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המכון לביוכימיה, מדעי המזון והתזונה

Dr. Roni Kasher

Zuckerberg Institute for Water Research
The Jacob Blaustein Institutes for Desert Research
Ben-Gurion University of the Negev, Sde-Boger Campus

http://web2.bgu.ac.il/ziwr/faculty/kasher/index.htm

Title:

Chemical modifications of water treatment polymeric membranes: Antifouling and novel surface properties

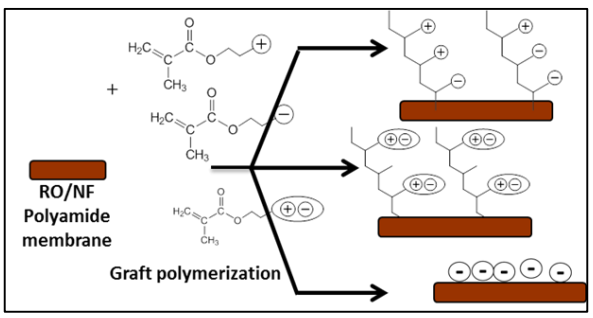
המפגש יתקיים
ביום א', 3 מאי 2015, בשעה 9:00
מועדון סגל
(5/3/2015, 9:00, Faculty Club)

Abstract:

The already existent shortage of fresh water at "red flag" points throughout the world is only expected to worsen in the coming decades, with water scarcity reaching global proportions[(1)]. Accordingly, there is an ever-increasing need to develop the requisite science and technology to underpin expanded, improved, and increased water purification capabilities. Today, reverse osmosis (RO) and nanofiltration (NF) processes enjoy widespread use in the desalination of seawater and brackish water, as well as in the treatment of industrial wastewater. ***The RO and NF membrane technologies are highly efficient in terms of energy consumption. Nevertheless, a continuing challenge remains - the clogging of membranes*** via accumulation of organic matter and growth of bacteria on the membrane surface, ***namely organic-fouling and biofouling.***

An attractive strategy to cope with organic fouling and biofouling is acquiring anti-fouling and low-bacterial adherence properties for the membrane. I will describe redox-initiated graft polymerization of RO membranes by hydrophilic monomers to achieve surface 'hydrophilization' and reduce membrane fouling: While zwitterionic monomers maintain the membrane surface charge, co-polymerization of oppositely charged monomers afford a controllable surface charge, with superior properties (see Fig. 1). Furthermore, the effect of grafted-polymer chemistry was found to be crucial, with PEG-based coating being superior antifouling surface.

Figure 1: Graft polymerization of RO membrane using methacrylate monomers with zwitterionic and oppositely charged side-chain groups.



Finally, recent results of immobilization of anti-microbial peptides on RO membranes that inhibit biofilm growth and reduce biofouling will be presented; membranes grafted by the peptides showed low bacteria count and lower biofilm content. This study may lead to novel membranes for water treatment and desalination with improved antifouling properties that eventually increase the accessibility for fresh water worldwide.

סגל וסטודנטים מוזמנים להשתתף
לתיאום פגישה: yaelf@savion.huji.ac.il