

תכנית האנרגיה ע"ש גרנד מתכבדת להזמין להרצאה סמינריונית שתיתן ע"י:

## נגה זיו

התכנית הבין-יחידתית לאנרגיה

בנושא:

### The Effect of CO<sub>2</sub> on Anion Exchange Membranes for Fuel Cells

Anion exchange membrane fuel cells (AEMFCs) are highly efficient, environmentally friendly electrochemical devices that can produce green power by converting the chemical energy stored in clean fuel molecules into electricity. Anion exchange membranes (AEMs) used in this fuel cell technology, consist of polymer chains containing fixed positively charged groups, which serve to conduct hydroxide (OH<sup>-</sup>) anions from the cathode to the anode side of the fuel cell device. AEMs offer several advantages over the main stream proton exchange membranes as they provide a non-acidic environment that enables the use of affordable platinum group metal-free catalysts and better reaction kinetics.

One of the main challenges of AEMFCs is the undesired reaction of OH<sup>-</sup> anions with atmospheric CO<sub>2</sub>, which converts OH<sup>-</sup> to bulkier, less mobile CO<sub>3</sub><sup>2-</sup>/HCO<sub>3</sub><sup>-</sup> anions (carbonation). This reaction takes place very quickly when the membrane is in contact with atmospheric air (which contains ~400ppm CO<sub>2</sub>). It has been shown that all OH<sup>-</sup> anions in the membrane are replaced by CO<sub>3</sub><sup>2-</sup>/HCO<sub>3</sub><sup>-</sup> within 0.5-6 hours of exposure to air. This process causes a decrease in the membrane's conductivity and therefore, a decrease in the fuel cell performance.

In this work, the effect of HCO<sub>3</sub><sup>-</sup> and CO<sub>3</sub><sup>2-</sup> anions on different AEM structures and their properties is explored, as well as the effect of CO<sub>2</sub> in the ambient gas, and in addition a novel method to measure the true hydroxide conductivity of AEMs is presented for the first time. Overall, this pioneering work may be used as a reference study for future research in the AEMFC community.

**מנחה: פרופ"ח דריו דקל, הפקולטה להנדסה כימית**

**במסגרת עבודת מחקר לתואר מגיסטר**

ההרצאה תתקיים ביום ה', 03/05/18, בשעה 12:00, אולם 6, הפקולטה להנדסה כימית