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| הפקולטה להנדסה כימית  ע"ש וולפסון |  |  |
| The Wolfson Department of Chemical Engineering |  |  |

**Wolfson Department of Chemical Engineering Seminar**

**Wednesday, June 23rd, 2021, at 13:30**

**Lecture Hall No. 6**

**Degradation of PEMFC cathode due to NO** **contamination, studied by**

**Distribution of Relaxation Times analysis**

**Arthur Doroshev**

**M.Sc. Seminar**

Grand Technion Energy Program (GTEP)

Advisor: Prof. Yoed Tsur

 A polymer electrolyte membrane fuel cell (PEMFC) is an environmentally friendly energy converter with many advantages, including low operating temperatures (70-100 °C), high power density (~1.4 kW/kg), high electrical efficiency (40-60%), and quiet operation. However, PEMFC commercialization is still hampered by cost and durability issues. The contamination of PEMFCs by impurities in feed streams is a significant contributor to durability issues. As a result, PEMFC technology development still necessitates intensive R&D.

In PEMFC research, EIS has been an indispensable diagnostic tool. An essential benefit of EIS is the ability to determine the total impedance from various components or processes within a PEMFC. To identify contributors correctly, it is necessary to analyze EIS data reliably. We have used the Impedance Spectroscopy Genetic Programming (ISGP) technique as an analysis tool to accomplish this.

In the presented research, PEMFCs were operated under heavy NO cathode contamination levels, and *in operando*EIS measurements were performed. The data were analyzed using ISGP based on a previously obtained model, revealing the impact of NO cathode contamination on each of the main processes within a fuel cell. A strategy to partially alleviate the damage caused by NO contamination is also suggested.

**Refreshments will be served at 13:15**

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**Wolfson Department of Chemical Engineering Seminar**

**Wednesday, June 23rd, 2021 at 13:30**

**Lecture Hall No. 6**

**Dynamic coating of one liquid by another by employing the Acoustowetting phenomenon**

**Avital Reizman**

Department of Chemical Engineering, Technion

MSc Seminar

Advisor: Prof. Ofer Manor

Recent advances in small scale and geographically flexible fabrication are believed to be the beginning of a manufacturing revolution. Some examples are 3D printers and suit-case size photolithography facilities. These advances highlight the necessity for a complementary advance in geographically flexible, small scale, and precise coating technologies. Dynamic wetting of solid substrates by liquid films of distinct thicknesses, called the Acoustowetting phenomenon, was discovered in the last decade and can be used to promote the development of coating technologies. To obtain a complementary advance in the field, we employ an acoustic actuator to produce MHz-frequency surface acoustic waves, commonly named as SAWs, in the solid substrate to power and control the dynamic wetting of objects by a coating liquid.

In our physical model, we employ and acoustic actuator to coat a model smooth and well defined liquid system -- a sessile water drop -- by a silicon oil film.  The thicknesses of the water drop, and oil film are below the capillary gravitational length, of approximately 1 mm. In the presence of the SAW, we observe that a thin film of oil dynamically wets the solid substrate of the device along the path of the SAW. At sufficient SAW power, the oil film climbs atop the water drop, rendering a full coating layer. We thus show that one liquid may coat another in a directional manner under well-defined MHz-frequency acoustic stress.

**Refreshments will be served at 13:15**