



Technion's Value Proposition: Facilities for testing performance of membranes with novel coatings and components in operational environments

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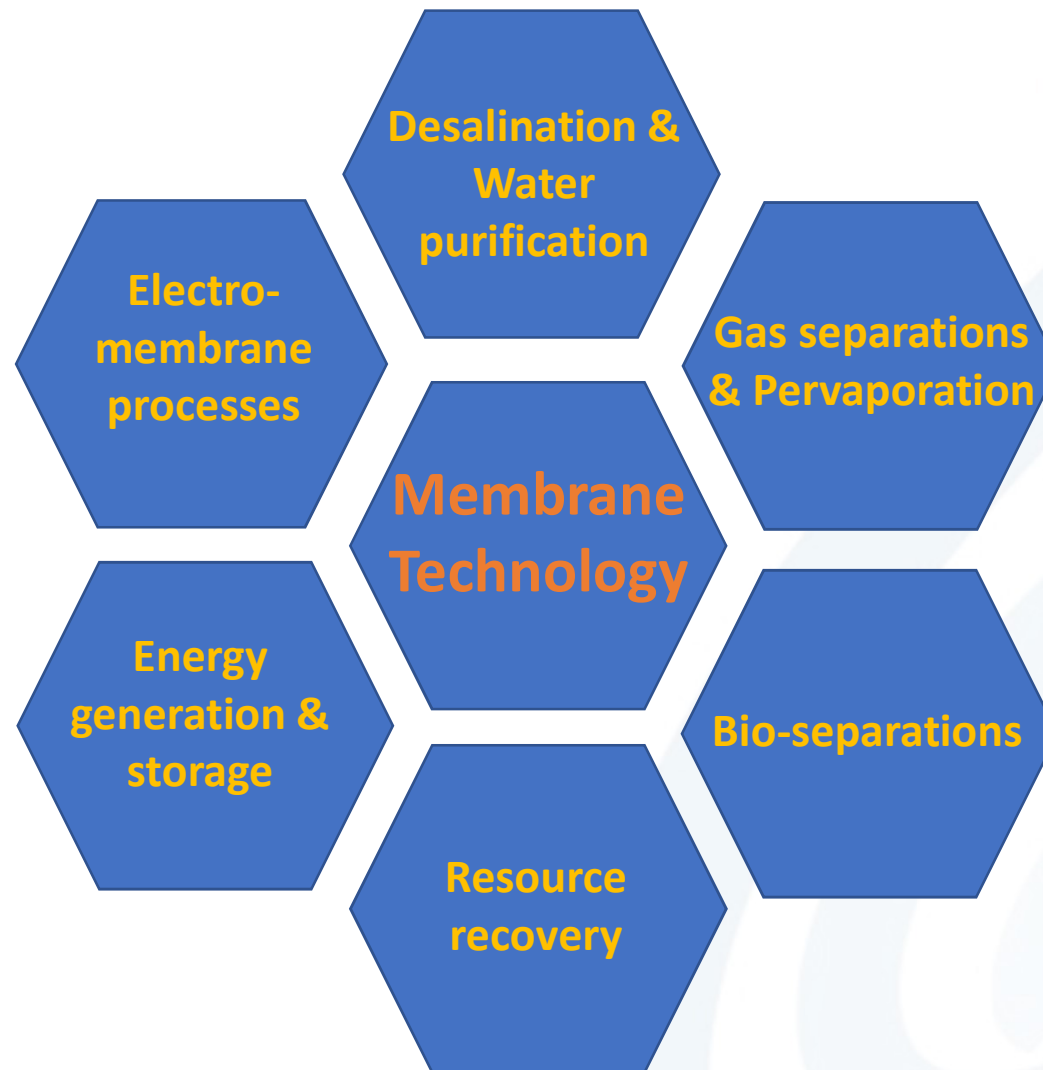


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Industries/Processes

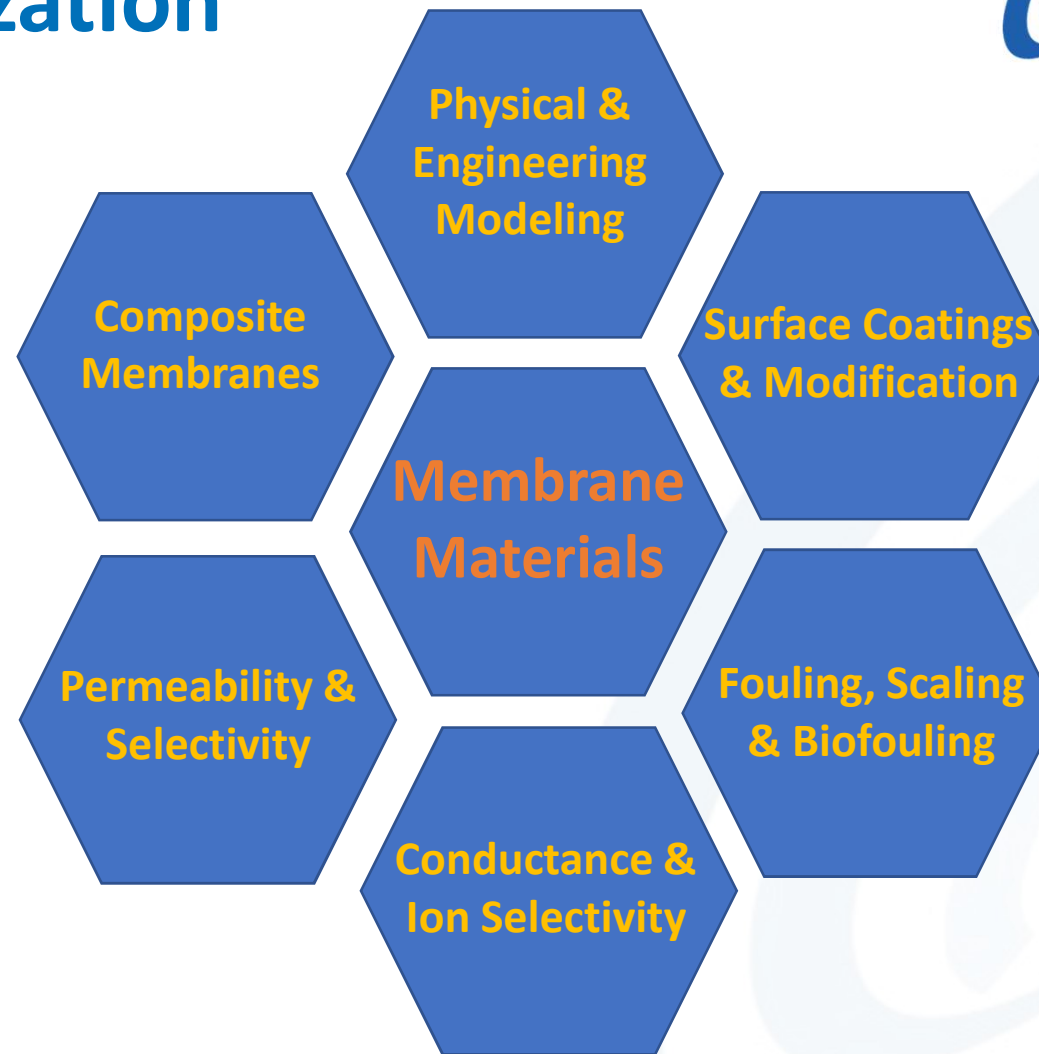


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Membrane Materials & Characterization

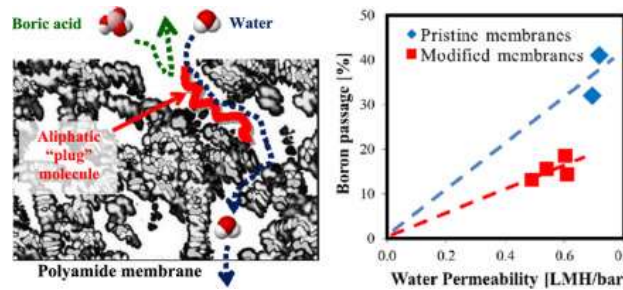
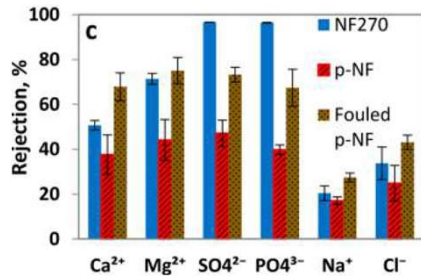


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Value proposition: Separation performance evaluation



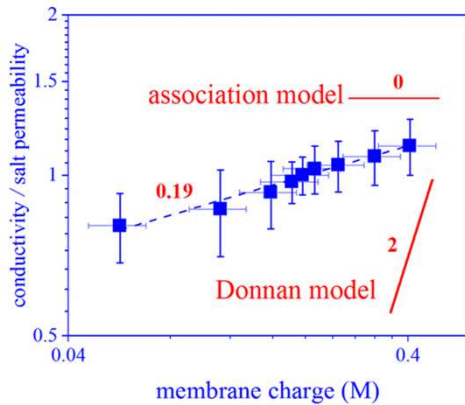
ENVIRONMENTAL
Science & Technology **LETTERS**

Breaking the Symmetry: Mitigating Scaling in Tertiary Treatment of Waste Effluents Using a Positively Charged Nanofiltration Membrane
Stanislav Levchenko and Viatcheslav Freger*

Journal of Membrane Science 546 (2018) 165–172

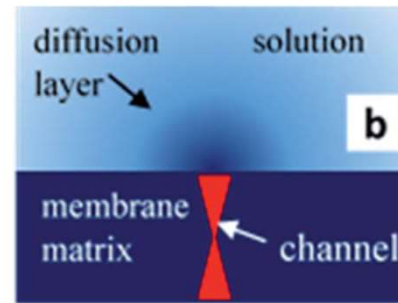
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Modification of polyamide membranes by hydrophobic molecular plugs for improved boron rejection
Shiran Shultz, Maria Bass, Raphael Semiat, Viatcheslav Freger*



ENVIRONMENTAL
Science & Technology **LETTERS**

Membrane Charge Weakly Affects Ion Transport in Reverse Osmosis
Mikhail Stolov and Viatcheslav Freger*



Faraday Discussions
Cite this: Faraday Discuss., 2018, 209, 371

PAPER
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Selectivity and polarization in water channel membranes: lessons learned from polymeric membranes and CNTs
Viatcheslav Freger*

- Measurements of membrane permeability & selectivity (lab & pilot scale)
- Modeling & separation mechanism validation
- Pore size & molecular cutoff
- Concentration-polarization correction and evaluation



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Value proposition: Surface characteristics & fouling



Regular Article
 Spatial pattern and surface-specificity of particle and microorganism deposition and attachment: Modeling, analytic solution and experimental test
 Aleksandr Leontev^{a,1}, Roi Bar-On^{a,1}, Maria Bass^{a,b}, Mladen Jurić^c, Christopher Schmetz^d, Viatcheslav Freger^{a,b,c,e,*}



Facile evaluation of coating thickness on membranes using ATR-FTIR
 Maria Bass, Viatcheslav Freger*



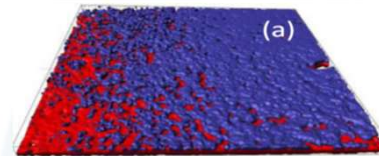
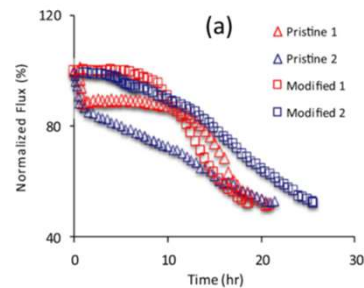
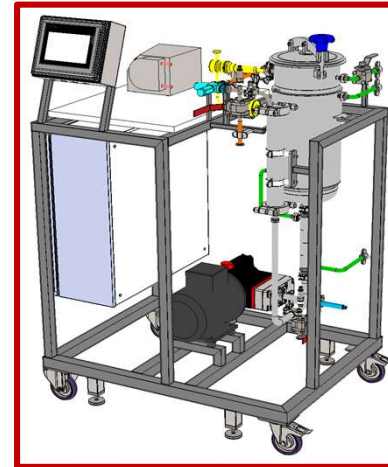
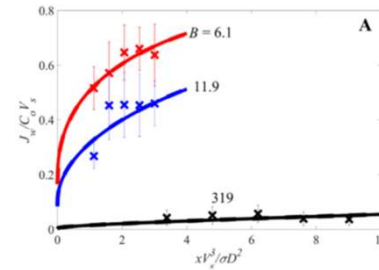
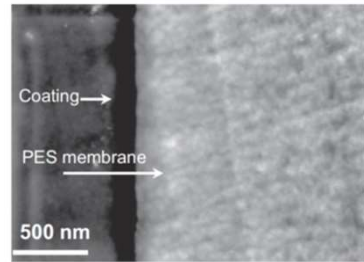
Effect of the membrane exclusion mechanism on phosphate scaling during synthetic effluent desalination
 Michaela Kaganovich^a, Wei Zhang^a, Viatcheslav Freger^b, Roy Bernstein^{a,*}



Electrotreated Carbon Nanotube Membranes for Facile Oil–Water Separations
 Karen Adie Tankus¹, Liron Issman², Mikhail Stolov¹ and Viatcheslav Freger^{1,2,3,4}



Assessing biofouling resistance of a polyamide reverse osmosis membrane surface-modified with a zwitterionic polymer
 Miguel Levi Marré Tirado^a, Maria Bass^b, Maria Piatkovsky^c, Mathias Ulbricht^d, Moshe Herzberg^{c,e}, Viatcheslav Freger^{b,e}



Surface characterization

- ✓ Morphology
- ✓ Charge
- ✓ Mechanics & Adhesion
- ✓ Autopsy

Fouling Tests

- ✓ Membrane scaling
- ✓ Organic & colloidal fouling
- ✓ Biofouling & bacterial deposition
- ✓ Cleaning efficiency

A custom designed flat-sheet system enabling work in constant flux & constant pressure regimes



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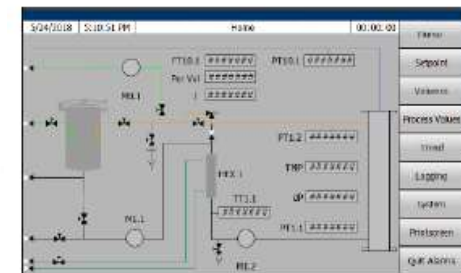
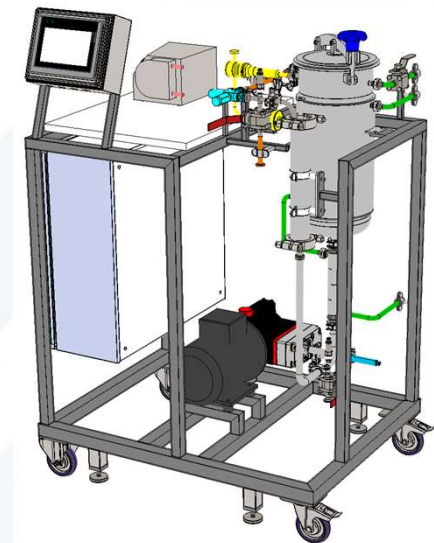
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Offering (testing)

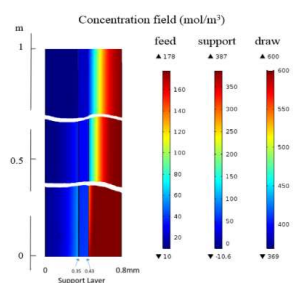
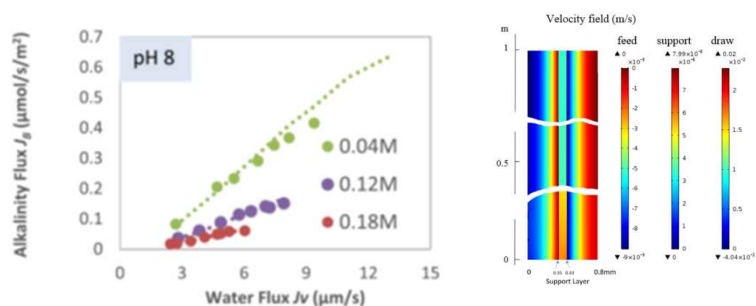


- Membrane evaluation on a flat-sheet cross-flow system custom-designed within the NewSkin project for short (separation performance evaluation) and extended (fouling, scaling) tests. The system enables data logging and extended tests in constant-flux or constant-pressure regimes.
- Smaller lab-scale dead-end and cross-flow systems for flat sheets and 2.5" elements are available as well for performance evaluation and modelling.
- A wide range of surface and structural characterization facilities and methods
- Expertise in process engineering and design



Offering (modelling)

Expertise in CFD, classical and first-principle (DFT, QMD, MD) modeling and parameter evaluation



Evaluation of osmotic energy extraction via FEM modeling and exploration of PRO operational parameter space
 Abraham Sagiv^a, Wenyan Xu^c, Panagiotis D. Christofides^b, Yoram Cohen^{b,*}, Raphael Semiat^{a,*}



Molecular Dynamics Investigation of Ion Sorption and Permeation in Desalination Membranes
 Vesselin Kolev and Viatcheslav Freger*

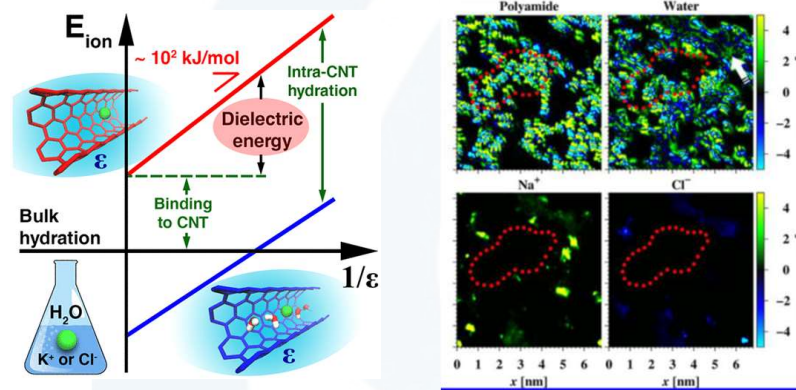


Modeling pH variation in reverse osmosis
 Oded Nir^{a,1}, Noga Fridman Bishop^{b,1}, Ori Lahav^a, Viatcheslav Freger^{b,*}



Water and Ion Transfer to Narrow Carbon Nanotubes: Roles of Exterior and Interior

Vadim Neklyudov and Viatcheslav Freger*



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