

## ***Program***

# **Separations Technology IX: New Frontiers in Media, Techniques, and Technologies**

**March 5-10, 2017**

**Grand Real Santa Eulalia Hotel  
Albufeira, Portugal**

### **Conference Chairs**

**Kamalesh K. Sirkar**

New Jersey Institute of Technology, USA

### **Conference Co-Chairs**

**Steven M. Cramer**

Rensselaer Polytechnic Institute, USA

**João G. Crespo**

Universidade Nova de Lisboa, Portugal

**Marco Mazzotti**

ETH Zurich, Switzerland



**Engineering Conferences International**

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**Grande Real Santa Eulalia Resort & Hotel Spa**  
**Praia de Santa Eulalia**  
**(Secondary road from Albufeira town to Olhos D ' Agua village)**  
**8200-916 Albufeira**  
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**Previous conferences in this series:**

***New Directions in Separations Technology***

**October 16-21, 1985**

**Davos, Switzerland**

*Conference Chair:*

Norman Li, UOP, Inc., USA

***Separations Technology***

**April 26-May 1, 1987**

**Bavaria, West Germany**

*Conference Chairs:*

Norman Li, Allied Signal Research Center, Inc., USA

Heiner Strathmann, Fraunhofer Institute, Germany

***Separations Technology***

**May 15-19, 1989**

**Davos, Switzerland**

*Conference Chairs:*

Heiner Strathmann, Fraunhofer Institute, Germany

C. Judson King, University of California-Berkeley, USA

Norman Li Allied Signal Research Center, Inc., USA

***Separations Technology***

**Oct. 20-25, 1991**

**Keauhou Beach, Hawaii, USA**

*Conference Chairs:*

George E. Keller, II, Union Carbide, USA

Darsh T. Wasan, Illinois Institute Of Technology, USA

***New Directions in Separation Technology***

**June 26-July 2, 1993**

**Noordwijkerhout, Netherlands**

*Conference Chairs:*

E. Lightfoot, Univ. of Wisconsin, USA

P. Danusi, IAEA – Australia

***Separation Technology: Advances and Opportunities in Environmental Separations***

**July 22-27, 1995**

**Snowbird, Utah**

*Conference Chairs:*

Ronald W. Rousseau, Georgia Institute of Technology, USA

Charles A. Eckert, Georgia Institute of Technology, USA

**Previous conferences in this series:**

***Separation Technology "Separations for Clean Production"***

**October 26 - 31, 1997**

**Davos, Switzerland**

*Conference Chairs:*

David W. Savage, Exxon Research & Engineering, USA

Gino V. Baron, Vrije Universiteit, Belgium

Christopher J.D. Fell, University of New South Wales, Australia

***Separations Technology: New Perspectives on Very Large-Scale Operations***

**October 3-8, 2004**

**Fraser Island, Queensland, Australia**

*Conference Chairs:*

Chris Fell, University of New South Wales, Australia

George E. Keller II, MATRIC, USA

***The Role of Structure in Biological, Chemical and Environmental Separations:***

***From the Molecular to the Macro***

**January 6-11, 2008**

**Puntarenas, Costa Rica**

*Conference Chairs:*

T.A. Hatton, Massachusetts Institute of Technology, USA

***Separations Technology: Sustainable Separation Technology for Energy and Environmental Challenges***

**December 5-9, 2010**

**Keauhou Beach, Hawaii, USA**

*Conference Chair:*

Michael F. Doherty, University of California, Santa Barbara, USA

**Conference Sponsors**

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## **Sunday, March 5, 2017**

16:30 – 18:00	<b>Conference Check-in</b> (Lower Lobby - near restaurant)
18:00 – 18:20	Introductions  Conference Chairs (K.K. Sirkar, M. Mazzotti, S. Cramer, J. Crespo)
18:20 – 20:00	Welcome Reception (Le Club)
20:00 – 21:30	Dinner (Le Club)

### ***NOTES***

- Technical Sessions will be held in Balaia.
- Poster Sessions will be held in Santa Eulalia I and II.
- Breakfasts and lunches will be in the Restaurante do Real.
- Dinners on Monday and Tuesday will be in the Restaurante do Real.
- The conference banquet on Thursday will be held in Le Club.
- Audiotaping, videotaping and photography of presentations are prohibited.
- Speakers – Please leave at least 5 minutes for questions and discussion.
- Speakers – Please ensure your talk adheres to your given time allotment. Talks that go over their allotment reduce time for valuable discussion and can disrupt the conference program.
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- Please do not smoke at any conference functions.
- Turn your cellular telephones to vibrate or off during technical sessions.
- After the conference, ECI will send an updated participant list to all participants. Please check your listing now and if it needs updating, you may correct it at any time by logging into your ECI account.
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**Monday, March 6, 2017**

07:00 – 08:30 Breakfast buffet

**Session 1: Separation Media Synthesis and Modeling**

Chairs: Marco Mazzotti, ETH Zurich, Switzerland  
Krista Walton, Georgia Institute of Technology, USA

08:30 – 09:10 **Modelling of metal-organic frameworks as tunable adsorbents for separations**  
Randall Snurr, Northwestern University, USA (Plenary)

09:10 – 09:40 **On the use of structured adsorbents in cyclic adsorption processes**  
James Ritter, University of South Carolina, USA

09:40 – 10:10 **Redox-based electrochemical adsorption technologies for energy-efficient water purification and wastewater treatment**  
T. Alan Hatton, Massachusetts Institute of Technology, USA

10:10 – 10:40 Coffee break

**Session 2: Adsorption and Chromatography - 1**

Chairs: T. Alan Hatton, Massachusetts Institute of Technology, USA  
Randall Snurr, Northwestern University, USA

10:40 – 11:10 **CO<sub>2</sub> interactions with porous carbons: Is the surface stable at ambient conditions?**  
Teresa Bandoz, CCNY/CUNY, USA

11:10 – 11:40 **Impact of metal substitution on stability and adsorption properties of MOF-74**  
Krista Walton, Georgia Institute of Technology, USA

11:40 – 12:10 **3D-printed structured adsorbents for molecular separation**  
Joeri Denayer, Virje Universiteit Brussels, Belgium

12:10 – 12:30 Break

12:30 – 13:40 Lunch

**Session 3: Adsorption and Chromatography - 2**

Chairs: Chang-Ha Lee, Yonsei University, Korea  
Teresa Bandoz, CCNY/CUNY, USA

13:40 – 14:10 **Electrochemically-mediated adsorptive processes for CO<sub>2</sub> capture**  
T. Alan Hatton, Massachusetts Institute of Technology, USA

14:10 – 14:40 **Adsorption equilibrium and kinetics of high molecular weight n-paraffins mixtures and kerosene on 5A zeolite**  
Daniel Aranda López, Universidad Complutense de Madrid, Spain

14:40 – 15:10 **Polymer-grade olefin production by gas-phase SMB**  
Vanessa Martins, FEUP/LSRE-LCM, Portugal

15:10 – 15:40 Coffee break

**Monday, March 6, 2017 (continued)**

**Session 4: Adsorption and Chromatography - 3**

Chairs: James Ritter, University of South Carolina, USA  
Joeri Denayer, Vrije Universiteit Brussel, Belgium

- 15:40 – 16:10      **H<sub>2</sub> pressure swing adsorption for IGCC power plant and techno-economic analysis of integrating PSA to IGCC with carbon capture**  
Chang-Ha Lee, Yonsei University, South Korea
- 16:10 – 16:40      **Cryogenic pressure temperature swing adsorption process for natural gas upgrade**  
Alexandre Ferreira, University of Porto, Portugal
- 16:40 – 17:10      **Two-column relay simulated moving-bed for gas-phase separations**  
Rui Ribeiro, LAQV-Requimte, Portugal
- 17:10 – 19:00      Free time / *ad hoc* Sessions
- 19:00 – 20:30      Dinner
- 20:30 – 21:30      **Social Hour/Poster Session - 1**  
Chairs: Ranil Wickramasinghe, University of Arkansas, USA  
James Ritter, University of South Carolina, USA

**Tuesday, March 7, 2017**

07:00 – 08:30 Breakfast buffet

**Session 5: Bioseparations: Recent Advances - 1**

Chairs: Ana Azevedo, Instituto Superior Técnico, Portugal  
Marcel Ottens, Delft University of Technology, Netherlands

08:30 – 09:00 **Analytical affinity chromatography-on-a-chip for selective capture and sensitive detection of protein and polynucleotide biomarkers**  
Ruben Soares, Institute for Bioengineering and Biosciences, Portugal

09:00 – 09:30 **Surface engineering for developing new membrane adsorbents**  
Ranil Wickramasinghe, University of Arkansas, USA

09:30 – 10:00 **New adsorbents for the removal of genotoxic impurities from active pharmaceutical ingredients**  
Teresa Esteves, Instituto Superior Técnico, Portugal

10:00 – 10:30 Coffee break

**Session 6: Bioseparations: Recent Advances - 2**

Chairs: Ranil Wickramasinghe, University of Arkansas, USA  
Alois Jungbauer, BOKU, Australia

10:30 – 11:00 **Core-shell versus inert polymer grafted adsorbents for the negative chromatography of virus-like particle**  
Beng Ti Tey, Monash University, Malaysia

11:00 – 11:30 **Why nanofibers are a good adsorptive surface – fundamental understanding and industrial applications for mAb bioprocessing**  
Karol Lacki, Puridify, United Kingdom

11:30 – 12:00 **Purification of minicircles by combined enzymatic modification of miniplasmid topology and multimodal chromatography**  
Duarte Prazeres, Instituto Superior Técnico, Portugal

12:30 – 14:00 Lunch

**Session 7: Bioseparations: Recent Advances - 3**

Chairs: Karol Lacki, Puridify, United Kingdom  
Ruben Soares, Institute for Bioengineering and Biosciences, Portugal

14:00 – 14:30 **Biocatalytic production and reaction-integrated separation of laminaribiose by adsorption and desorption on zeolite BEA**  
Dave Hartig, Technische Universität Braunschweig, Germany

14:30 – 15:00 **Understanding and enhancing selective Fab separations using multimodal chromatography**  
Steven Cramer, Rensselaer Polytechnic Institute, USA

15:00 – 15:30 **Rapid optimization of chromatography operating conditions using a nanoliter scale column on a microfluidic chip with integrated pneumatic valves and optical sensors**  
Ines Pinto, Instituto Superior Técnico, INESC-MN, Portugal

**Tuesday, March 7, 2017 (continued)**

15:30 – 16:00 Coffee break

**Session 8: Bioseparations: Recent Advances - 4**

Chairs: Steven Cramer, Rensselaer Polytechnic Institute, USA

Dave Hartig, Technische Universität Braunschweig, Germany

16:00 – 16:40 **Integration of continuous precipitation, crystallization and flocculation of recombinant proteins**

Alois Jungbauer, BOKU, Austria (Plenary)

16:40 – 17:10 **Use of expanded bed chromatography in industrial scale enzymes production**

Guilherme Ferreira, DSM Biotechnology Center, Netherlands

17:10 – 17:40 **LYTAG-driven purification strategies as a key to integrate and intensify the downstream processing of monoclonal antibodies**

Ana Azevedo, Instituto Superior Técnico, Portugal

17:40 – 18:10 **Computational bioseparation process development**

Marcel Ottens, Delft University of Technology, Netherlands

18:10 – 19:00 Free Time / *ad hoc* Sessions

19:00 – 20:30 Dinner

20:30 – 21:30 **Social Hour / Poster Session – 2**

Chairs: Mainak Majumder, Monash University, Australia

Krista Walton, Georgia Institute of Technology, USA

Dibakar Bhattacharyya, University of Kentucky, USA

**Wednesday, March 8, 2017**

07:00 – 08:30 Breakfast Buffet

**Session 9: Other Technologies Especially Novel Separation Technologies**

Chairs: Kamalesh Sirkar, New Jersey Institute of Technology, USA  
T. Alan Hatton, Massachusetts Institute of Technology, USA

08:30 – 09:10 **Synthesis of energy efficient separation processes using distillation and membranes**  
Rakesh Agrawal, Purdue University, USA (Plenary)

09:10 – 09:40 **Miniaturization of aqueous two-phase extraction for biological applications**  
Raquel Aires-Barros, Instituto Superior Tecnico/IBB, Portugal

09:40 – 10:10 **Optimizing the regeneration process parameters for forward osmosis to produce clean water at low temperature**  
Abdukrem Amhamed, Hamed Bin Khalifa University, Qatar

10:10 – 10:40 Coffee break

**Session 10: Other Technologies Especially Novel Separation Technologies**

Chairs: Rakesh Agrawal, Purdue University, USA  
Marco Mazzotti, ETH Zurich, Switzerland

10:40 – 12:00 **Panel Discussion: Alternative Separation Processes (AltSep) for Current Organic-Organic Separation Technologies**  
Panelists: James Ritter, Andrew Livingston, Randall Snurr, Joao Crespo, Rakesh Agrawal, Marco Mazzotti

12:30 – 13:30 Lunch

13:40 Coaches depart the hotel for the conference excursion.

There will be a guided tour inside the medieval wall of Faro for a glimpse of the local history. We expect to visit a museum or the cathedral. The harbor stands outside one of the entrances of the medieval walls where the group will board a catamaran which will take us along the Natural Park of the Ria Formosa. The island where we will stop is at the southern-most point of Portugal, where the silence and stillness are most impressive. The catamaran will return the group to Faro where the coaches will be waiting for the return to the hotel. Anticipated return time is 18:00.

Dinner this evening will be “on your own”. We’ll have a list of restaurants in Albufeira available; however, it is fun to go to the downtown area and find an interesting restaurant.

## Thursday, March 9, 2017

07:00 – 08:30 Breakfast buffet

### Session 11: Membrane Separations - 1

Chairs: Andrew Livingston, Imperial College London, United Kingdom  
Kamalesh Sirkar, New Jersey Institute of Technology, USA

08:30 – 09:10 **Thin film membranes for molecular separations**  
Andrew Livingston, Imperial College, London (Plenary)

09:10 – 09:40 **Organic solvent nanofiltration with novel perfluoropolymer and other polymeric membranes**  
Kamalesh Sirkar, New Jersey Institute of Technology, USA

09:40 – 10:10 **Overview of research on graphene-based membranes**  
Mainak Majumder, Monash University, Australia

10:10 – 10:40 Coffee break

### Session 12: Membrane Separations - 2

Chairs: João Crespo, FCT-Universidade Nova de Lisboa, Portugal  
Ranil Wickramasinghe, University of Arkansas, USA

10:40 – 11:10 **Monitoring of membrane processes with fluorescence molecular probes**  
João Crespo, FCT-Universidade Nova de Lisboa, Portugal

11:10 – 11:40 **Membrane distillation for treating hydraulic fracturing produced waters**  
Ranil Wickramasinghe, University of Arkansas, USA

11:40 – 12:10 **Membrane supports designed for Pd membranes**  
Bernard Bladergroen, University of the Western Cape, South Africa

12:10 – 12:40 **Computational fluid dynamics (CFD) approach for characterizing and improving fluid flow for membrane filtration technologies and successful scale-up**  
Mohd Shawkat Hussain, University College London, United Kingdom

12:40 – 14:00 Lunch

### Session 13: Membrane Separations - 3

Chairs: Winston Ho, The Ohio State University, USA  
Mihail Barboiu, Institut Européen des Membranes, France

14:00 – 14:30 **Oxidatively stable membranes for CO<sub>2</sub> separation and H<sub>2</sub> purification**  
Winston Ho, The Ohio State University, USA

14:30 – 15:00 **Rubbery organic frameworks-tuning the Gas-diffusion through dynamic membranes**  
Mihail Barboiu, Institut Européen des Membranes, France

15:00 – 15:30 **CO<sub>2</sub> capture over H<sub>2</sub> by polymeric membranes for carbon-free H<sub>2</sub> production**  
Ikuo Taniguchi, Kyushu University, Japan

15:30 – 16:00 Coffee break

**Thursday, March 9, 2017 (continued)**

**Session 14: Membrane Separation - 4**

Chairs: Dibakar Bhattacharyya, University of Kentucky, USA  
Alois Jungbauer, BOKU, Austria

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|---------------|---|
| 16:00 – 16:30 | <b>Synthesis of functionalized membranes for metal capture to tunable separations</b><br>Dibakar Bhattacharyya, University of Kentucky, USA |
| 16:30 – 17:00 | <b>Nanomembranes in biotechnology: Separation of small and large biomolecules</b><br>Alois Jungbauer, BOKU, Austria                         |
| 17:00 – 17:30 | <b>Advanced RO element obtained by new membrane and channel material</b><br>Hiroyuki Yamada, Toray Industries, Inc, Japan                   |
| 17:30 – 18:00 | <b>ElectroOsmoDialysis</b><br>Andriy Yaroshchuk, ICREA & Polytechnic University of Catalonia, Spain   |
| 18:00 – 19:00 | Free Time / <i>ad hoc</i> sessions  |
| 19:00 – 21:00 | Conference Banquet  |

**Friday, March 10, 2017**

07:00 – 08:30 Breakfast buffet

**Session 15: Crystallizations and Solid-Liquid Separations - 1**

Chairs: Ronald Rousseau, Georgia Institute of Technology, USA  
Marco Mazzotti, Swiss Federal Institute of Technology Zurich,  
Switzerland

08:30 – 09:10 **Sequencing synthesis and crystallization to improve product yield**  
Ronald Rousseau, Georgia Institute of Technology, USA (Plenary)

09:10 – 09:40 **Crystal nucleation from solution: design and modelling of detection time experiments**  
Giovanni Maggioni, ETH Zurich, Switzerland

09:40 – 10:10 **Selective manipulation of crystal shape by combined crystallization, milling, and dissolution stages - An approach for robust process design**  
Fabio Salvatori, Technical University Zurich, Switzerland

10:10 – 10:40 Coffee break

**Session 16: Crystallizations and Solid-Liquid Separations - 2**

Chairs: Kamallesh Sirkar, New Jersey Institute of Technology, USA  
Steven Cramer, Rensselaer Polytechnic Institute, USA

10:40 – 11:10 **Holistic development of a low-energy ammonia-based process for CO<sub>2</sub> capture with solid formation**  
Marco Mazzotti, ETH Zurich, Switzerland

11:10 – 11:40 **On the potential of phase-change adsorbents for CO<sub>2</sub> capture by temperature swing adsorption**  
Marco Mazzotti, ETH Zurich, Switzerland

11:40 – 12:00 Conference wrap-up and discussion with conference chairs

12:30 Lunch and departures



## Poster Presentations

1.	<p><b>Integrating Nanomembrane Separation with Plasmonic Detection for Real-Time Cell Culture Monitoring</b> Stephan Hinterberger, acib GmbH, Austria</p>
2.	<p><b>Conductive nanothick gold on hydrophilic polymeric nanomembranes</b> Christian Schuster, acib GmbH, Austria</p>
3.	<p><b>Hybrid process for genotoxics removal from active pharmaceutical ingredients combining organic solvent nanofiltration with polybenzimidazole adsorbents</b> Flávio A. Ferreira, IST, Portugal</p>
4.	<p><b>Adsorptive removal of CO<sub>2</sub> from CO<sub>2</sub>-CH<sub>4</sub> mixture using cation-exchanged zeolites</b> Jong-Nam Kim, Korea Institute of Energy Research, South Korea</p>
5.	<p><b>Development of carbon-based adsorbent for separation of impurities such as siloxane and ammonia from land-fill gas</b> Kanghee Cho, Korea Institute of Energy Research, South Korea</p>
6.	<p><b>Mechanism of preferential CO<sub>2</sub> permeation of amine-containing polymeric membrane</b> Mai Yoshizawa, Kyushu University, Japan</p>
7.	<p><b>Biorefinery to produce activated carbon from biomass - an approach for a biogas refining process</b> Isabel Esteves, LAQV-Requimte, Portugal</p>
8.	<p><b>Design of structured adsorbents for applications in gas adsorption processes - Conventional shaping vs 3D-Printed formulation</b> Isabel Esteves, LAQV-Requimte, Portugal</p>
9.	<p><b>Mass transfer simulation for concentration of kiwi juice by osmotic distillation using finite volume method</b> Carlos Zambra, Universidad de Talca, Chile</p>
10.	<p><b>Selective Modification of Membrane Pore and External Surfaces</b> Ranil S. Wickramasinghe, University of Arkansas, USA</p>
11.	<p><b>Rapid and high-capacity MgO composites by salt-controllable precipitation for pre-combustion CO<sub>2</sub> capture</b> Chang-Ha Lee, Yonsei University, South Korea</p>
12.	<p><b>Carbon dioxide separation from anaesthetic gases with membrane contactors and biocompatible ionic liquids</b> Carla Martins, Universidade NOVA de Lisboa, Portugal</p>
13.	<p><b>Comparison and evaluation of agglomerated MOFs in gaseous biofuels purification by means of pressure swing adsorption (PSA)</b> Ismael Águeda, Universidad Complutense de Madrid, Spain</p>
14.	<p><b>Adsorption of representative pharmaceutical compounds from hospital wastewater by carbon materials</b> Ismael Águeda, Universidad Complutense de Madrid, Spain</p>

15.	<b>Recovery of butanol from model fermentation broths by adsorption on activated carbon</b> Ismael Águeda, Universidad Complutense de Madrid, Spain
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