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27th International Symposium,
Exhibit & Workshops on
Preparative / Process Chromatography,
Ion Exchange, Adsorption Processes
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FINAL PROGRAM

PREP 2014

Boston, MA, USA • July 20-23, 2014

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Poster Session Chairs
Kathleen Mihlbachler, LEWA-Nikkiso and Arvind Rajendran, University of Alberta

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The use of still or video cameras and cell phones is prohibited during the oral program; and prohibited in the poster and exhibition areas without the express consent of the presenter or exhibitor. Opinions expressed by presenters, instructors and exhibitors are not necessarily the opinions of the PREP 2014 Symposium.
GENERAL INFORMATION

Venue
Westin Boston Waterfront, 425 Summer Street, Boston, MA 02210, USA
Phone 617-532-4600 ◊ www.westinbostonwaterfront.com

Name Badges
A name badge must be worn to all conference functions.

Registration
Symposium Registration is located near the Harbor Ballroom

Exhibits
The exhibition is an important component of the meeting, and we thank all the exhibitors for their support of the program.

Exhibit Hours
Sunday 6:00 PM – 7:30 PM
Monday 10:10 AM – 5:10 PM
Tuesday 9:40 AM – 3:30 PM

Reception
Sunday, July 20, 2014 @ 6:00 PM – 7:30 PM in Galleria Exhibit Hall
(name badge required)

Free Vendor Workshops

Monday 12:30 – 1:50 pm
Free Vendor Workshop Sponsored by Pall Life Sciences
Chromatographic Strategies for Purification of Antibodies and Non-antibody Proteins and Large Biomolecules.
Meeting Location: Burroughs Room (light lunch will be provided)
Must register at the booth of Pall Life Sciences by Monday @ 10:40 AM

Monday 12:30 – 1:50 pm
Free Vendor Workshop Sponsored by KNAUER
Contichrom: A Versatile Purification Platform with All-in-one Process Capabilities
Meeting Location: Lewis Room (light lunch will be provided)
Must register at the booth of KNAUER by Monday @ 10:40 AM

Tuesday 12:30 – 1:50 pm
Free Vendor Workshop Sponsored by LEWA-Nikkiso America
LEWA - Your Single Source in Preparative Chromatography
Meeting Location: Burroughs Room (light lunch will be provided)
Must register at the booth of LEWA-Nikkiso America by Monday @ 5:10 PM

Tuesday 12:30 – 1:50 pm
Free Vendor Workshop Sponsored by Purolite Corporation
The Design and Application of a New Range of Resins for Separation and Purification of Biomolecules
Meeting Location: Lewis Room (light lunch will be provided)
Must register at the booth of Purolite Corporation by Monday @ 5:10 PM

Tuesday 12:30 – 1:50 pm
Free Vendor Workshop Sponsored by Grace
Integrated Flash and Preparative LC in a Single, Compact Purification Instrument
Meeting Location: Carlton Room (light lunch will be provided)
Must register at the booth of Grace by Monday @ 5:10 PM

Wednesday 12:45 – 1:45 pm
Free Vendor Workshop Sponsored by Life Technologies
The Benefits of High Performing Chromatography Resins Including POROS XQ, A New Strong Anion Exchanger
Meeting Location: Burroughs Room (light lunch will be provided)
Must register at the booth of Life Technologies by Tuesday @ 5:10 PM
GENERAL INFORMATION

Oral Presenters

Prior to the start of each session, please arrive at your session at least 20 minutes before the start of the session to introduce yourself to the session chair and to submit your presentation on a flash drive labeled with the presenter’s name. Important to note that if there is no time to submit your presentation between sessions, please submit the presentation during the break that immediately precedes your session.

Please come to the podium and get your presentation set up during the question period for the previous talk.

Kindly note that session chairs are under very strict instructions to keep their sessions on schedule.

Poster Presenters

Details regarding set-up, presentation, and tear-down days and times:

- ALL posters in Poster Sessions I and II should be put up on Monday, July 21, between 8:30 AM and 1:00 PM and remain on the poster boards for participants to view both days (do not remove until Tuesday between 3:30 PM to 6:15 PM).
- Poster presentations are numbered in the scientific program to correspond with the poster board number and its abstract located on the USB drive.
- Presenters must be in attendance at their posters on the day and time of their poster presentations.
- Authors of posters in the P-100 series should stand at their posters and be available to discuss the research during Poster Session I on Monday, July 21, from 1:50 PM to 3:20 PM.
- Authors of posters in the P-200 series should stand at their posters and be available to discuss the research during Poster Session II on Tuesday, July 22, from 2:00 PM to 3:30 PM.
- Remove all posters from the poster boards only on Tuesday, July 22, between 3:30-6:15 PM. Anything remaining on the poster boards after 6:15 PM will be discarded.

POSTER COMPETITION

Poster presentations are a very important component of the PREP Symposia.

In order to acknowledge their contribution to the field and high standards of the Symposium, awards will be offered to the best posters at PREP 2014. All presented posters will be evaluated on the basis of scientific content, clarity of presentation, and layout. The Poster Judging Committee will have final say in the selection of the Prize Winners. At least two committee members will read each poster and top posters will be read by at least four committee members. If a poster author does not want the poster considered for a poster award, please notify the Symposium Manager before 1:00 PM on Monday, July 21.

Wednesday, July 23

Presentation of awards to winners of the Best Poster Competition will take place at 9:40 a.m. on Wednesday morning following the last talk in Session 9. The awards will be presented by Kathleen Mihlbachler and Arvind Rajendran, Poster Session Chairs. The winners are encouraged to be present, but it is not mandatory to be present to win.
EDUCATIONAL TRAINING WORKSHOP PROGRAM
– Must pre-register to attend workshops –

WORKSHOP 1 - Preparative Chromatography for Biopharmaceuticals
9:00am - 12:30pm

Focus: Biomolecule chromatography, stationary phases, binding capacity and selectivity, mass transfer, modeling, design for capture and step elution
This workshop will focus on the theory and practice of biomolecule chromatography. Since mass transfer and the structure of the stationary phase influence deeply chromatographic performance, the main emphasis is on describing adsorption/desorption kinetics in single and multicomponent systems and determining the relationship between stationary phase properties and process performance. The latest advances in stationary phase developments will be reviewed along with methods for their experimental characterization. Design and optimization strategies for capture and high-resolution applications will be discussed.

Topics: Adsorption equilibrium and transport in single and multicomponent systems; Stationary phases for small and large biomolecules; Design and optimization for capture and high-resolution steps

Lecturers:

Giorgio Carta received his Ph.D. in Chemical Engineering from the University of Delaware in 1984. Since then he has been a professor in the Department of Chemical Engineering at the University of Virginia, where his research focuses on transport phenomena and bioseparations. He regularly organizes professional courses on various aspects of bioseparations, including a course on protein chromatography development and scale-up together with Alois Jungbauer.

Alan Hunter received his Ph.D. in Chemical Engineering from the University of Virginia in 2002 and is currently Principal Scientist in the Process Biochemistry Group at MedImmune. Prior to joining MedImmune he held positions of Process Engineer at Cambrex Bio Science Baltimore, and of Senior Principal Scientist at Pfizer Biologics. Dr. Hunter has broad biotechnology experience and expertise in areas including process development for large-scale cGMP manufacture of biologics, recombinant biopharmaceutical purification, and technology transfer and scale-up.

Alois Jungbauer is the head of protein technology and downstream processing at the Department of Biotechnology of the University of Natural Resources and Applied Life Sciences in Vienna (Austria). For more than 20 years, Professor Jungbauer has worked in biochemical engineering, with a focus on bioseparation, where he has published widely and holds 15 patents. For over 10 years, he has organized a biennial professional course in protein chromatography focused on mass transfer, dispersion, and scale-up.
WORKSHOP 2 – Preparative Chromatography for Intermediates and APIs
9:00am - 12:30pm

**Focus:** Small molecules, HPLC, column packing, gradient elution, overloaded chromatography, SFC, SMB, examples and industrial applications

This workshop will focus on development of method for the preparative purification of small molecules for the pharmaceutical industry. After an introduction of the theory, optimization and practice of prep HPLC, SMB and SFC for small molecule separations, the instructors will present practical approaches to the development of preparative separation through a series of examples. The attendees will learn valuable information and techniques to apply in the laboratory and at manufacturing scale to increase throughput and performance.

**Topics:** Prep HPLC batch - Theory, optimization and practice; SMB - Principle and technology; SMB - Examples and applications; SFC - Theory, equipment and examples

**Lecturer:**

Olivier Dapremont has worked on the development of SMB technology since 1992. He is Director of Process Technologies at AMPAC Fine Chemicals where his role encompasses the development of SMB separations using multiple SMB units ranging from 4.6 mm to 1 m in diameter as well as developing continuous processes for the manufacturing of APIs.
EDUCATIONAL TRAINING WORKSHOP PROGRAM
– Must pre-register to attend workshops –

WORKSHOP 3 - Multi-Column Continuous Chromatography for Downstream Purification of Biomolecules
1:30pm - 4:30pm

**Focus:** Focus on continuous chromatography for biomolecules, isotherms for biomolecules, SMB basic principles, difference between SMB for small molecules and SMB for biomolecules, challenges, practical examples.

Chromatographic processes are essential for the downstream purification of bio-molecules. During the last 10 years, a tremendous increase in the upstream expression levels, especially for monoclonal antibodies requires a significant shift in the downstream approach. To overcome "bottlenecks", the implementation of Multi-Column Continuous Chromatography (Bio-MCC) became of interest. Therefore, the workshop will introduce the audience to the fundamentals on Bio-MCC and provide guidelines for the process and equipment design after reviewing the downstream chromatographic processes and the Simulated Moving Bed (SMB) technology. The workshop will present applications and current developments. Although, the SMB technology has a proven record to bring synthetic pharmaceuticals faster to the market and to purify non-pharmaceutical bio-molecules at a large industrial scale; barriers still remain to implement the technology into the bio-pharmaceutical industry. These barriers will be identified and ways how to eliminate them. In particular, eliminating barriers related to column and equipment hardware, packing material, solvent systems, CIP of the systems, bio-molecule characteristics and regulatory constrains to allow continuous chromatographic processes to become part of the processing platform in the bio-pharmaceutical industry. This workshop is a complement to the basics of prep chromatography presented in the morning.

**Topics:** Simulated Moving Bed and Multicolumn Continuous Chromatography technology for biomolecules, fundamentals and design criteria, challenges and opportunities, regulatory constraints

**Lecturer:**

Dr. Mihlbachler has worked in the field of process chromatography for more than 15 years. Currently she is the Global Director of Separations Development at IPT Integrated Process Technology – A member of LEWA-Nikkiso Group (future LEWA Process Technology). She is responsible for the development of separation technologies for synthetic and biological molecules, in particular for continuous processing. Prior to this appointment Dr. Mihlbachler worked as an external consultant for LEWA-NIKKISO since 2012 where she has supported the technical transfer of process chromatographic technology and consulted in customer projects. Previously, Dr. Mihlbachler was involved as a Sr. Researcher at BMS, Eli Lilly and Pfizer in the development, scale-up and manufacturing of purification/separation processes for chiral and non-chiral compounds, peptides and proteins, in particular to implement continuous processes. From 2011 to 2013, Dr. Mihlbachler has taught undergraduate courses for chemical and biomedical students in the Department of Chemical, Biological and Pharmaceutical Engineering at New Jersey Institute of Technology.
EDUCATIONAL TRAINING WORKSHOP PROGRAM

− Must pre-register to attend workshops −

WORKSHOP 4 - Regulatory and Marketing Fundamentals and QbD Tools to Bring Biomolecules to Market and Keep Them There
1:30pm - 4:30pm

**Focus:** This workshop will focus on Quality by Design, Quality Systems Management, Science-based Risk Management, Process Analytical Technology and Continuous Process Improvement as tools that can be incorporated into basic drug development processes.

We will examine the relationship between good drug development science, quality and regulatory flexibility, with emphasis on application to the biopharmaceutical industry. Particular attention will be placed on the practice of Quality by Design. A practical study of how the integration of quality and risk management is used in an application to bring a mAb to market will be presented. In addition, we will address the challenges for technology and regulation created by the emerging biosimilars industry along with the current status of internationally developed guidance.

**Topics:** Regulatory aspects, QbD, Process Analytical Technology, Quality System Management, Biosimilars, Marketing

**Lecturers:**

After a multi-decade career with the U.S. Food and Drug Administration, in 2009 Lois Ann Beaver founded a regulatory consulting group, LAB Enterprises. While working in FDA's Office of the Commissioner, Lois served on the FDA Pharmaceutical Quality Council that conceived and developed quality by design; led activity for FDA's joining the international Pharmaceutical Inspection Cooperation Scheme; worked as liaison with international organizations such as WHO, most recently focusing on biosimilars; managed the export program for international investigations of unapproved pharmaceuticals; was associate director for international harmonization working on international best practice and standardization activities such as the ICH; was US Coordinator for Veterinary ICH; and served as delegate to the APEC (Asia Pacific Economic Cooperation) Life Sciences Innovation Forum. Lois also led international projects on anti-counterfeiting of medical products and good manufacturing practices in pharmaceutical firms in emerging countries, and established a pharmaceutical information center in Cairo.

Gisela Ferreira received her Ph.D. in Chemical Engineering from the University of Maryland Baltimore County in 2001 and is currently Senior Scientist in the Process Biochemistry Group at MedImmune. Prior to joining MedImmune she held positions as Senior Scientist at Medarex in the downstream department. Dr. Ferreira has broad biotechnology experience and expertise in areas including process development for large-scale cGMP manufacture of biologics, recombinant biopharmaceutical purification (early and late stage development), QbD, technology transfer and scale-up.
Sunday, July 20, 2014

The Sunday Training Workshop program is designed to provide advanced tutorials covering various aspects of process chromatography. The Workshops are presented by leading academic and industrial scientists and engineers and cover both fundamentals as well as real-world application examples. For details describing the workshops see http://prepsymposium.org/workshop-sunday.html

9:00 AM - 12:30 PM  
**Workshop 1: Preparative Chromatography for Biomolecule Purification**  
*Burroughs Room*  
Must pre-register to attend

9:00 AM - 12:30 PM  
**Workshop 2: Preparative Chromatography for Intermediates and APIs**  
*Lewis Room*  
Must pre-register to attend

1:30 - 4:30 PM  
**Workshop 3: Multi-Column Continuous Chromatography for Downstream Purification of Biomolecules**  
*Burroughs Room*  
Must pre-register to attend

1:30 - 4:30 PM  
**Workshop 4: Regulatory and Marketing Fundamentals and QbD Tools to Bring Biomolecules to Market and Keep Them There**  
*Lewis Room*  
Must pre-register to attend

6:00 - 7:30 PM  
**SYMPOSIUM REGISTRATION OPEN** near Harbor Ballroom

6:00 - 7:30 PM  
**WELCOME RECEPTION & EXHIBITION** in Galleria Hall

Monday, July 21, 2014

7:30 AM  
Symposium Registration Open near Harbor Ballroom

10:10 AM - 5:10 PM  
**Exhibition Open in Galleria Hall**

8:20 AM  
**Welcome and Opening Remarks in Harbor Ballroom I**

1. **Monday Keynote: Industrial Case Studies in Protein Chromatography**  
   Session Chair: Giorgio Carta, University of Virginia, Charlottesville, VA, USA  
   Location: Harbor Ballroom I

8:30 AM  
**L-101 Custom Affinity Chromatography Development for Novel Molecule Purification.**  
Alan K. Hunter¹, Xiangyang Wang¹, Timothy Pabst¹, Michaela Wendeler¹, Pim Hermans², ¹MedImmune, Gaithersburg, MD, USA; ²Life Technologies, Leiden, NETHERLANDS

8:50 AM  
**L-102 Leveraging High Throughput Screening Techniques to Identify Alternative Capture Resins for Bi-ScFv Purification.**  
Balakumar Thangaraj, Kenneth Prentice, Jason O’Neill, Ronald Gillespie, Amgen, Seattle, WA, USA

9:10 AM  
**L-103 Towards a Protein A Free Monoclonal Antibody Purification Platform: Case Studies in Membrane Chromatography.**  
Ying Hou, Mark Brower, David Pollard, Merck & Co. Inc., Kenilworth, NJ, USA

9:30 AM  
**L-104 Enabling High Mass Recovery in Downstream Purification of a High Titer Monoclonal Antibody: Beyond Flow-through.**  
James Patch, Marc Wong, Evelyn Martin, Mark Iverson, Deepa Nadarajah, Genentech, South San Francisco, CA, USA
9:50 AM  L-105  Investigating the Mechanisms of a Protein A Resin Fouling for Improved Lifetime Performance. William Daniels1, Shaojie Zhang2, Giorgio Carta3, Corey Allan3, Jeffrey Salm1, Judy Glynn3, Joseph Martin3, Christopher Gallo1, Ranga Godavarti1, Pfizer, Andover, MA, USA; 2UVA, Charlottesville, VA, USA; 3Pfizer, St Louis, MO, USA

10:10–10:40 AM  Break in Galleria Exhibit Hall

2. Monday Session: Molecular and Process Modeling
Session Chair: Massimo Morbidelli, ETH Zürich, Zürich, SWITZERLAND
Location: Harbor Ballroom I

10:40 AM  L-106  Biophysical Insights into the Molecular and Thermodynamic Basis of Protein Selectivity in Multimodal Chromatography. Kartik Srinivasan, Mirco Sorci, Siddharth Parimal, George Belfort, Maria M. Lopez, Scott A. McCallum, Blanca Barquera, Steven M. Cramer, Rensselaer Polytechnic Institute, Troy, NY, USA

11:00 AM  L-107  Conformational Change of Proteins upon Adsorption onto Nanoparticles: Effect of Surface Curvature. Peter Satzer1, Frantisek Svec2, Alois Jungbauer1, 1University of Natural Resources and Life Sciences, Vienna, AUSTRIA; 2The Molecular Foundry E.O. Lawrence Berkeley National Laboratory, Berkeley, CA, USA

11:20 AM  L-108  Protein Elution within Polysaccharidic Stationary Phases for Ion-exchange. James Angelo, Abraham Lenhoff, University of Delaware, Newark, DE, USA

11:40 AM  L-109  Study on Kinetics of the Protein Refolding in Different Chromatographic and Non-chromatographic Systems. Sylwia Rys, Renata Muca, Wojciech Piatkowski, Dorota Antos, Rzeszow University of Technology, Rzeszow, POLAND

12:00 PM  L-110  Adsorption Model onto RPLC-C18 Stationary Phases Doped with Positively Charged Surface Ligands. Potential Application for Bio-Purification. Fabrice Gritti1, Uwe Neue2, Pamela Iraneta2, Georges Guiochon1, 1University of Tennessee, Knoxville, TN, USA; 2Waters Corporation, Milford, MA, USA

12:20-1:50 PM  PAUSE, EXHIBITS, POSTERS, FREE VENDOR WORKSHOPS (lunch on own)

12:30-1:50 PM  Free Vendor Workshop Sponsored by Pall Life Sciences
"Chromatographic Strategies for Purification of Antibodies, Non-antibody Proteins and Large Biomolecules"
Location: Burroughs Room (light lunch will be provided)
Must register at the booth of Pall Life Sciences by Monday @ 10:40 AM

12:30-1:50 PM  Free Vendor Workshop Sponsored by KNAUER
"Contichrom®: A Versatile Purification Platform with All-in-one Process Capabilities"
Location: Lewis Room (light lunch will be provided)
Must register at the booth of KNAUER by Monday @ 10:40 AM

1:50–3:20 PM  POSTER SESSION I in Galleria Exhibit Hall
Poster Session Chairs: Kathleen Mihlbachler, LEWA-Nikkiso, Devens, MA, USA and Arvind Rajendran, University of Alberta, Alberta, CANADA
3A. Monday Parallel Session: Purification Strategies and Processes for Biomolecules
Session Chair: Dorota Antos, Rzeszow University of Technology, Rzeszow, POLAND
Location: Harbor Ballroom I

3:20 PM L-111 Solvent Modulated IEC on the Next Level: Solubility Enhancers Give Access to Higher Resolution and Protein Concentration. Simon Kluters¹, Theresa Hiller¹, Thomas von Hirschheydt², Christian Frech³, ¹University of Applied Sciences, Mannheim, GERMANY; ²Roche Diagnostics GmbH, Penzberg, GERMANY

3:40 PM L-112 Separation of mAb Charge Variants using Mixed-Beds of Strong and Weak Anion Exchange Resins with Step-Induced pH Gradients at High Protein Loadings. Giorgio Carta¹, Tarl A. Vetter¹,a,c, Gisela Ferreira¹b, David Robbins¹b, ¹University of Virginia, Charlottesville, VA, USA; ²MedImmune, Gaithersburg, MD, USA; ³Genzyme Corporation, Framingham, MA, USA

4:00 PM L-113 Development of a Downstream Process for Purification of Interferon α-2a. Jarnil Shanagar, Kjell Eriksson, Charlotte Brink, Sara Grönlund, Ola Lind, Anna Moberg, Ewa Pol, Maria Winkvist, Veronica Fridh, GE Healthcare Bio-Sciences AB, Uppsala, SWEDEN

4:20 PM L-114 Particle Movement in Expanded Beds under the Spotlight. Stephanie Ewert¹, Joseph Gargiuli¹, David J. Parker¹, Serafim Bakalis², Eirini Theodosiou³, Owen R.T. Thomas¹, ¹University of Birmingham, Birmingham, UK; ²Loughborough University, Loughborough, UK

4:40-5:10 PM Break in Galleria Exhibit Hall

3B. Monday Parallel Session: Stationary Phases I
Session Chair: Shuichi Yamamoto, Yamaguchi University, Ube, JAPAN
Location: Harbor Ballroom II

3:20 PM L-115 A New Agarose Based Platform for Protein Purification. Hans Johansson¹, Alessandra Basso², Patrick Gilbert³, Mark Hicks³, Hans Berg³, ¹Purolite, Uppsala, SWEDEN; ²Purolite, Llantrisant, UK; ³Purolite

3:40 PM L-116 Characterization of a Newly Developed High Capacity Alkaline Resistant Recombinant Protein A Resin. Atis Chakrabarti¹, Kevin O'Donnell¹, K Nakamura², SNakatani², ¹Tosoh Bioscience LLC, King of Prussia, PA, USA; ²Tosoh Corporation, JAPAN

4:00 PM L-117 Evaluation of a Novel Methacrylate Based Protein A Resin for the Purification of Immunoglobulins and Fc-Fusion Proteins. Tyler McCaw¹, Edward Koepf², Lynn Conley², ¹University of Alabama School of Medicine, Birmingham, AL, USA; ²Biogen Idec, Research Triangle Park, NC, USA

4:20 PM L-118 Leveraging Selectivity and Resolution in Biopharmaceutical Purification. Carsten Voss¹, Xuemei He², Jidong Li³, Kim Brisack², Mark Snyder², ¹Bio-Rad Laboratories, Munich, GERMANY; ²Bio-Rad Laboratories, Hercules, CA, USA; ³Bio-Rad Laboratories, Shenzhen, CHINA

4:40-5:10 PM Break in Galleria Exhibit Hall
### 4A. Monday Parallel Session: Resolution of Chiral Molecules and APIs

**Session Chair:** Yoshiaki Kawajiri, Georgia Institute of Technology, Atlanta, GA, USA  
**Location:** Harbor Ballroom I

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| 5:10 PM| **The Influence of the Buffer on the Retention Phenomena of Mefloquine Enantiomers on Switterionic Stationary Phase.**  
Attila Felinger¹, Wolfgang Lindner², Csaba Szmolnık³, ¹University of Pecs, Pecs, HUNGARY; ²University of Vienna, Vienna, AUSTRIA |
| 5:30 PM| **Advances in Method Development for Preparative Chiral Chromatography.**  
J.T. Lee¹, Clint Amoss¹, Pilar Franco², Tiago de Campos Lourenço², Juliana Cristina Barreiro³, Quezia Bezerra Cass³, ¹Chiral Technologies Inc., West Chester, PA, USA; ²Chiral Technologies Europe, Illkirch, FRANCE; ³Universidade Federal de Sao Carlos, Sao Carlos, BRAZIL |
| 5:50 PM| **Automated Compound Purification after Automated Result Transfer from Analytical Sub-2-Micron UHPLC Columns to Preparative Scale Chromatography.**  
Andreas Tei, Pierre Penduff, Manuel Renz, Vlastimil Hruska, Frank Wolf, Helmut Schulenberg-Schell, Agilent Technologies, Waldbronn, GERMANY |

### 4B. Monday Parallel Session: Stationary Phases II

**Session Chair:** Owen Thomas, University of Birmingham, Birmingham, UK  
**Location:** Harbor Ballroom II

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| 5:10 PM| **Effects of Ligand Density on Properties of Tentacular Ion-Exchange Adsorbents.**  
Rahul Bhambure¹, Michael Phillips², Christopher Gillespie², Heiner Graalfs³, Abraham Lenhoff¹, University of Delaware, Newark, DE, USA; ²EMD Millipore, Bedford, MA, USA; ³Merck Millipore, Darmstadt, GERMANY |
| 5:30 PM| **Bespoke Chromatography Materials for the Separation of Biological Nanoplexes.**  
Johannes Mohr¹, Thomas Willett¹, Kritsandchalee Karnchanasri¹, Eirini Theodosiou², Daniel Bracewell³, James Walsh⁴, Owen R.T. Thomas¹, ¹University of Birmingham, Birmingham, UK; ²Loughborough University, Birmingham, UK; ³University College London, London, UK; ⁴University of Liverpool, Liverpool, UK |
| 5:50 PM| **Ligand-assisted Chromatography for Lanthanide Separations using an Inorganic Sorbent.**  
Lei Ling, Nien-Hwa Linda Wang, Purdue University, West Lafayette, IN, USA |

6:10 PM Pause
Tuesday, July 22, 2014

7:45 AM  Symposium Registration Open near Harbor Ballroom

9:40 AM - 3:30 PM  Exhibition Open in Galleria Hall

5. Tuesday Keynote: Advancing Technologies in Support of Small Scale Purifications for Medicinal Chemistry, Drug Discovery and Development
Session Chairs: Larry Miller and Manuel Ventura, Amgen Inc., S. San Francisco, CA, USA
Location: Harbor Ballroom I

8:30 AM  L-201  Isolation of Impurities using SFC: Fast, Economical, and Enabling.
Jeffrey Kiplinger, Paul Lefebvre, John Tipping, Averica Discovery Services, Marlborough, MA, USA

8:50 AM  L-202  Purification Support of Late Stage Functionalization Chemistries in Drug Discovery.
Eric Streckfuss, Shane Kraska, Sriram Tyagarajan, Kevin Dykstra, Timothy Cernak, Min Liu, Scott Borges, Judy Morris, Daniel DiRocco, Renee Derenjian, Yong Liu, Huifang Yao, Mikhail Reibarkh, Gary Martin, Merck & Co., Inc., Rahway, NJ, USA

9:10 AM  L-203  Supercritical Fluid Chromatography in Open Access Purification for Medicinal Chemistry Support.
David Dunstan, Joseph Twomey, Melissa Grondine, Jennifer Poirier, John Reilly, Novartis, Cambridge, MA, USA

9:30 AM  L-204  Development and use of a Dual-mode SFC/RPLC Mass-directed Purification System in Medicinal Chemistry.
Kanaka Hettiarachchi, Qifeng Xue, Theravance Biopharma U.S., Inc., South San Francisco, CA, USA

10:10-10:40 AM  Break in Galleria Exhibit Hall

6. Tuesday Keynote: Continuous Chromatography
Session Chair: Olivier Dapremont, AMPAC Fine Chemicals, Rancho Cordova, CA, USA
Location: Harbor Ballroom I

10:40 AM  L-206  A Few Basic Considerations for Comparing Batch and Continuous Chromatography.
Roger-Marc Nicoud, Lay Saint Christophe, FRANCE

11:00 AM  L-207  The Largest Pharma Chromatography Plant for the Production of Omega-3’s.
Jean Blehaut, Eric Valery, Philippe Adam, Novasep, Pompey, FRANCE

11:20 AM  L-208  Continuous Purification of Artemisinin Produced Continuously in a Photocatalytic Reaction.
Zoltan Horvath, Ju Weon Lee, Elena Horosanskaia, Anne-Kathleen Kort, Heike Lorenz, Andreas Seidel-Morgenstern, Max-Planck-Institute for Dynamics of Complex Technical Systems, Magdeburg, GERMANY

11:40 AM  L-209  Analysis of Hybrid SMB-crystallization Process using a Binary Solvent.
Balamurali Sreedhar1, Baochun Shen2, Huayu Li1, Ronald Rousseau1, Yoshiaki Kawajiri1, 1Georgia Institute of Technology, Atlanta, GA, USA; 2Kunming Medical University, Kunming, CHINA

12:00 PM  L-210  Relay Simulated Moving-Bed Chromatography: Design and Experimental Validation.
Jose Mota1,2, Ricardo J.S. Silva2, 1Requimte/CQFB & IBET, Caparica, PORTUGAL; 2IBET, Oeiras, PORTUGAL

12:20 PM  ANNOUNCEMENT
12:25-2:00 PM  PAUSE, EXHIBITS, POSTERS, FREE VENDOR WORKSHOPS (lunch on own)

12:30-1:50 PM  Free Vendor Workshop Sponsored by LEWA-Nikkiso America
"LEWA - Your Single Source in Preparative Chromatography"
Location: Burroughs Room  *(light lunch will be provided)*
Must register at the booth of LEWA-Nikkiso America by Monday @ 5:10 PM

12:30-1:50 PM  Free Vendor Workshop Sponsored by Purolite Corporation
"The Design and Application of a New Range of Resins for Separation and Purification of Biomolecules"
Location: Lewis Room  *(light lunch will be provided)*
Must register at the booth of Purolite Corporation by Monday @ 5:10 PM

12:30-1:50 PM  Free Vendor Workshop Sponsored by Grace
"Integrated Flash and Preparative LC in a Single, Compact Purification Instrument"
Location: Carlton Room  *(light lunch will be provided)*
Must register at the booth of Grace by Monday @ 5:10 PM

2:00–3:30 PM  POSTER SESSION II in Galleria Exhibit Hall
Poster Session Chairs: Kathleen Mihlbachler, LEWA-Nikkiso, Devens, MA, USA
and Arvind Rajendran, University of Alberta, Alberta, CANADA

| 7A. Tuesday Parallel Session: Modeling and Design of Chromatographic Processes |
| Session Chair: David Roush, Merck, Sharp and Dohme, Inc., Kenilworth, NJ, USA |
| Location: Harbor Ballroom I |
| 3:30 PM L-211 Predicting the Productivity of Capture Chromatography based on a Simplified Mechanistic Model. Noriko Yoshimoto, Yu Isakari, Shuichi Yamamoto, Yamaguchi University, Ube, JAPAN |
| 3:50 PM L-212 Scalability of Mechanistic Models for Ion Exchange Chromatography. Thiemo C. Huuk¹, Tobias Hahn¹, Anna Osberghaus¹, Jan Griesbach², Stefan Hepbildikler², Jürgen Hubbuch¹, ¹Karlsruhe Institute of Technology (KIT), Karlsruhe, GERMANY, ²Roche Diagnostics GmbH, Penzberg, GERMANY |
| 4:10 PM L-213 General Design Method for Affinity Chromatography. Lei Ling, Lee-wei Kao, Nien-Hwa Linda Wang, Purdue University, West Lafayette, IN, USA |
| 4:30-4:50 PM L-214 Design and Optimization of Bypass-SMB: An Improved Operation for Reduced Purity Requirements. Preetika Karnal¹, Arvind Rajendran², Tuomo Sainio³, ¹Indian Institute of Technology, Bombay, INDIA; ²University of Alberta, Edmonton, CANADA; ³Lappeenranta University of Technology, Lappeenranta, FINLAND |

| 7B. Tuesday Parallel Session: Continuous Chromatography for Bioseparations |
| Session Chair: David Robbins, MedImmune, Gaithersburg, MD, USA |
| Location: Harbor Ballroom II |
| 3:30 PM L-215 How to Overcome Challenges When Implementing Continuous Chromatography in the DSP. Kathleen Mihlbachler, IPT - A member of LEWA-Nikkiso, Devens, MA, USA |
| 3:50 PM L-216 Automated Process Development and Control of a Twin-column Counter-current Process (CaptureSMB) for Affinity Capture. Thomas Muller-Spatt, Nicole Ulmer, Lars Aumann, Guido Strohlein, Michael Bavand, ChromaCon AG, Zurich, SWITZERLAND |
4:10 PM  L-217  Adenovirus Purification by Two-column, Open-loop, Size-exclusion, Simulated Countercurrent Chromatography. Piergiuseppe Nestola1, Ricardo J.S. Silva1, Cristina Peixoto1, Paula Alves1, Manuel J.T. Carrondo1, Jose P.B. Mota1,2, 1Instituto de Biologia Experimental e Tecnologica, Oeiras, PORTUGAL; 2Universidade Nova de Lisboa, Caparica, PORTUGAL

4:30-4:50 PM  L-218  Comparison of Simulated Moving Bed Chromatography and Batch Chromatography using Affinity, Mixed Mode and Ion Exchange Chromatography and Different Biological Feedstreams. Karl Rogler, Aleksandar Cvetkovic, Peter Levison, Rene Gantier, Pall Corporation, Westborough, MA, USA

8A. Tuesday Parallel Session: DoE & QbD for Bioprocess Development
Session Chair: James Patch, Genentech, S. San Francisco, CA, USA
Location: Harbor Ballroom I


5:20 PM  L-220  Design of Experiments can Help to Optimize the Purification Processes for Plant-derived Biopharmaceutical Proteins. Johannes Buyel1, Hannah Gruchow2, Patrick Opdensteinen3, Rainer Fischer4, 1RWTH Aachen University, Aachen, GERMANY; 2Fraunhofer Institute for Molecular Biology and Applied Ecology, Aachen, GERMANY; 3RWTH Aachen University/Fraunhofer Institute for Molecular Biology and Applied Ecology, Aachen, GERMANY

5:40 PM  L-221  Application of DoE and HTS for the Selection of Prototype Cation-exchange Mixed-mode Sorbents that are Versatile. Mark Schofield1, Alexander Martino1, Magali Toueille2, Audrey Uzel2, Rene Gantier1, 1Pall, Westborough, MA, USA; 2Pall, Cergy, FRANCE

6:00 PM  Pause

8B. Tuesday Parallel Session: Chromatographic Processes for Small Molecule Separations
Session Chair: Attila Felinger, University of Pecs, Pecs, HUNGARY
Location: Harbor Ballroom II

5:00 PM  L-222  Scalable Purification of Omega Fatty Acid API by Next-generation Counter-current Chromatography. Thomas Müller-Späth, Nicole Ulmer, Lars Aumann, Guido Stroehlein, Michael Bavand, ChromaCon, Zurich, SWITZERLAND

5:20 PM  L-223  Modeling and Optimization based Design of Reactive Simulated Moving Bed Systems for Equilibrium-limited Reactions. Gaurav Agrawal1, Jungmin Oh1, Balamurali Sreedhar1, Megan E. Donaldson2, Timothy C. Frank3, Alfred K. Schultz4, Andreas S. Bommarius1, Yoshiaki Kawajiri1, 1Georgia Institute of Technology, Atlanta, GA, USA; 2Process Separations - Engineering Sciences Laboratory, The Dow Chemical Company, Midland, MI, USA; 3Core R&D/Process Separations The Dow Chemical Company, Midland, MI, USA; 4Senior Research Scientist The Dow Chemical Company, Philadelphia, PA, USA

5:40 PM  L-224  Crude2Pure - Preparative HPLC Fractions to Pure, Dry Powder. Robert Buco1, Masayuki Nishimura2, Yosuke Iwata3, Tomoyuki Yamazaki3, Tsutomu Okoba2, Junichi Masuda3, Tsuyoshi Morikawa4, Takayuki Iriki5, 1Shimadzu Corporation, Marlborough, MA, USA; 2Shimadzu Corporation, Columbia, MD, USA; 3Shimadzu Corporation, Kyoto, JAPAN

6:00 PM  Pause
**Wednesday, July 23, 2014**

7:45 AM  
Symposium Registration Open near Harbor Ballroom

Session Chairs: Olivier Dapremont, AMPAC Fine Chemicals, Rancho Cordova, CA, USA and Marc Jacob, Phenomenex, Torrance, CA, USA  
Location: Harbor Ballroom I

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<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Presenters</th>
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<tbody>
<tr>
<td>8:20 AM</td>
<td>L-301</td>
<td><strong>Peptide Purification via Ion-exchange Doped Reversed Phase Chromatography: A Combined Experimental and Modeling Approach.</strong></td>
<td>Gianluca Buffolino¹, Rushd Khalaf², Massimo Morbidelli³, Alessandro Butte⁴, Zeochem AG, SWITZERLAND; ETH Zürich, SWITZERLAND</td>
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<tr>
<td>8:40 AM</td>
<td>L-302</td>
<td><strong>Safety by Design: The Advantages of Chromatography in the Production of Highly Active Small Molecules and Peptides.</strong></td>
<td>Ulf Altenhoner, Dominique Roberge, Conrad Roten, Lonza AG, Visp, SWITZERLAND</td>
</tr>
<tr>
<td>9:00 AM</td>
<td>L-303</td>
<td><strong>Peptide Preparatory Chromatography Scale up and Pitfalls.</strong></td>
<td>Brad DeHoff, Dennis Petersen, Valerie Paulsen, Lin Chen, Corden Pharma, Boulder, CO, USA</td>
</tr>
<tr>
<td>9:20 AM</td>
<td>L-304</td>
<td><strong>Multi-step Synthetic Peptide Purification using a Single Silica Based Sorbent.</strong></td>
<td>J. Preston, Jeff Layne, Marc Jacob, Phenomenex, Torrance, CA, USA</td>
</tr>
<tr>
<td>9:40-9:50 AM</td>
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<td><strong>PRESENTATION OF AWARDS TO WINNERS OF THE BEST POSTER COMPETITION</strong></td>
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<td>9:50-10:10 AM</td>
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<td><strong>BREAK</strong></td>
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**10. Wednesday Session: Monoliths and Membrane Chromatography**  
Session Chair: Igor Quinones-Garcia, Shire, Lexington, MA, USA  
Location: Harbor Ballroom I

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<th>Time</th>
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<tr>
<td>10:10 AM</td>
<td>L-305</td>
<td><strong>3D Structure and Flow Properties of Polymer Based Monoliths.</strong></td>
<td>Alois Jungbauer¹, Christian Jungreuthmayer², Gerhard Sekot², Petra Stepert³, ACIB/BOKU, Vienna, AUSTRIA; ACIB, Vienna, AUSTRIA; BOKU, Vienna, AUSTRIA</td>
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<tr>
<td>10:30 AM</td>
<td>L-306</td>
<td><strong>Design of Monoliths through their Mechanical Properties.</strong></td>
<td>Ales Podgornik¹, Ales Savnik², Janez Jancar², Nika Lendero Krajnc², University of Ljubljana, Ljubljana, SLOVENIA; BIA Separations doo, Ajdovscina, SLOVENIA</td>
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<tr>
<td>10:50 AM</td>
<td>L-307</td>
<td><strong>Protein Adsorption Performance and Mathematical Modeling of Ion-exchange Membrane Chromatography at Different Membrane Scales and Module Geometries.</strong></td>
<td>Chalore Teepakorn, Catherine Charcosset, Koffi Fiyat, University Lyon I - LAGEP, Villeurbanne, FRANCE</td>
</tr>
<tr>
<td>11:10 AM</td>
<td>L-308</td>
<td><strong>Performance and Economic Study of Next Generation Single-use Technologies.</strong></td>
<td>Kristina Pleitt, Paul Jorjorian, Gallus BioPharmaceuticals LLC, St. Louis, MO, USA</td>
</tr>
</tbody>
</table>
11. Wednesday Session: New Approaches for Biopurification

Session Chair: Andreas Seidel-Morgenstern, Max Planck Institute, Magdeburg, GERMANY
Location: Harbor Ballroom I

11:30 AM L-309 **Protein Purification by Microparticles.** Rainer Hahn¹, Alexander Trefilov², Moritz Imendoerffer², Alois Jungbauer¹, ¹University of Natural Resources and Life Sciences, Vienna, AUSTRIA; ²Austrian Centre of Industrial Biotechnology, Vienna, AUSTRIA

11:50 AM L-310 **Non-protein A, Non-column Purification of IgG.** Hui Theng Gan¹, Rui Nian², Lihan Tan¹, Wei Zhang¹, Pete Gagnon¹, ¹Bioprocessing Technology Institute, Singapore, SINGAPORE; ²Bioprocessig Technology Institute, Singapore, SINGAPORE

12:10 PM L-311 **Countercurrent Tangential Chromatography for Purification of Monoclonal Antibodies.** Amit Dutta¹, Oleg Shinkazh¹, Boris Napadensky¹, Travis Tran¹, Andrew Zydney², ¹ChromaTan Corporation, State College, PA, USA; ²Penn State University, University Park, PA, USA

12:30-2:00 PM PAUSE, FREE VENDOR WORKSHOP (lunch on own)

12:45-1:45 PM Free Vendor Workshop Sponsored by Life Technologies
"The Benefits of High Performing Chromatography Resins Including POROS XQ, A New Strong Anion Exchanger"
Location: Burroughs Room (light lunch will be provided)
Must register at the booth of Life Technologies by Tuesday @ 3:30 PM

12. Wednesday Session: Improving Bioprocess Chromatography

Session Chair: Jeffrey Salm, Pfizer, Inc., Andover, MA, USA
Location: Harbor Ballroom I

2:00 PM L-312 **Can Membrane Chromatography Streamline Influenza Virus Purification?** Aleksandar Cvetkovic¹, Rene Gantier¹, Annelies Onraedt², ¹Pall Life Science, Westborough, MA, USA; ²Pall International, Fribourg, SWITZERLAND

2:20 PM L-313 **Characterization of the Product Related Impurities of an Fc Fusion Protein and Rational Design of a Robust Downstream Purification Process.** Chao Huang, Xuankuo Xu, Udesh De Silva, Mi Jin, Zheng Jian Li, Bristol-Myers Squibb, East Syracuse, NY, USA

2:40 PM L-314 **Hybrid Process Technology for Antibody Purification.** Vijaykumar Dhadge², Ana Azevedo¹, Maria Raquel Aires-Barros¹, Cecilia Roque²; ¹IST, Lisbon, PORTUGAL; ²FCT-UNL, Lisbon, PORTUGAL

3:00-3:20 PM BREAK
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<tr>
<td>3:20 PM</td>
<td>L-315</td>
<td>The Modeling of Overloaded Elution Band Profiles in Supercritical Fluid Chromatography</td>
<td>Fahimeh Kamarei, Peter Vajda, Georges Guiochon, University of Tennessee, Knoxville, TN, USA</td>
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<tr>
<td>3:40 PM</td>
<td>L-316</td>
<td>Scalability and Adsorption Behavior in Chiral Supercritical Fluid Chromatography</td>
<td>Martin Enmark¹, Dennis Åsberg¹, Jorgen Samuelsson¹, Hanna Nelander², Magnus Klarqvist², Torgny Fornstedt¹, ¹Karlstad University, Karlstad, SWEDEN; ²AstraZeneca R&amp;D, Molndal, SWEDEN</td>
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<td>4:00 PM</td>
<td>L-317</td>
<td>Scale-up in Supercritical Fluid Chromatography</td>
<td>Abhijit Tarafder, Christopher Hudalla, Pamela Iraneta, Kenneth Fountain, Waters Corporation, Milford, MA, USA</td>
</tr>
<tr>
<td>4:20 PM</td>
<td>L-318</td>
<td>The Separation of Tashinone IIA by Supercritical Fluid Simulated Moving Bed</td>
<td>Ming-Tsai Liang, Chih-Hsiung Lin, Ru-Chien Liang, I-Shou University, Kaohsiung, TAIWAN</td>
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<td>4:40 PM</td>
<td>L-319</td>
<td>Extraction – Injection (&quot;X-Injection&quot;) as a Solution to the Demands of Sample Introduction in Preparative SFC</td>
<td>Mohamed Shaimi¹, Geoffrey Cox², ¹PIC Solution SAS, Avignon, FRANCE; ²PIC Solution Inc., Rose Valley, PA, USA</td>
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<tr>
<td>5:00 PM</td>
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<td>CLOSING REMARKS</td>
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Monday Poster Session I Presentations

Posters in the P-100 series will be presented on Monday in Poster Session I @ 1:50 - 3:20 PM

Poster Session Chairs:
Kathleen Mihlbachler, LEWA-Nikkiso, Devens, MA, USA
and Arvind Rajendran, University of Alberta, Alberta, CANADA

See Poster Guidelines at http://prepsymposium.org/poster-guidelines.html

Poster Board size 3.6 feet high by 3.6 feet wide (110cm x 110cm)


P-M-103 Combining Process Science and Engineering to Build a Comprehensive Chromatography Resin Screening Approach. Vani Mathur, Bruno Marques, Kent Goklen, GlaxoSmithKline, King of Prussia, PA, USA

P-M-104 Purification and Isolation of Proteins in Integrated Processes of Extraction and Chromatography. Wojciech Marek, Roman Bochenek, Renata Muca, Wojciech Piatkowski, Dorota Antos, Rzeszow University of Technology, Rzeszow, POLAND

P-M-105 Clarification of Solubilized Inclusion Bodies by Permeate-driven Tangential Microfiltration using 1000kDa Membrane. Marc Pompiati, Christoph Feistl, Dennis Funk, Roche Diagnostics GmbH, Penzberg, GERMANY

P-M-106 On-column Aggregation of a Recombinant Immunotoxin during Anion Exchange Chromatography. Andrew Fulton, Thomas Linke, Yang Wang, Alan Hunter, MedImmune, Gaithersburg, MD, USA

P-M-107 Peptisil 10: The New Bulk Silica for Peptide Purification. Imre Sallay¹, Keiji Koyanagi¹, Junichiro Kadoya¹, Oscar Rebollo², ¹DAISO Co. Ltd., Osaka, JAPAN; ²DAISO Fine Chem USA Inc., Torrance, CA, USA

P-M-108 Automated Purification Group: An Important Functional Group in Merck Discovery Chemistry. Min Liu on behalf of all ACE-AP, Merck & Co., Kenilworth, NJ, USA

P-M-109 SMB Process with Internal Recycle to Produce Pure Product Stream of Desired Enantiomer from Complex Mixture. Dawid Kiwala¹, Dorota Antos², Andreas Seidel-Morgenstern¹, ¹Max Planck Institute for Dynamics of Complex Technical Systems, Magdeburg, GERMANY; ²Rzeszow University of Technology, Rzeszow, POLAND

P-M-110 High Throughput Optimization Approach for Single Step Polishing of Monoclonal Antibodies Post Protein A Capture. Aleksandar Cvetkovic¹, Amitava Kundu², Rene Gantier¹, ¹Pall Life Science, Westborough, MA, USA; ²Genmab MN Inc., MN, USA

P-M-111 Spermine Sepharose as a Clustered-charge Anion Exchange Adsorbent. Sagar Dhamane¹, Federico Ruiz-Ruiz², Mohan-Vivekanandan Poongavanam¹, Katerina Kourentzi¹, Jorge Benavides², Marco Rito-Palomares², Richard Willson¹, ¹University of Houston, Houston, TX, USA; ²Centro de Biotecnología FEMSA, Monterrey, MEXICO
P-M-112  Open-access-based High Throughput Solutions for Purification of Target Compounds by using Agilent Walk-up and Automated Purification Software. Pierre Penduff¹, Andreas Tei¹, Helmut Schulenberg-Schell¹, Ronald Guilliet², ¹Agilent Technologies, Waldbronn, GERMANY; ²Agilent Technologies, Middelburg, NETHERLANDS

P-M-113  The Benefits of Continuous Downstream Processing. Sascha Keller, Sandoz Biopharmaceuticals, Kundl, AUSTRIA

P-M-114  Novel Flowthrough Platform for Virus Purification. Cristina Peixoto¹, Piergiuseppe Nestola¹, Ricardo Silva¹, Louis Villain², Manuel J.T. Carrondo¹, Jose P.B. Mota¹, ¹IBET, Oeiras, PORTUGAL; ²Sartorius Stedim Biotech, Gottingen, GERMANY

P-M-115  Evaluation of Charged Surface Hybrid Stationary Phases for Medicinal Chemistry Purifications. Shawn Ayube, Larry Miller, Amgen, Cambridge, MA, USA

P-M-116  Simulated Moving Bed Chromatography for Separating Nuclear Waste. Balamurali Sreedhar¹, David Hobbs², Yoshiaki Kawajiri¹, ¹Georgia Institute of Technology, Atlanta, GA, USA; ²Savannah River National Laboratory, Aiken, SC, USA

P-M-117  Mechanistic Insights into Protein Ion-exchange Adsorptive Separations using Single-molecule, Super-resolution Imaging. Mohan-Vivekanandan Poongavanam¹, Lydia Kisley², Jixin Chen², Andrea Mansur², Sergio Dominguez Medina², Eliona Kulla², Marci Kang², Bo Shuang², Katerina Kourentzi¹, Sagar Dhamane¹, Christy Landes², Richard Willson¹, ¹University of Houston, Houston, TX, USA; ²Rice University, Houston, TX, USA

P-M-118  Diversity within the ODS Modified Silica Gel Family. Keiji Koyanagi¹, Junich Kadoya¹, Imre Sallay², Oscar Rebolledo³, ¹DAISO CO. LTD., Hyogo, JAPAN; ²DAISO CO. LTD., Osaka, JAPAN; ³DAISO FINECHEM USA, Torrance, CA, USA

P-M-119  Extending the Range of Supercritical Fluid Chromatography by use of Water-rich Modifiers. Jinchu Liu, Erik Regalado, Ingrid Mergelsberg, Christopher Welch, Merck & Co., Rahway, NJ, USA

P-M-120  Experimental Productivity Rate Optimization of Rare Earth Element Separation through Preparative Solid Phase Extraction Chromatography. Hans-Kristian Knutson, Lund University, Lund, SWEDEN

P-M-121  Application of High Throughput Screening in the Downstream Process Development of a PEGylated Protein - A Case Study. Manju Kuruganti, Brian O'Mara, Zhong-Hua Gao, Pauline Bariola, Crystal Welch, Robert Mallet, Karen De Jongh, Bristol-Myers Squibb, Seattle, WA, USA

P-M-122  Custom Preparative HPLC Systems. Marcus Zyla¹, Jim Schools², ¹LABOMATIC, Allschwil, SWITZERLAND; ²Zinsser NA, Northridge, CA, USA

P-M-123  Comparison of Protein and VLP Adsorption in Monoliths and in Columns Packed with Large-Pore Particles. Yige Wu¹, Jared Simons², Dicky Abraham², Giorgio Carta¹, ¹University of Virginia, Charlottesville, VA, USA; ²Merck & Co., Inc., West Point, PA, USA
Monday Poster Session I Presentations

Posters in the P-100 series will be presented on Monday in Poster Session I @ 1:50 - 3:20 PM
Poster Session Chairs:
Kathleen Mihlbachler, LEWA-Nikkiso, Devens, MA, USA
and Arvind Rajendran, University of Alberta, Alberta, CANADA
See Poster Guidelines at http://prepsymposium.org/poster-guidelines.html
Poster Board size 3.6 feet high by 3.6 feet wide (110cm x 110cm)

Martin Leuthold, Louis Villain, Stefan Fischer-Frühholz, Miyako Hirai, Gregory Krueger,
Sartorius, Goettingen, GERMANY

P-M-125 Ligand Density Variations of Fractogel EMD TMAE: Influence on Protein Binding.
Simon Kluters1, Jan Konrad1, Lothar Jacob2, Heiner Graafels2, Christian Frech1,1 University of
Applied Sciences Mannheim, Mannheim, GERMANY; 2 Merck KGaA, Darmstadt, GERMANY

P-M-126 Modeling of Multimodal Ligand-protein Interactions - Molecular Simulations and Coarse-
grained Approaches. Siddharth Parimal, James Woo, Suvrajit Banerjee, Shekhar Garde,
Steven Cramer, Rensselaer Polytechnic Institute, Troy, NY, USA

P-M-127 Novel Protein A Chromatography for Single-Use Facilities. Feng Gu1, Kiran Chodavarapu1,
Reno Nguyen2, Melissa Wilcox3, W.R. Grace, Columbia, MD, USA; 2 W.R. Grace, Hesperia, CA,
USA; 3 W.R. Grace, Deerfield, IL, USA

P-M-128 Integrated Flash and Preparative LC Capabilities in a Single Instrument Provide a
Versatile Purification Platform. Melissa Wilcox, Yogesh Choudhari, Grace Discovery
Sciences, Deerfield, IL, USA

P-M-129 High Purity Purification of Eicosapentaenoic Acid Ethyl Ester (EPA-EE) Utilizing a Newly
Developed Packing Material. Chie Yamashita1, Takashi Sato1, Yayoi Hiroshi1, Norika Shoji1,
Takatomo Takai1, Ernest Sobkow2,1 YMC Co., Ltd., Kyoto, JAPAN; 2 YMC America, Inc.,
Allentown, PA, USA

P-M-130 withdrawn

Hans-Joachim Johl1, Marco Klinkigt1, Gary Gaudet2, Kathleen Mihlbachler3, LEWA GmbH,
Leonberg, GERMANY; 2 LEWA Nikkiso America, Inc., Holliston, MA, USA; 3 LEWA Process
Technologies, Devens, MA, USA

Tuesday Poster Session II Presentations

Posters in the P-200 series will be presented on Tuesday in Poster Session II @ 2:00 - 3:30 PM
Poster Session Chairs:
Kathleen Mihlbachler, LEWA-Nikkiso, Devens, MA, USA
and Arvind Rajendran, University of Alberta, Alberta, CANADA
See Poster Guidelines at http://prepsymposium.org/poster-guidelines.html
Poster Board size 3.6 feet high by 3.6 feet wide (110cm x 110cm)

P-T-201 Polishing of Biomolecules by Twin-column Counter-current Chromatography (MCSGP).
Thomas Müller-Späth, Nicole Ulmer, Lars Aumann, Guido Stroehlein, Michael Bavand,
ChromaCon AG, Zurich, SWITZERLAND
**Tuesday Poster Session II Presentations**

Posters in the P-200 series will be presented on Tuesday in Poster Session II @ 2:00 - 3:30 PM

Poster Session Chairs:
Kathleen Mihlbachler, LEWA-Nikkiso, Devens, MA, USA
and Arvind Rajendran, University of Alberta, Alberta, CANADA

See Poster Guidelines at http://prepsymposium.org/poster-guidelines.html

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**P-T-202**  Solubility Limits in Chromatographic Elution of Proteins: Crystallization Kinetics versus the Mobile Phase Composition. Izabela Poplewska, Wojciech Piatkowski, Dorota Antos, Rzeszow University of Technology, Rzeszow, POLAND

**P-T-203**  Purification of Antibodies by Precipitating Impurities Using Additives to Enable a Two-Chromatography Step Process. Ji Zheng, Lu Wang, Reb Russell, Michelle Wang, Bristol-Myers Squibb, Bloomsbury, NJ, USA

**P-T-204**  Custom Liquid Handling for Prep LC. Marcus Zyla¹, Jim Schools², ¹LABOMATIC, Allschwil, SWITZERLAND; ²Zinsser NA, Northridge, CA, USA

**P-T-205**  Comparison of Protein Adsorption and Transport on Two Multimodal CEX Resins. Mimi Zhu, Giorgio Carta, University of Virginia, Charlottesville, VA, USA

**P-T-206**  Characterization of a Novel Salt Tolerant Anion Exchanger. Satoshi Fujii, Yuji Kubo, Shigeru Nakatani, Koji Nakamura, Tosoh Corporation, Shunan, JAPAN

**P-T-207**  On-Column Unfolding and Aggregation of a Glycosylated Monoclonal Antibody in Columns Packed with Different CEX Resins. Jing Guo, Giorgio Carta, University of Virginia, Charlottesville, VA, USA

**P-T-208**  Modeling of Dual Gradient Chromatofocusing in Ion Exchange and Multi-Modal Chromatography. Yi Feng Lee¹, Heiner Graalfs², Christian Frech¹, ¹University of Applied Sciences Mannheim, Mannheim, GERMANY; ²Merck KGaA, Darmstadt, GERMANY

**P-T-209**  Development of a Predictive Model and Concise Set of Mixed-mode Ligands to Facilitate Development of Multimodal Chromatographic Separations. James Woo¹, Hong Chen², Russell Frost², Mark Snyder², Steven Cramer¹, ¹Rensselaer Polytechnic Institute, Troy, NY, USA; ²Bio-Rad Laboratories, Hercules, CA, USA

**P-T-210**  Countercurrent Tangential Chromatography for Purification of Monoclonal Antibodies. Oleg Shinkazh¹, Amit Dutta¹, Boris Napadenskyy¹, Travis Tran¹, Andrew Zydney², ¹Chromatian Corporation, State College, PA, USA; ²Penn State University, State College, PA, USA

**P-T-211**  Anion Exchange Chromatography: From Resin Screening to Manufacturing Process. Patricia Rowicki, John Gavin, Sunitha Kandula, Nihal Tugcu, Thoma Linden, Merck, Kenilworth, NJ, USA

**P-T-212**  Efficient Separation of Antibody using FcR-based Affinity Resin. Teruhiko Ide, Toru Tanaka, Yoshiharu Asaoka, Yousuke Terao, Naoki Yamanaka, Kizu Natsuko, Tosoh Corporation, Ayase, JAPAN

**P-T-213**  Novel Small Particle Polymer Media for Process-Scale Protein Separation. Kazuhiko Tokunaga¹, Noriyuki Yasuda¹, Yoshito Fukuda¹, Shinya Nozaki¹, Shouhei Ohara¹, Masato Towata¹, Masahiko Ishitobi¹, Shouya Yoda¹, Seigo Miyachi², Nozomi Itou², Masashi Yamanashi², Tadashi Adachi¹, ¹Mitsubishi Chemical Corporation, Kitakyushu, JAPAN; ²Mitsubishi Chemical Group, Yokohama, JAPAN
Tuesday Poster Session II Presentations

Tuesday Poster Session II Presentations
Posters in the P-200 series will be presented on Tuesday in Poster Session II @ 2:00 - 3:30 PM
Poster Session Chairs:
Kathleen Mihlbachler, LEWA-Nikkiso, Devens, MA, USA
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See Poster Guidelines at http://prepsymposium.org/poster-guidelines.html
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P-T-214 Methodical Guide for Stationary Phase Selection for Early-Discovery Peptide Analysis and Process-Scale Peptide Purification by HPLC. Oscar Rebolledo¹, Imre Sallay², Keiji Koyanagi³, Junichi Kadoya³, ¹DAISO Fine Chem USA, Inc., Torrance, CA, USA; ²DAISO Co. Ltd., Osaka, JAPAN; ³DAISO Co. Ltd., Amagasaki, JAPAN

P-T-215 A Novel Microporous Walled Micro-Capillary Film (MMCF) Module for Protein Separations. Ipshita Mandal, Matthew Townsend, Nick Darton, Sina Bonyadi, Nigel Slater, University of Cambridge, Cambridge, UK#


P-T-217 A High Capacity 150Å Reversed-Phase Silica Gel for the Purification of Oligonucleotides. Reno Nguyen, Mark Jacyno, Joe Bystron, Melissa Wilcox, Grace, Deerfield, IL, USA

P-T-218 Silica-Based Tentacle Type Strong Anion Exchange Media for Protein Purifications. Feng Gu, Dennis McCreary, Thomas Plitt, Edward Tamoria, W. Michelle Ni, Michael Peters, W.R.Grace, Columbia, MD, USA

P-T-219 Evaluation of Process Scalability to a 45cm (ID) Pre-packed Column. Paul Jorjorian, Kristina Pleitt, Gallus BioPharmaceuticals, St. Louis, MO, USA

P-T-220 Design Calculation Procedure for Radial Flow Monolith Tube Chromatography based on the Data with Axial Flow Monolith Disk Chromatography. Masataka Hamachi, Yu Isakari, Noriko Yoshimoto, Shuichi Yamamoto, Yamaguchi University, Ube, JAPAN

P-T-221 Cost Effective Method for Analysis and Purification of Stereoisomers using New Chiral Stationary Phases Consisting of Polysaccharide Derivatives. Munehiro Shoda¹, Ken Tsutsui¹, Takashi Sato¹, Norkio Shoji¹, Takatomo Takai¹, Naohiro Kuriyama¹, Jeffrey Kakaley², ¹YMC Co., Ltd., Kyoto, JAPAN; ²YMC America, Inc., Allentown, PA, USA (presented by Ernest Sobkow)

P-T-222 Change Selectivity Not the Stationary Phase for Synthetic Peptide Multi-Step Purifications. J. Preston, Jeff Layne, Marc Jacob, Phenomenex, Torrance, CA, USA

P-T-223 Modeling Robust Pooling of CIEX Purification of mAb Monomers from Soluble Aggregates. Niklas Borg¹, John Moscariello², Ganesh Vedantham², Karin Westerberg¹, Frida Ojala¹, Bernt Nilsson¹, ¹Lund University, Lund, SWEDEN; ²Amgen, Seattle, WA, USA

P-T-224 Multi-scale Modeling of Protein Adsorption and Transport in Dextran-grafted Ion-exchangers. Joseph Basconi, Giorgio Carta, Michael Shirts, University of Virginia, Charlottesville, VA, USA

P-T-225 Impact of Parameter Variation in Supercritical Fluid Chromatography. Dennis Asberg, Martin Enmark, Joergen Samuelsson, Torgny Fornstedt, Karlstad University, Karlstad, SWEDEN
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<td>Streamlined Purification of Assay-ready Oligonucleotides by Automated HPLC</td>
<td>Laine Stewart(^1), Luke Roenneburg(^1), Mark Muncey(^1), Karen Kleman(^1), Christopher Sherrill(^2), (^1)Gilson, Inc., Middleton, WI, USA; (^2)Luminex Corporation, Madison, WI, USA</td>
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<td>P-T-227</td>
<td>CaptureSelect™ Affinity Chromatography Ligands and Resins for Laboratory and Process Scale Applications</td>
<td>Bruce Dawson, Thermo Fisher Scientific, Carlsbad, CA, USA</td>
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<td>P-T-228</td>
<td>Case Study of Crude Peptide Separation with Reversed-Phase Silica Gel</td>
<td>Axel Delp, Fransiska Paesler, Markus Funk, Matthias Joehnck, Merck KGaA, Darmstadt, GERMANY</td>
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<td>Aptamer-facilitated Protein Isolation from Cells (AptaPIC)</td>
<td>Srgey Krylov, Jiayin Bao, Svetlana Krylova, Mirzo Katanov, York University, Toronto, CANADA</td>
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**FREE VENDOR WORKSHOPS (Monday-Tuesday-Wednesday)**

**Monday 12:30 – 1:50 pm**
Free Vendor Workshop Sponsored by Pall Life Sciences  
Chromatographic Strategies for Purification of Antibodies and Non-antibody Proteins and Large Biomolecules.  
Meeting Location: Burroughs Room *(light lunch will be provided)*  
Must register at the booth of Pall Life Sciences by Monday @ 10:40 AM

**Monday 12:30 – 1:50 pm**
Free Vendor Workshop Sponsored by KNAUER  
Contichrom: A Versatile Purification Platform with All-in-one Process Capabilities  
Meeting Location: Lewis Room *(light lunch will be provided)*  
Must register at the booth of KNAUER by Monday @ 10:40 AM

**Tuesday 12:30 – 1:50 pm**
Free Vendor Workshop Sponsored by LEWA-Nikkiso America  
LEWA - Your Single Source in Preparative Chromatography  
Meeting Location: Burroughs Room *(light lunch will be provided)*  
Must register at the booth of LEWA-Nikkiso America by Monday @ 5:10 PM

**Tuesday 12:30 – 1:50 pm**
Free Vendor Workshop Sponsored by Purolite Corporation  
The Design and Application of a New Range of Resins for Separation and Purification of Biomolecules  
Meeting Location: Lewis Room *(light lunch will be provided)*  
Must register at the booth of Purolite Corporation by Monday @ 5:10 PM

**Tuesday 12:30 – 1:50 pm**
Free Vendor Workshop Sponsored by Grace  
Integrated Flash and Preparative LC in a Single, Compact Purification Instrument  
Meeting Location: Carlton Room *(light lunch will be provided)*  
Must register at the booth of Grace by Monday @ 5:10 PM

**Wednesday 12:45 – 1:45 pm**
Free Vendor Workshop Sponsored by Life Technologies  
The Benefits of High Performing Chromatography Resins Including POROS XQ, A New Strong Anion Exchanger  
Meeting Location: Burroughs Room *(light lunch will be provided)*  
Must register at the booth of Life Technologies by Tuesday @ 5:10 PM

**FREE VENDOR WORKSHOP DESCRIPTIONS (must pre-register)**

**Monday PALL Free Vendor Workshop at 12:30-1:50 PM**  
"Chromatographic Strategies for Purification of Antibodies, Non-antibody Proteins and Large Biomolecules"  
*Presented by Warren E. Schwartz, Ph.D., Senior Technical Director, Chromatography, Pall Biopharmaceuticals, SLS Global Technical Support*

This workshop will focus on strategies that can be applied to optimize individual chromatographic steps and also to enhance the effectiveness and efficiency of an overall downstream processing scheme. Both mixed-mode chromatography and ion exchange chromatography will be considered, including IEX using conventional column chromatography and membrane adsorbers. Findings will be presented concerning use of high throughput screening and design-of-experiments tools to optimize conditions for both mixed-mode and ion exchange chromatography.
Monday KNAUER Free Vendor Workshop at 12:30-1:50 PM
"Contichrom: A Versatile Purification Platform with All-in-one Process Capabilities"
Presented by Dr. Ingo Piotrowski, Senior Product Manager, Wissenschaftliche Gerätebau Dr. Ing. Herbert KNAUER GmbH
A liquid chromatographic process platform consisting of novel capture and polish processes will be presented. The novel process principles (CaptureSMB, MCSGP) offer significant benefits in discovery, process development and production and will be discussed in conjunction with the Contichrom® equipment platform being capable of performing all LC processes. Contichrom® lab is a preparative twin-column liquid chromatography platform, offering great flexibility for all process choices (batch, SMB, CaptureSMB, MCSGP, sequential flow-through) confined in a single equipment and control software. Contichrom® lab allows fast development of superior process resulting in substantial increase in processivity, yield and product purity whilst omitting large screening and process optimization efforts. Starting from a simple non-optimized batch process, the user-friendly Contichrom® lab equipment and control software allows to transform a batch process into an optimized MCSGP in a simple three step procedure.

Tuesday LEWA-NIKKISO AMERICA Free Vendor Workshop at 12:30-1:50 PM
"LEWA - Your Single Source in Preparative Chromatography"
Presented by Gary Gaudet, Clean Market Sales, LEWA-Nikkiso
LEWA-Nikkiso America, Inc. (LNA) is your global supplier of chromatography and buffer in line dilution systems for biopharmaceutical and API manufacturing. Experience the fluid engineering advantage of the LEWA Intellidrive® technology, our open architecture automation software and quality control of the industry's most vertical supply chain. Talk to us about how a single LEWA system does the range of up to 3 conventional units while providing higher accuracy. Design consultation, manufacturing, installation, followed by our service, spare parts supply, maintenance and training is our 360° commercial certainty pledge. We listen to your ideas and produce a complete customized solution to meet your requirements.

Tuesday PUROLITE Free Vendor Workshop at 12:30-1:50 PM
"The Design and Application of a New Range of Resins for Separation and Purification of Biomolecules"
Presented by Dr. Alessandra Basso and Hans J. Johansson, Purolite LifeTech
This workshop will include an in-depth description of the design and applications of a novel range of agarose based ion exchange resins for large-scale purification of biomolecules such as proteins, and monoclonal antibodies. These novel resins have been developed, optimized and manufactured by Purolite exploiting their extensive experience in resin bead production. The introduction of agarose compliments Purolite’s platform of products for life science applications, which include synthetic IEX and RPC chromatographic resins, enzyme immobilization carriers together with immobilized enzymes and newly developed resins for peptide synthesis.

Tuesday GRACE Free Vendor Workshop at 12:30-1:50 PM
"Integrated Flash and Preparative LC in a Single, Compact Purification Instrument"
Presented by Melissa Wilcox, Technical Service Manager, Grace
Join us to learn how the NEW REVELERIS® PREP purification system can help streamline purification by combining flash chromatography and preparative LC capabilities in a single intuitive instrument. This advanced dual-mode system serves the needs of both synthetic chemists and preparative LC chromatographers. Attendees will learn: the versatility/flexibility of this dual-purification platform; the benefits of dual detection (UV/Vis and ELSD) in Prep and flash purifications; how integrated Prep and flash can save time and money; and performance benefits demonstrated through example applications.
Wednesday LIFE TECHNOLOGIES Free Vendor Workshop at 12:45-1:45 PM
"The Benefits of High Performing Chromatography Resins Including POROS XQ, A New Strong Anion Exchanger"

Presented by Christine Gebski and Shelly Parra, Life Technologies

Learn how high performance chromatography resins can help revolutionize your downstream process. Shelly Parra presents how chromatography can benefit downstream processing and impact process flexibility, cost of goods and overall productivity. POROS resins offer unique performance attributes and drive benefits to downstream processing. POROS XQ is the newest addition to our product portfolio. This high capacity, salt tolerant, high resolution anion exchanger enables unique selectivity, higher product yields through better separation and reduced cost of goods. Applications data will be used to demonstrate the benefits of POROS resins to capture and polish chromatography and process modeling will be used to demonstrate cost of goods improvements and process efficiencies that can be realized.
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