathode catalyst and ionomer that are correlated with this performance loss and strategies to mitigate degradation towards commercialization. Second, I will discuss bipolar membranes (BPM) electrolyzers. BPMs consist of a laminated AEM and PEM and can conduct ionic current by dissociating water into protons and hydroxide at the AEM/CEM junction. BPMs are used industrially in electrodialysis, but are limited ~100 mA cm-2 due to large overpotentials for dissociating water. Our studies show how to accelerate water dissociation (Science, 2020) and enable BPMs at > 3 A cm-2 and with improved efficiency. BPMs also limit crossover and enable operation of a cathode and anode in different pH, and are thus useful for CO2 electrolysis, electrodialysis, and water electrolysis..

Host: Assoc Prof. Maytal Caspary-Toroker

ההרצאה תתקיים ביום חמישי , ה-18 בנובמבר 2021 בשעה 14:30
באודיטוריום, בניין מידן, לבעלי תו ירוק או דרך הזום

The lecture will take place on Thursday, November 18, 2021, at 14:30
at the Auditorium, Meidan, for green pass holders, or via ZOOM.

https://technion.zoom.us/j/95098324958

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