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

**Wolfson Department of Chemical Engineering Seminar**

**Wednesday, July 7th, 2021 at 13:30**

**Lecture Hall No. 6**

**Preparation, mechanics and particle deposition behavior of thin, low-fouling hydrogel coatings**

**Lina Rozental**

Department of Chemical Engineering, Technion

Research Advisor: **Prof. Viatcheslav Freger**

Co- Advisor: **Prof. Charles Diesendruck**

Water-submerged surfaces commonly suffer from undesired material deposition, impairing the intended surface function and increasing operational costs. One popular mitigation strategy involves coating the surface with non-toxic, low-fouling polymer films, which can reduce deposition significantly. Among these low-fouling coatings, hydrogels – crosslinked, hydrophilic polymer networks that swell in water – play an important role. Their water uptake renders them similar to the surrounding aqueous medium, thus lowering the interfacial energy and discouraging adhesion. Despite ongoing research, the connection between synthetic parameters, mechanochemical properties and the fouling behavior of hydrogels is still elusive.

Reducing hydrogel thickness can improve its uniformity and stability by minimizing swelling-related stresses as well as minimize the impact on surface performance. Moreover, since excessive swelling can lead to detachment of the gel from the surface, the degree of swelling should be controlled by an appropriate crosslinking ratio, and the hydrogel should be firmly anchored to the surface. One goal of our research is to develop a generic procedure to prepare thin and covalently anchored hydrogels with defined properties.

Our second goal is to study how the mechanochemical properties of a hydrogel affect its fouling propensity. We will characterize coatings both macroscopically by quantifying particle deposition on the hydrogel, and microscopically by probing their adhesive and elastic properties with atomic force microscopy (AFM) using the colloidal probe technique. Combining these two approaches will help elucidate the rules that govern material deposition on soft surfaces.

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

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

**Wolfson Department of Chemical Engineering Seminar**

**Wednesday, July 7th, 2021 at 13:30**

**Lecture Hall No. 6**

## **Macroscopic and microscopic investigation of deposition processes and particle and bacteria attachment to surfaces of different nature.**

**Alexander Leontev**

Department of Chemical Engineering, Technion

Research Advisor: **Prof. Viatcheslav Freger**

Co- Advisor: **Prof. Alexander Leshansky**



Surfaces engaged in aquatic processes tend to become fouled with time by different types of non-living (particles, colloids, salts) or living (microorganisms such as bacteria) contaminants. Fouling and biofouling are undesirable surface phenomena which reduce performance and functioning of systems and equipment in various areas, e.g. ship hulls, medical devices, implants, vascular grafts, and membrane filtration systems.

The intensity of fouling and biofouling processes largely depends on the particle and bacteria deposition rate and on the specificity of deposition. The features of the deposition process, in turn, are determined by the kinetics of particle attachment, their bulk transport, and adhesion of particles to the surface at the microscopic level.

In our work, we investigate the macroscopic picture of deposition based on microscopic analysis of the interactions between an individual particle and the analyzed surfaces at the moment of attachment and during subsequent dwelling. For this purpose, we want to develop a unified theory of deposition of particles and bacteria that will combine our macroscopic vision of the problem with the theory of microscopic interactions that we are working on.

In this seminar I will present how we understand and interpret the complex physics behind the deposition and attachment of particles and bacteria on surfaces with different fouling propensities, as well as the results of our theoretical and experimental analysis of the problem.

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