|  |  |  |
| --- | --- | --- |
|  |  |  הטכניון - מכון טכנולוגי לישראל TECHNION - ISRAEL INSTITUTE OF TECHNOLOGY  |
| הפקולטה להנדסה כימיתע"ש וולפסון |  |  |
| The Wolfson Department of Chemical Engineering |  |  |

**Wolfson Department of Chemical Engineering Seminar**

**Monday, April 1st, 2023 at 14:00**

**Room 1**

**Fluid Manipulation using Surface Acoustic Waves: Precision Oil Extraction and Dynamic Coating**

**Yifan Li**

**PhD Mid Seminar**

Advisor: Prof. Ofer Manor

Department of Chemical Engineering, Technion-Israel Institute for Technology

We investigate fluid manipulation using surface acoustic waves (SAW) from two perspectives: Breaking oil/water emulsions and coating objects. In the first project, we use SAW to extract oil out of droplets of nano-emulsions, stabilized by surfactants––SDS or Tween 20. On the shelf, the emulsions remain stable for over a year in a closed container. We extract a micron-thick oil film, appearing at the free surface of the drop due to water evaporation, using a MHz-frequency SAW that we generate in the solid substrate. This is the Acoustowetting phenomenon: Lower energy liquids––Oil––are attracted by the SAW outside the drop, leaving the emulsion behind, while higher energy liquids––Water––remain still. In the second project, we delve into the physics of dynamic coating propelled by SAWs. We use MHz-frequency SAW to manipulate micrometer to millimeter thick oil film to dynamically wet and coat solid objects of millimeter size. The objects in our experiments are sculpted into two forms: round half-cylinder bumps of differing heights and a tall triangular prism. The former tests the oil’s ability to climb over an object of varying the curvature. The latter demonstrates acoustic/capillary/gravitational balance and the extent of object height that we may coat using this approach. The wealth of experimental data we provide aids our collaborating theorists in understanding and simulating this dynamic wetting process using thin film theory. Overall, we study interactions between surface acoustic waves and soft matter for water/oil separation and coating strategies.