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|  |  |  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, July 29th, 2024 at 14:00**

**Room 4**

**How low can you go?**

**Enhancing the chemical stability of polymers by tuning the growth of metal oxides in them**

**Gilad Sasson**

**MSc Seminar**

Advisor: Assoc. Prof. Tamar Segal Peretz.

Department of Chemical Engineering, Technion-Israel Institute for Technology

Polymers are ubiquitous materials in modern society, integral to a myriad of applications across various industries. In some of these applications, the polymers need to withstand various solvent environments, including exposure to liquid or vapor organic solvents. In recent years, a technique named sequential infiltration synthesis (SIS) was demonstrated to increase polymer resistance to dissolution by organic solvents. In SIS, vapor precursors infiltrate the polymer and react with its functional groups, resulting in a hybrid material at the molecular level, which can contribute to increased solvent resistance. However, there is a challenge to individually control the inorganic growth rate and its depth due to complex relationship between the process conditions and the precursors’ diffusion and reaction.

A new way to address this challenge and tune the SIS process is through the use of random copolymers. By tuning the concentration of reactive functional groups in the polymer, the inorganic mass gain can be precisely controlled. This research explored the SIS process in random copolymer systems. By tuning the process conditions and the concentration of functional groups the mechanisms of the SIS mass gain and inorganic infiltration depth were explored. To gain more insight on the SIS treatment in a random co polymer system, a newly developed reaction diffusion model I developed was used. Furthermore, I will demonstrate the ability of SIS to drastically increase the solvent resistance of polymers with a low concentration of functional groups and explore the solvent protection mechanisms of the treated hybrid material.

Refreshments will be served at 13:15.