The focus of this one-day workshop is presenting novel theoretical approaches to model membrane processes. We aim to discuss theoretical approaches that focus on the microscopic level, modeling the membrane-solution interface, the membrane structure, and the single compartment.

This symposium is driven by a renewed interest in the physics-based modeling of membrane processes, and the need for understanding the laws that all membrane processes have in common at the fundamental level. Different scales of microscopic models, empirical models and phenomenological approaches all have their various applications. However, it is imperative to build bridges between these levels of modeling.

The workshop will focus on all the membrane processes that have pressure, electrical, and osmotic effects as driving force. These include, but are not limited to: microfiltration (MF), nanofiltration (NF), electrodialysis (ED), reverse electrodialysis (RED), reverse osmosis (RO), forward osmosis (FO), and membrane capacitive deionization (MCDI).

**TOPICS**

- Ion sorption equilibrium
- Donnan potential
- Modeling membrane-solution interface
- Overlimiting current phenomena
- Water transport in ion exchange membranes
- Transport of multivalent ions
- Electrokinetics
- Polarization phenomena
- Modeling fouling phenomena
- Modeling pH effects
- Non-ohmic energy losses
- Transport of organics
- Modeling membrane structure
- Gas separation membranes

[physicsofmembranes.org/event/pmp2018-bologna]
# LIST OF SPEAKERS AND TALKS

<table>
<thead>
<tr>
<th>Speaker</th>
<th>Institution/Location</th>
<th>Talk Title</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patrice Bacchin</strong></td>
<td>Université de Toulouse, France</td>
<td><em>Osmotic secondary flows in membranes pores</em></td>
</tr>
<tr>
<td><strong>Maarten Biesheuvel</strong></td>
<td>Wetsus, The Netherlands</td>
<td><em>The Sonin-Probstein approach for electrodialysis, capacitive deionization and reverse electrodialysis</em></td>
</tr>
<tr>
<td><strong>Karel Bouzek</strong></td>
<td>UCT Prague, Czech Republic</td>
<td><em>On the aspects of mathematical modelling of electromembrane processes - from single membrane to electrodialysis stack</em></td>
</tr>
<tr>
<td><strong>Jacopo Catalano</strong></td>
<td>Aarhus University, Denmark</td>
<td><em>Electroviscous effects and AC/DC electro-osmotic flow in charged membranes</em></td>
</tr>
<tr>
<td><strong>Emil Drazevic</strong></td>
<td>Aarhus University, Denmark</td>
<td><em>How do organics permeate in water swollen reverse osmosis membranes?</em></td>
</tr>
<tr>
<td><strong>Maria Grazia de Angelis</strong></td>
<td>University of Bologna, Italy</td>
<td><em>Macroscopic and multiscale modeling of sorption and transport in polymer-based membranes for gas separation and CO₂ capture</em></td>
</tr>
<tr>
<td><strong>Jouke Dykstra</strong></td>
<td>Wageningen University, The Netherlands</td>
<td><em>Theory of (selective) ion transport and acid-base reactions in ion-exchange membranes</em></td>
</tr>
<tr>
<td><strong>Jürgen Fuhrmann</strong></td>
<td>Weierstrass Institute for Applied Analysis and Stochastics (WIAS), Germany</td>
<td><em>Models and numerical methods for electroosmotic flow with finite ion size effects</em></td>
</tr>
<tr>
<td><strong>Sylvain Galier</strong></td>
<td>Université de Toulouse, France</td>
<td><em>Multi-scale characterization of saccharide/electrolyte interactions: for a better understanding of the transfer in nanofiltration</em></td>
</tr>
<tr>
<td>Name</td>
<td>Institution</td>
<td>Topic</td>
</tr>
<tr>
<td>---------------------</td>
<td>------------------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Aziz Ghoufi</td>
<td>Université de Rennes 1, France</td>
<td>Water and ions transport through sub-nanoporous materials</td>
</tr>
<tr>
<td>Manoel Manghi</td>
<td>Université Tolouse III - Paul Sabatier, France</td>
<td>Influence of surface characteristics on nanopore conductivity</td>
</tr>
<tr>
<td>Ali Mani</td>
<td>Stanford University, USA</td>
<td>Scale dependence of flow structures in electroconvection induced near ion-selective membranes</td>
</tr>
<tr>
<td>Semyon Mareev</td>
<td>Kuban State University, Russia</td>
<td>1D and 2D mathematical modeling of ion transport in electrodialysis systems at overlimitting currents: galvanostatic mode</td>
</tr>
<tr>
<td>Mohammad Mirzadeh</td>
<td>Massachusetts Institute of Technology, USA</td>
<td>Electrokinetic control of fingering instability in porous media</td>
</tr>
<tr>
<td>Yaeli Oren</td>
<td>Ben Gurion University, Israel</td>
<td>Modeling Reverse Osmosis as a multicomponent mass transfer problem including acid-base reactions</td>
</tr>
<tr>
<td>Ilya I. Ryzhkov</td>
<td>Institute of Computational Modelling SB RAS, Russia</td>
<td>New mechanisms of ion transport driven by concentration and/or electrical potential gradients in membranes with polarizable nanopores</td>
</tr>
<tr>
<td>Anthony Szymczyk</td>
<td>Université de Rennes 1, France</td>
<td>Modeling of pressure-driven transport through charged conical nanopores</td>
</tr>
<tr>
<td>Michele Tedesco</td>
<td>Wetsus, The Netherlands</td>
<td>Nernst-Planck theory to identify optimal membrane thickness in electrodialysis</td>
</tr>
</tbody>
</table>
International Workshop on PHYSICS OF MEMBRANE PROCESSES
2 SEPTEMBER 2018, BOLOGNA, ITALY

SCIENTIFIC AND ORGANIZING COMMITTEE
Michele Tedesco (chair)
Maria Grazia de Angelis (co-chair)
Jacopo Catalano
Maarten Biesheuvel
Ali Mani
Aaron Thornton
Kyle C. Smith
Anthony Szymczyk
Martin Z. Bazant

VENUE
ROYAL HOTEL CARLTON
Via Montebello, 8, Bologna

ACCOMMODATION
ROYAL HOTEL CARLTON (VENUE)
Via Montebello, 8, Bologna
Special offer available until 31 May 2018
email: carlton@monrifhotels.it.
Promo code: PMP 2018

HOTEL INTERNAZIONALE (0.3 km from venue)
Via dell’Indipendenza, 60, Bologna
www.hotel-internazionalebologna.com

I PORTICI HOTEL (0.3 km from venue)
Via dell’Indipendenza, 69, Bologna
www.iporticihotel.com

STARHOTEL EXCELSIOR (0.4 km from venue)
Via Pietramellara, 51, Bologna
starhotels-excelsior.h-rsv.com

GRAND HOTEL MAJESTIC (0.9 km from venue)
Via dell’Indipendenza, 8, Bologna
grandhotelmajestic.duetorrihotels.com

REGISTRATION FEES

<table>
<thead>
<tr>
<th></th>
<th>BEFORE 31st MAY 2018</th>
<th>AFTER 31st MAY 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workshop</td>
<td>100 €</td>
<td>150 €</td>
</tr>
<tr>
<td>Workshop + dinner</td>
<td>150 €</td>
<td>200 €</td>
</tr>
</tbody>
</table>

ONLINE REGISTRATION FORM

physicsofmembranes.org/event/pmp2018-bologna/registration

PAYMENT METHOD

Bank Transfer to be sent to the address below. Please take care of your own bank charges.

Account name: WETSUS
Payment description: “PMP 2018 – <your Name>”
IBAN: NL75 RABO 0103 5431 98
BIC: RABONL2U
Bank: Rabobank
Address: Beursplein 1, 8911 BE Leeuwarden, the Netherlands