31st International Symposium on Preparative and Process Chromatography

PREP 2018

July 8-11, 2018 • Baltimore, MD USA

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Technology lunch workshop:
Innovations drive changes in antibody purification platforms and efficient transition to GMP environment
Monday, July 9 | 12:30–2:00 pm
By: Fredrik Larsson, Bioprocess resins portfolio strategy manager, GE Healthcare

Stop by booth #12 to register for lunch at our workshop.

Presentations:
Optimization of ligand and base matrix for a novel high capacity and alkaline resistant Protein A resin
Monday, July 9 | 5:10 pm | Session 4A
By: Mats Ander, Senior Research Engineer, GE Healthcare

Displacement chromatography for mAb charge separation
Tuesday, July 10 | 5:30 pm | Session 8A
By: Tomas Björkman, Senior Scientist, GE Healthcare

Mats and Tomas will also be presenting posters on their topics above. Stop by and discuss your application challenges with them, or visit us at booth #12.
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PREP 2018 Final Scientific Program

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Giorgio Carta, University of Virginia

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Message from the PREP 2018 Program Chair

On behalf of the Organizing Committee, I look forward to welcoming you to Baltimore, Maryland, for PREP 2018, the 31th International Symposium, Exhibit & Workshops on Preparative and Process Chromatography. PREP 2018 continues its thirty-year history of driving scientific progress by bringing together the very best people and companies in the field with an exciting scientific program, an in-depth technical education and training program, and a vibrant exhibit and vendor workshops showcasing the latest commercial technology.

The Scientific Program includes 70 oral presentations and 90 posters addressing the most recent developments in preparative chromatography from the gram scale to the multiple ton scale for both small molecules and for biomolecules. The Oral Program includes Keynote Sessions on Industrial Case Studies in Protein Chromatography (1), Preparative Chromatography in Drug Discovery, Development, and Manufacture (5); Continuous and Integrated Processes for Biomolecules (6), Continuous and Integrated Processing for Small Molecules (9), and Monoliths, Membrane Chromatography, and Column Characterization (10); Plenary Sessions on Mechanistic Understanding (2), Using Knowledge and Process Modeling for Design and Optimization (11), and Applications to Virus, VLPs, and Vaccine Purification (12); and Parallel Sessions on Protein-A Fundamentals (3A) and Protein-A Resins (4A), Stationary Phases (3B, 4B, and 7B), Fundamentals and Modeling (7A), Alternative Chromatographic Processes (8A), and Processes and Applied Process Modeling (8B). The Poster Program consists of two poster sessions that take place on Monday and Tuesday where all posters will be on display both days for in-depth discussion with the authors. We are accepting abstracts for poster presentation that may be submitted online at PREPsymposium.org for inclusion in the online program and for presentation during the poster program.

The Technical Education Program includes two half-day Sunday Workshops addressing “Fundamentals of Preparative Chromatography for Biomolecule Purification by Batch and Continuous Processes” and “Fundamentals of Preparative Chromatography for Purification of Small and Intermediate Size APIs by Batch Chromatography, SMB, and SFC” as well as Monday and Tuesday morning Tutorials on “Tips, Tricks, and Troubleshooting Analytical and Overloaded Prep Chromatography” and on “Practical Concepts on Process Characterization and Validation of Biopharmaceuticals based on QbD Principles”. The Vendor Exhibit includes 23 exhibitors who bring to you the latest commercial advances. Seven Vendor Workshops sponsored by Agilent Technologies, AkzoNobel/Kromasil, Bio-Rad Laboratories, GE Healthcare Life Sciences, Purolite Life Sciences, Thermo Fisher Scientific, and Wyatt Technology, complement the exhibit with more extensive and detailed information on new materials, equipment, and processes. These workshops are free and include lunch, but you must register in advance by visiting the vendor booth. We invite you to attend PREP 2018 to take advantage of all of these unique training and educational opportunities and to interact with vendors and providers of chromatography media, equipment, processes, and services. You may pre-register online at PREPsymposium.org, or you may register on-site at the conference.

I very much hope you will enjoy this meeting and that the talks, posters, exhibits, training and vendor workshops, discussions, and networking opportunities will help you solve today’s separation problems and better prepare you for the future of preparative chromatography.

Giorgio Carta
University of Virginia
PREP 2018 Chair
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# At-a-glance List of Sponsors, Exhibitors, Media Partners

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Training Workshops and Tutorials

The Workshop and Tutorial Training Program provides advanced tutorials covering various aspects of preparative and process chromatography. Workshops and Tutorial are open to conference and non-conference participants. Workshop and tutorial registration is in addition to the symposium registration fee. See details and pricing posted online under "Workshops & Tutorial" at PREPsymposium.org. Must pre-register to attend.

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<td>9:00 AM - 1:00 PM</td>
<td>Fundamentals of Preparative Chromatography for Biomolecule Purification by Batch and Continuous Processes</td>
<td>Giorgio Carta, University of Virginia Alois Jungbauer, BOKU, Vienna Massimo Morbidelli, ETH Zurich</td>
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<td>2:00 PM - 6:00 PM</td>
<td>Fundamentals of Preparative Chromatography for Purification of Small and Intermediate Size APIs by Batch Chromatography, SMB, and SFC</td>
<td>Olivier Dapremont, AMPAC Fine Chemicals Geoffrey Cox, PIC Solution</td>
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<td>7:00 AM - 8:25 AM</td>
<td>Tips, Tricks, and Troubleshooting Analytical and Overloaded Prep Chromatography</td>
<td>Cecilia Mazza, AkzoNobel Tony Yan, Pfizer, Inc.</td>
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<th>Tuesday, July 10</th>
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<tr>
<td>7:00 AM - 8:25 AM</td>
<td>Practical Concepts on Process Characterization and Validation of Biopharmaceuticals based on Qbd Principles</td>
<td>Gisela Ferreira, MedImmune</td>
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**Workshop 1: Sunday, July 8, at 9:00 AM - 1:00 PM**

**Fundamentals of Preparative Chromatography for Biomolecule Purification by Batch and Continuous Chromatography**

*Workshop registration is in addition to the symposium registration fee; open to conference and non-conference participants.*

*Location: President Room, 1st floor*

*Must pre-register/pay to attend*

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**Focus:** Biomolecule chromatography, stationary phases, binding capacity and selectivity, mass transfer, modeling, design for capture and resolution, multicolumn and continuous chromatography processes.

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 resolution applications will be discussed including multicolumn and continuous bio-chromatography processes.

**Topics:** Adsorption equilibrium and transport in single and multicomponent systems; Stationary phases for small and large biomolecules; Design and optimization of batch processes for capture and high-resolution steps; Multicolumn and continuous bio-chromatography processes; Process validation.

**Expert Instructors:**

**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.

**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.

**Massimo Morbidelli** received his Laurea in Chemical Engineering at the Politecnico di Milano in 1977, and his PhD in Chemical Engineering at the University of Notre Dame in 1986. After appointments as professor at the University of Cagliari (Italy) and at the Politecnico di Milano, since 1997 he is Professor of Chemical Reaction Engineering at the Institute for Chemical and Bioengineering at ETH Zurich (Switzerland). His research interests are in polymer reactions and reaction-separation processes based on continuous chromatography and in biomolecule purification with specific focus on therapeutic proteins and monoclonal antibodies. He is co-author of more than 300 papers, 11 international patents and 4 books. He serves as an associate editor of Industrial & Engineering Chemistry Research, and is a member of the scientific board of several international journals. He is the recipient of the 2005 R.H. Wilhelm Award in Chemical Reaction Engineering of the American Institute of Chemical Engineers, of the 2017 AIChE Award for Excellence in Process Development Research, and of the 2018 ACS Award in Separations Science & Technology.
Focus: Small molecules, APIs, peptides, oligonucleotides, chiral molecules, HPLC, column packing, gradient elution, overloaded chromatography, SFC, SMB, examples and industrial applications.

This workshop will focus on development of methods 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.

Expert Instructors:

Olivier Dapremont received his PhD on Chemical Engineering and Applied Chemistry from University of Paris on the development of continuous chromatography for the pharmaceutical industry. He has worked on the development of SMB technology since 1992. He is currently Executive 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. He is coauthor of several publications and patents related to the use of SMB applications for the purification of small molecules.

Geoffrey Cox received his PhD in Organic Chemistry from the University of Sheffield, England. Since then his career has been centered around chromatography, starting with preparative gas chromatography through introduction of HPLC to the premier Government analytical laboratory in the UK, development of bonded stationary phases and moving to preparative and industrial scale chromatography first with Du Pont and then in the mid-1980s as Director R&D with Prochrom. In 1997 he moved to Chiral Technologies, first in Europe before relocating to the USA as VP Technology, working in chiral separations. In March 2011 he started the US subsidiary of PIC Solution, the French SFC manufacturer, in order to expand the company’s business into North America. He is author and coauthor of several publications and patents related to the use of chromatography for the purification of small molecules using multiple techniques.
Tutorial: Monday, July 9, at 7:00 AM - 8:25 AM
Tips, Tricks, and Troubleshooting
Analytical and Overloaded Prep Chromatography

Tutorial registration is in addition to the symposium registration fee; open to conference and non-conference participants.
Location: Maryland Suite “COLUMBIA”, 2nd floor
Must pre-register/pay to attend

Focus: Analytical chromatography, overloaded chromatography, HPLC, SFC, examples of small molecules, APIs, peptides

This workshop will focus on the practical aspects of analytical and preparative chromatography, scale-up, and how to overcome the challenges that the chromatographer encounters on a daily basis by using the tips and tricks provided.

Topics: Analytical and Preparative chromatography purpose, practical scaleup, issues with peak shape, considering the whole chromatographic system (equipment, column and software) as contributors to the final chromatographic result, troubleshooting tools for improved chromatographic performance.

Expert Lecturers:

Cecilia Mazza has worked with small molecules, APIs, peptides and proteins for twenty five years, both in analytical as well as preparative chromatography. She is product manager and regional sales manager for Kromasil columns and bulk at AkzoNobel in Sweden.

Qi (Tony) Yan is currently working for Pfizer, Inc. (Groton, CT, USA) in the field of impurity isolation for structure elucidation in the department of pharmaceutical science. He has worked in pharmaceutical research and development in the area of chiral and achiral purifications, and impurity isolation for over 20 years.

Tutorial: Tuesday, July 10, at 7:00 AM - 8:25 AM
Practical Concepts on Process Characterization and Validation of Biopharmaceuticals based on QbD Principles

Tutorial registration is in addition to the symposium registration fee; open to conference and non-conference participants.
Location: Maryland Suite “COLUMBIA”, 2nd floor
Must pre-register/pay to attend

Focus: This workshop will focus on the practical aspects of analytical and preparative chromatography, scale-up, and how to overcome the challenges that the chromatographer encounters on a daily basis by using the tips and tricks provided.

Topics: This interactive tutorial introduces principles of Quality by Design including preparation of risk assessments, design of experiments for process characterization, statistical data analysis, quality risk management and validation of biopharmaceutical processes. Topics: Quality by Design, quality risk management, overall process control strategy, process characterization, application examples.

Expert Lecturer:

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.
Free Vendor Workshops
Monday, July 9, 2018 @ 12:30 - 2:00 PM

12:30-2:00 PM Workshop on Innovation Drives Changes in Antibody Purification Platforms and Efficient Transition to GMP Environment
Maryland Suite “COLUMBIA” Sponsored by GE Healthcare Life Sciences
2nd floor Must pre-register at the booth of GE Healthcare Life Sciences by Monday @ 10:50 AM

12:30-2:00 PM Workshop on Light Scattering Solutions for Real-time Monitoring of Protein Purification Processes
Maryland Suite “FREDERICK” Sponsored by Wyatt Technology
2nd floor Must pre-register at the booth of Wyatt Technology by Monday @ 10:50 AM

12:30-2:00 PM Workshop on Purification Solutions for Next Generation Biotherapeutics–Tools for Even the Most Demanding Challenges
Maryland Suite “ANNAPOLIS” Sponsored by Thermo Fisher Scientific
2nd floor Must pre-register at the booth of Thermo Fisher Scientific by Monday @ 10:50 AM

Free Vendor Workshops
Tuesday, July 10, 2018 @ 12:30 - 2:00 PM

12:30-2:00 PM Workshop on Advances in Chromatography: Novel Jetted Agarose and New Methacrylate Resins for Purification of Biomolecules, from the Best Protein A Resins to the Widest Platform of Functional Groups for Every Separation Need
Maryland Suite “COLUMBIA” Sponsored by Purolite Life Sciences
2nd floor Must pre-register at the booth of Purolite Life Sciences by Tuesday @ 10:40 AM

12:30-2:00 PM Workshop on HPLC Method Development and Scale Up of Peptides, Polypeptides and Other Biomolecules
Maryland Suite “FREDERICK” Sponsored by AkzoNobel
2nd floor Must pre-register at the booth of AkzoNobel by Tuesday @ 10:40 AM

12:30-2:00 PM Workshop on Accelerating Synthetic Chemistry by Removing the Purification Bottleneck
Maryland Suite “ANNAPOLIS” Sponsored by Agilent Technologies
2nd floor Must pre-register at the booth of Agilent Technologies by Tuesday @ 10:40 AM

12:30-2:00 PM Workshop on Unique Functionalities to Purify Challenging Molecules
Maryland Suite “BALTIMORE” Sponsored by Bio-Rad Laboratories
2nd floor Must pre-register at the booth of Bio-Rad Laboratories by Tuesday @ 10:40 AM
PREP 2018 Scientific Program

Sunday, July 8, 2018

9:00 AM - 1:00 PM
**Workshop 1 on Fundamentals of Preparative Chromatography for Biomolecule Purification by Batch and Continuous Processes**
President Room, 1st floor

Workshop registration is in addition to the symposium registration fee. See details and pricing at [PREPsymposium.org](http://PREPsymposium.org). Open to conference and non-conference participants. Must pre-register to attend.

2:00 PM - 6:00 PM
**Workshop 2 on Fundamentals of Preparative Chromatography for Purification of Small and Intermediate Size APIs by Batch Chromatography, SMB, and SFC**
President Room, 1st floor

Workshop registration is in addition to the symposium registration fee. See details and pricing at [PREPsymposium.org](http://PREPsymposium.org). Open to conference and non-conference participants. Must pre-register to attend.

1:30 PM - 5:30 PM
**Exhibitor Registration Only -- badge required to set up booth**
Location: Constellation Ballroom, 2nd floor

6:00 PM - 7:30 PM
**Symposium Registration Open for Conferees**
Location: Constellation Ballroom, 2nd floor

6:00 PM - 7:30 PM
**Grand Opening of the Exhibition & Welcome Reception**
Location: Constellation Ballroom, 2nd floor

Open to all conference participants
Conference name badge in badge holder is required for entry

Monday, July 9, 2018

7:30 AM
**Symposium Registration Open**
Location: Constellation Ballroom, 2nd floor

10:15 AM - 7:30 PM
**Exhibition Open in Constellation Ballroom**, 2nd floor

**Monday Tutorial**
Location: Maryland Suite “COLUMBIA”, 2nd floor

7:00 AM - 8:25 AM
**Tutorial on Tips, Tricks, and Troubleshooting Analytical and Overloaded Prep Chromatography**
Tutorial registration is in addition to the symposium registration fee. See details and pricing at [PREPsymposium.org](http://PREPsymposium.org). Open to conference and non-conference participants. Must pre-register/pay to attend.

**Monday Welcome and Opening Remarks**
Location: Constellation Ballroom C/D, 2nd floor

8:30 AM - 8:40 AM
**Welcome and Opening Remarks**
Giorgio Carta, University of Virginia, Charlottesville, VA, USA
1. Monday Keynote: Industrial Case Studies in Protein Chromatography  
Session Chairs: Alan Hunter, MedImmune and Timothy Pabst, MedImmune  
Location: Constellation Ballroom C/D, 2nd floor

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<td>(L-101) <strong>Mechanisms of IgG1 and IgG4 LMW Formation and Strategies of LMW Mitigation in Bioprocessing.</strong> Yuanli Song, Bristol-Myers Squibb, Devens, MA, USA</td>
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<tr>
<td>9:00 AM</td>
<td>(L-102) <strong>Quantitative Assessment of the Environmental Impact of Biologics Operations using Process Mass Intensity (PMI) Analysis.</strong> Jack Gavin, Sri Madabhushi, Sen Xu, Collette Cutler, Rebecca Chmielowski, William Rayfield, Nihal Tugcu, Hao Chen, Merck, Kenilworth, NJ, USA</td>
</tr>
<tr>
<td>9:20 AM</td>
<td>(L-103) <strong>Application of Mechanistic Modeling to High Throughput Methods and Multivariate Study Designs in an Industrial Setting.</strong> Chris Williams¹, Jessica Yang¹, Till Briskot², Ferdinand Stueckler², ¹Genentech, South San Francisco, CA, USA; ²Roche, Penzberg, GERMANY</td>
</tr>
<tr>
<td>9:40 AM</td>
<td>(L-104) <strong>Methods to Easily and Accurately Measure Total and Extraparticle Porosity of Preparative Chromatography Resins used for the Purification of Biopharmaceuticals.</strong> Chris Gerberich, Andre Dumetz, Gerald Terfloth, GlaxoSmithKline, King of Prussia, PA, USA</td>
</tr>
<tr>
<td>10:00 AM</td>
<td>(L-105) <strong>Cathepsin L Causes Proteolytic Cleavage of CHO Expressed Proteins during Processing and Storage: Identification, Characterization, and Mitigation.</strong> Liu Tie, Mingyan Cao, Alan Hunter, Timothy Pabst, Jiall Du, Raymond Field, Yuling Li, William Wang, Haibin Luo, Medimmune, Gaithersburg, MD, USA</td>
</tr>
</tbody>
</table>

10:20 AM - 10:50 AM **Mixer in Constellation Exhibition Hall, 2nd floor**

2. Monday Plenary Session: Mechanistic Understanding  
Session Chair: Lois Beaver, LAB Enterprises  
Location: Constellation Ballroom C/D, 2nd floor

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>10:50 AM</td>
<td>(L-106) <strong>Conformational Changes of Antibodies upon Adsorption onto Hydrophobic Interaction Chromatography Surfaces.</strong> Beate Beyer, Alois Jungbauer, University of Natural Resources and Life Sciences and Austrian Centre of Industrial Biotechnology, Vienna, AUSTRIA</td>
</tr>
<tr>
<td>11:10 AM</td>
<td>(L-107) <strong>The Effect of Multimodal Ligand Chemistry and Architecture on Ligand Conformation and Presentation in Chromatographic Systems.</strong> Camille Bilodeau, Shekhar Garde, Steve Cramer, Rensselaer Polytechnic Institute, Troy, NY, USA</td>
</tr>
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<td>11:30 AM</td>
<td>(L-108) <strong>Effects of Resin Architecture and Isotherm in Modeling Protein Elution in Ion-Exchange Chromatography.</strong> Vijesh Kumar¹, Karin Westerberg², Christian Kunert³, Fabrice Schlegel³, Abraham Lenhoff¹, ¹University of Delaware, Newark, DE, USA; ²Amgen Process Development, Thousand Oaks, CA, USA; ³Amgen Process Development, Cambridge, MA, USA</td>
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<tr>
<td>11:50 AM</td>
<td>(L-109) <strong>Real-Time Monitoring of the Structure of a Monoclonal Antibody during Chromatographic Elution from a Protein A Affinity Column.</strong> Charles Moore-Kelly¹, John Welsh², Tim Dafforn¹, Owen Thomas¹, ¹University of Birmingham, Birmingham, UK; ²Pall Corporation, Portsmouth, UK</td>
</tr>
<tr>
<td>12:10 PM</td>
<td>(L-110) <strong>Knowledge-based Downstream Process Design to Ensure Robust HCP Clearance.</strong> Yinying Tao, Borna Ghosh, Lihua Huang, Eli Lilly and Company, Indianapolis, IN, USA</td>
</tr>
</tbody>
</table>
Monday Mixer in Constellation Exhibition Hall
Location: Constellation Ballroom, 2nd floor – Mixer includes light lunch in the Hall

12:30 PM - 3:20 PM  Break, Exhibits, Mixer, Posters

Monday Free Vendor Workshops
Must pre-register at the sponsor’s booth to attend; light lunch will be provided

12:30-2:00 PM  Workshop on Innovation Drives Changes in Antibody Purification Platforms and Efficient Transition to GMP Environment
Maryland Suite “COLUMBIA”  2nd floor
Sponsored by GE Healthcare Life Sciences
Must pre-register at the booth of GE Healthcare Life Sciences by Monday @ 10:50 AM

The antibody pipeline remains strong, but as upstream technologies improve and antibody structures diversify, purification strategies must be adapted. For high-productive and robust manufacturing, planning for GMP production must begin in process development. Fortunately, new innovations in chromatographic technologies create the potential for dramatic improvements in productivity, reliability, and applicability of antibody purification platforms. This workshop will cover some of the recent developments in downstream processing, including new chromatography resin and fiber technologies, and potential future states of antibody purification platforms. A new pilot chromatography system, enabling seamless transfer from process development to GMP production, will also be demonstrated.

12:30-2:00 PM  Workshop on Light Scattering Solutions for Real-time Monitoring of Protein Purification Processes
Maryland Suite “FREDERICK”  2nd floor
Sponsored by Wyatt Technology
Must pre-register at the booth of Wyatt Technology by Monday @ 10:50 AM

Molar mass is an important indicator of product quality for biotherapeutics. Light scattering enables the absolute, non-destructive determination of molar mass over a wide range of solution conditions. SEC-MALS has become a standard method for measuring protein purity and molar mass, but the analysis time is too long to be used for effective process control. We have demonstrated the use of multi-angle light scattering for real-time, in-line monitoring and control of a protein purification process.

12:30-2:00 PM  Workshop on Purification Solutions for Next Generation Biotherapeutics– Tools for Even the Most Demanding Challenges
Maryland Suite “ANNAPOLIS”  2nd floor
Sponsored by Thermo Fisher Scientific
Must pre-register at the booth of Thermo Fisher Scientific by Monday @ 10:50 AM

The manufacture of complex biotherapeutics requires novel purification strategies without compromising the economic aspects of the process. This holds true for new antibody or antibody fragment formats, viral vectors for gene therapy as well as recombinant proteins. This presentation will cover solutions that help enable reduced time-to-market, increased purity and yield, and reduced cost of goods for biopharmaceutical drug development. We will further discuss customer case studies demonstrating reduction in chromatography steps in the manufacturing processes, thereby increasing productivity and process efficiency of these biologics.
### MONDAY POSTER SESSION 1

**Poster Session Co-Chairs:** Dorota Antos, Rzeszow University of Technology and Igor Quinones-Garcia, Mersana Therapeutics  
**Location:** Constellation Ballroom, 2nd floor

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<th>Time</th>
<th>Session</th>
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<tr>
<td>2:00 PM - 3:20 PM</td>
<td><strong>POSTER SESSION 1 - Sponsored by Bristol-Myers Squibb</strong></td>
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<td></td>
<td><strong>3A. Monday Parallel Session: Protein-A Fundamentals</strong></td>
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</table>
|          | **Session Chair:** Shuichi Yamamoto, Yamaguchi University  
**Location:** Constellation Ballroom C, 2nd floor |
|          | *(L-111) withdrawn*                                                                                                                      |
| 3:20 PM  | *(L-112) The Role of Protein A Ligand Saturation on Host Cell Protein and Antibody Interaction.* Carl Beigie, Ray Asare, Adam Meizinger, Cheng Zhang, Yi Li, Sanofi Genzyme, Framingham, MA, USA |
| 3:40 PM  | *(L-113) 3D Structure of the Antibody-staphylococcal Protein A Complex on Chromatography Surface by Small Angle X-ray Scattering and Molecular Simulation.* Goncalo Silva¹,², Cristina Dias-Cabra³, Alois Jungbauer¹,³, Rupert Tschelissnig¹,³, ¹ACIB – Austrian Centre of Industrial Biotechnology, Vienna, AUSTRIA; ²CICS-UBI Health Sciences Research Centre, University of Beira Interior, Covilha, PORTUGAL; ³University of Natural Resources and Life Sciences, Vienna, AUSTRIA |
| 4:00 PM  | *(L-114) Protein A Affinity Chromatography: A Detailed Analysis of Elution Characteristics.* Desiree Womser, Matthias Kubek, Rainer Hahn, BOKU Vienna, Vienna, AUSTRIA |
| 4:20-4:40 | Single and Multicomponent Adsorption of a Monomer-Dimer Monoclonal Antibody Mixture on Ceramic Hydroxyapatite. Yi Ran Wang, Giorgio Carta, University of Virginia, VA, USA (also presented as P-M-115) |
| 4:40 PM - 5:10 PM | **Mixer in Constellation Exhibition Hall, 2nd floor**                                                                                   |
|          | **3B. Monday Parallel Session: Stationary Phases – I**                                                                                 |
|          | **Session Chair:** Ales Podgornik, University of Ljubljana  
**Location:** Constellation Ballroom D, 2nd floor |
| 3:20 PM  | *(L-115) Scalable High-throughput Chromatography Resins for Ultrafast Antibody Purification.* Marcel Lorenz, Giuseppe Storti, Massimo Morbidelli, ETH Zurich, Zurich, SWITZERLAND |
| 3:40 PM  | *(L-116) Are All Chromatography Beads Created Equal?* Patrick Gilbert¹, Hans Johansson², ¹Purolite, Llantrissant, UK; ²Purolite, Uppsala, SWEDEN |
| 4:00 PM  | *(L-117) A Mixed-Mode Chromatography Strategy for the Purification of Recombinant Protein from E. coli Fermentate.* David Frisch¹, James Sulzberger², William Rushton², Hyunsic Choi¹, Xuemei He², ¹Scarab Genomics LLC, Madison, WI, USA; ²Bio-Rad Laboratories, Hercules, CA, USA |
| 4:20 PM  | *(L-118) Data Rich Experimental Methods for Industrial Immobilized Biocatalysis.* Jacob Forstater, Gabriel Graffius, Birgit Kosjek, Shane Grosser, Merck, Rahway, NJ, USA |
| 4:40 PM - 5:10 PM | **Mixer in Constellation Exhibition Hall, 2nd floor**                                                                                   |
4A. Monday Parallel Session: Protein A Resins
Session Co-chairs: Preston Fuks, University of Virginia and Joao Cardoso, Yamaguchi University
Location: Constellation Ballroom C, 2nd floor

5:10 PM  (L-119) Optimization of Ligand and Base Matrix for a Novel High Capacity and Alkaline Resistant Protein A Resin. Tomas Bjorkman, Annika Forss, Jelena Vasic, Mats Ander, GE Healthcare, Uppsala, SWEDEN

5:30 PM  (L-120) Development of a Novel Cellulose based rProtein A Capture Resin: Discussion of Critical Success Factors Identified for a New Bead Structure Design Combined with an Advanced Base Stable Affinity rProtein A Ligand. Malcolm G. Pluskal1, Natsuki Okaniwa2, Eri Narita2, Naoki Yamanaka2, Masami Shiina3, Yoshihiro Matsumoto2, Shigeyuki Aoyama4, 1JNC America Ltd., Littleton, MA, USA; 2JNC Corporation R&D, Yokohama, JAPAN; 3JNC Corporation Manufacturing R&D, Minamata, JAPAN; 4JNC Corporation, Tokyo, JAPAN

5:50 PM  (L-121) Plant-derived Fusion-protein based Affinity Ligands as an Alternative to MAb Purification using Protein A. Clemens Ruehl1, Matthias Knoedler1, Johannes Buyel2. 1RWTH Aachen University, Aachen, GERMANY; 2Fraunhofer IME, Aachen, GERMANY

6:10 PM - 7:10 PM  Reception in Constellation Exhibition Hall, 2nd floor

4B. Monday Parallel Session: Stationary Phases – II
Session Chair: Cecilia Mazza, AkzoNobel/Kromasil
Location: Constellation Ballroom D, 2nd floor

5:10 PM  (L-122) Improved Peptide and Oligonucleotide Purification via Reversed Phase and Ion Exchange Mixed-Mode Chromatography. Timothy O’Mara1, Juergen Machielse2, Andrea Wild2, Timo Nuijens3, Marcel Schmidt4, Isaiah Cedillo1, ITOCHU Chemicals America Inc., White Plains, NY, USA; 2Zeochem AG, Rüti, SWITZERLAND; 3EnzyPep BV, Geleen, NETHERLANDS; 4Ionis Pharmaceuticals, Carlsbad, CA, USA

5:30 PM  (L-123) Separation and Purification of Withaferin A from Withania Somnifera (L) Dunal using Agilent InfinityLab Preparative Columns. Lakshmi Subbarao, Sami Chanaa, Agilent Technologies, Wilmington, DE, USA


6:10 PM - 7:10 PM  Reception in Constellation Exhibition Hall, 2nd floor
Tuesday, July 10, 2018

7:30 AM  Symposium Registration Open
Location: Constellation Ballroom, 2nd floor

9:00 AM - 3:30 PM  Exhibition Open in Constellation Ballroom, 2nd floor

Tuesday Tutorial
Location: Maryland Suite “COLUMBIA”, 2nd floor

7:00 AM - 8:25 AM  Practical Concepts on Process Characterization and Validation of Biopharmaceuticals based on Qbd Principles
Tutorial registration is in addition to the symposium registration fee. See details and pricing at PREPsymposium.org. Open to conference and non-conference participants. Must pre-register/pay to attend.

5. Tuesday Keynote: Preparative Chromatography in Drug Discovery, Development, and Manufacture
Session Chair: Qi (Tony) Yan, Pfizer
Location: Constellation Ballroom C/D, 2nd floor

8:30 AM (L-201) Isolation and Preparation of Co-eluting Impurities Present in Pharmaceutical Samples by Automated Recycling Chromatography. Fabrice Gritti¹, Qi Yan², Sylvain Cormier¹, Michael Fogwill¹, Martin Gilar¹, Frank Riley², Thomas McDonald¹, ¹Waters Corporation, Milford, MA, USA; ²Pfizer Inc., Groton, CT, USA

8:50 AM (L-202) Use of Orthogonal Chromatographic Techniques to Address Early Discovery Challenging Purifications. Tom Kazarian¹, Kyung Gahm², Wes Barnhart², Heather Eastwood², Larry Miller¹, ¹Amgen, Cambridge, MA, USA; ²Amgen, Thousand Oaks, CA, USA

9:10 AM (L-203) Peptide Prep Chromatography from a Small Molecule Chromatographer. J Preston, Venkat Reddy, Phenomenex, Torrance, CA, USA

9:30 AM (L-204) Increasing the Robustness of SFC: Examples from Chiral and Peptide Separations. Torgny Fornstedt¹, Martin Enmark¹, Emelie Glenne¹, Marek Lesko¹,², Annika Weinmann³, Tomas Leek³, Krzysztof Kaczmarski², Magnus Klarqvist³, Jorgen Samuelsson¹, ¹Karlstad University, Karlstad, SWEDEN; ²Rzeszow University of Technology, Rzeszow, POLAND; ³AstraZeneca, Molndal, SWEDEN

9:50 AM (L-205) Low level Impurity Isolations for Impurity Profiling and Structure Elucidation. Qi Yan, Frank Riley, Pfizer, Groton, CT, USA

10:10 AM - 10:40 AM  Mixer in Constellation Exhibition Hall, 2nd floor
6. Tuesday Keynote: Continuous and Integrated Processes for Biomolecules
Session Chair: Sunitha Kandula, Merck & Co., Inc.
Location: Constellation Ballroom C/D, 2nd floor

10:40 AM (L-206) Continuous Integrated Manufacture of Therapeutic Proteins. Massimo Morbidelli, ETH Zurich, Zurich, SWITZERLAND

11:00 AM (L-207) From Multi-column Chromatography to Integrated Continuous Biomanufacturing. Mark Brower, Nuno Pinto, Adrian Gospodarek, Douglas Richardson, Nihal Tugcu, Merck & Co. Inc., Kenilworth, NJ, USA

11:20 AM (L-208) A Rapid Process Development Strategy for Continuous Chromatography mAb Bioprocessing. Rachel Quesenberry, Chia-Yun Sun, Aditya Utturkar, Keith Gillette, Mark Allen Pagkaliwangan, Mark Schofield, Pall Life Sciences, Westborough, MA, USA

11:40 AM (L-209) One-column Analog to SMB for Purification of Biomolecules. Abimaelle Chiberio, Jose Paulo Mota, LAQV-REQUIMTE NOVA University of Lisbon, Almada, PORTUGAL

12:00 PM (L-210) Methods for Calculating the Productivity of Continuous Chromatography Processes based on the Repeated Cyclic Operations. Noriko Yoshimoto, Shuichi Yamamoto, Yamaguchi University, Ube, JAPAN

Tuesday Mixer in Constellation Exhibition Hall
Location: Constellation Ballroom, 2nd floor – Mixer includes light lunch in the Hall

12:30 PM - 3:20 PM Break, Exhibits, Mixer, Posters
**Tuesday Free Vendor Workshops**

Must pre-register at the sponsor's booth to attend; light lunch will be provided.

**12:30-2:00 PM  
Maryland Suite “COLUMBIA” 2nd floor**

**Workshop on Advances in Chromatography: Novel Jetted Agarose and New Methacrylate Resins for Purification of Biomolecules, from the Best Protein A Resins to the Widest Platform of Functional Groups for Every Separation Need**

Sponsored by Purolite Life Sciences

*Must pre-register at the booth of Purolite Life Sciences by Tuesday @ 10:40 AM*

Purolite Life Sciences brings Purolite’s innovative thinking and distinguished history of resin technology expertise to the global Life Sciences marketplace. A pioneer in resin innovation, and with production plants and advanced research labs across the globe; we continue to lead the future of chromatography. This workshop will focus on and discuss the advances in chromatography - from the next generation of ultra-high capacity, alkaline stable Protein A resins, to the use of new Methacrylate resins for the purification of biomolecules. Case Studies will examine Purolite Life Sciences’ innovative, patented jetting technology in the use of our Chromalite® resins, which are ideal for down-stream processing for the separation of biomolecules such as proteins, aminoacids, peptides, oligonucleotides; and in the use of our novel agarose resin, Praesto® Jetted A50, which combines ‘jetting’ with a new, superior Protein A ligand to deliver outstanding performance.

**12:30-2:00 PM  
Maryland Suite “FREDERICK” 2nd floor**

**Workshop on HPLC Method Development and Scale Up of Peptides, Polypeptides and Other Biomolecules**

Sponsored by AkzoNobel

*Must pre-register at the booth of AkzoNobel by Tuesday @ 10:40 AM*

In the presentation a number of examples of method development for large scale HPLC will be shown, ranging from peptides and polypeptides to other biomolecules. Method transfer from smaller particles to preparative particles will be illustrated, as well as scale-up from small, analytical columns to large diameter columns.

**12:30-2:00 PM  
Maryland Suite “ANnapolis” 2nd floor**

**Workshop on Accelerating Synthetic Chemistry by Removing the Purification Bottleneck**

Sponsored by Agilent Technologies

*Must pre-register at the booth of Agilent Technologies by Tuesday @ 10:40 AM*

Purification of target compounds from crude synthetic mixtures has been a rate limiting step in the new molecular entity discovery process. Typical technologies either have limited resolving power, but simple guiding principles (Flash Chromatography, TLC) or high resolving power without simple rules (Mass-directed HPLC). Rilas Technologies’ scientists have incorporated Agilent’s 1290 Infinity II LC/MSD System with Automated Purification Software, resulting in dramatic increase in throughput and significant decrease in turnaround time. This presentation covers pre-purification to FinalQC and the best practices to obtain the preparative conditions to isolate the target molecules from a wide variety of synthetic mixtures.

**12:30-2:00 PM  
Maryland Suite “BALTIMORE” 2nd floor**

**Workshop on Unique Functionalities to Purify Challenging Molecules**

Sponsored by Bio-Rad Laboratories

*Must pre-register at the booth of Bio-Rad Laboratories by Tuesday @ 10:40 AM*

As the structures of biotherapeutics become more diverse, new purification schemes are necessary to address these challenges. Mixed-mode chromatography media with their unique selectivity are becoming powerful tools for purification and the removal of product related impurities. In this talk we will discuss ligand-protein interactions and present several applications using a hydrophobic anion exchange mixed-mode media (Nuvia™ aPrime™ 4A) and a calcium affinity, cation exchange mixed-mode media (CHT™ XT). Lastly, we will present a new approach to purify large biomolecules like plasma proteins IgA and IgM, viruses and VLPs. A new engineered bead, Nuvia HP-Q, meets the current and future processing needs of large biomolecule purification. We will highlight how these new functionalities can be used to achieve simpler, more selective purification processes spanning a range of biomolecules.
### TUESDAY POSTER SESSION 2
Poster Session Co-Chairs: Dorota Antos, Rzeszow University of Technology and Igor Quinones-Garcia, Mersana Therapeutics
Location: Constellation Ballroom, 2nd floor

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<th>Time</th>
<th>Session</th>
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<tr>
<td>2:00 PM - 3:20 PM</td>
<td><strong>POSTER SESSION 2 - Sponsored by Bristol-Myers Squibb</strong></td>
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<tr>
<td><strong>7A. Tuesday Parallel Session: Fundamentals and Modeling</strong></td>
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<tr>
<td>Session Chair: Alois Jungbauer, BOKU, Vienna</td>
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<td>Location: Constellation Ballroom C, 2nd floor</td>
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<td>3:20 PM</td>
<td>(L-211) <strong>Quantifying the Thermodynamic Consistency of Competitive Adsorption Isotherm Models.</strong> Julien Cousin-Saint-Remi¹, Andreas Seidel-Morgenstern², ¹Vrije Universiteit Brussel, Brussels, BELGIUM; ²Max Planck Institute for Dynamics of Complex Technical Systems, Magdeburg, GERMANY</td>
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<td>3:40 PM</td>
<td>(L-212) <strong>Pitfalls to Avoid when Modelling and Scaling Up of Protein Chromatography.</strong> Wojciech Marek¹, Jakub Gac², Krystian Baran¹, Wojciech Piatkowski¹, Dorota Antos¹, ¹Rzeszow University of Technology, Rzeszow, POLAND; ²Warsaw University of Technology, Rzeszow, POLAND</td>
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<td>4:00 PM</td>
<td>(L-213) <strong>Experimental Design for Parameter Estimation in Chromatography.</strong> William Heymann, Eric von Lieres, Forschungszentrum Jülich, Julich, GERMANY</td>
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<td>4:20 PM</td>
<td>(L-214) <strong>When Adsorption Models Fail at Describing Ion-exchange Chromatography.</strong> David Pfister¹, Karen-Vanessa Gonzalez², Laurent David², Roger-Marc Nicoud², ¹Ypso-Facto, Cambridge, MA, USA; ²Ypso-Facto, Nancy, FRANCE</td>
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<td>4:40 PM - 4:50 PM</td>
<td>Intermission</td>
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### 7B. Tuesday Parallel Session: Stationary Phases - III
Session Chair: Rainier Hahn, BOKU, Vienna
Location: Constellation Ballroom D, 2nd floor

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<th>Time</th>
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<tr>
<td>3:20 PM</td>
<td>(L-215) <strong>Novel Protein A Chromatography Resin Enabling Purification Platforms for Bispecific Antibodies.</strong> Afshin Mahmoudi¹, Bengt Westerlund², ¹Celgene, San Diego, CA, USA; ²GE Healthcare, Uppsala, SWEDEN</td>
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<tr>
<td>3:40 PM</td>
<td>(L-216) <strong>Capacity and Beyond: Evaluation of a Next Generation Protein A Resin.</strong> Felicia Sadikin, Chris Furcht, Brad Stanley, Engin Ayturk, Biogen, Cambridge, MA, USA</td>
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<td>4:00 PM</td>
<td>(L-217) <strong>A Novel Cation Exchange Resin for the Removal of mAb Aggregate in the Flow-through Frontal Chromatography Mode of Operation.</strong> Matthew Stone¹, Kristen Cotoni¹, Jayson Stoner¹, Peter Menstell², ¹MilliporeSigma, Bedford, MA, USA; ²MilliporeSigma, Darmstadt, GERMANY</td>
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<td>4:20 PM</td>
<td>(L-218) <strong>Comparative Study of Commercially Available Protein A Chromatography Resins and Amsphere™ A3: Qualitative Analysis of Residual Host Cell Proteins by Means of 2D-LC/MS.</strong> Tomonori Shiotani¹, Sachiko Tsuda², Takashi Tanaka³, Masaaki Hanamura², Masayoshi Nagaya¹, ¹JSR Life Sciences, Sunnyvale, CA, USA; ²JSR Life Sciences, Tsukuba, JAPAN; ³JSR Corporation, Tsukuba, JAPAN</td>
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<td>4:40 PM - 4:50 PM</td>
<td>Intermission</td>
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8A. Tuesday Parallel Session: Alternative Chromatographic Processes
Session Chair: Andreas Seidel-Morgenstern, Max-Planck Institute, Magdeburg
Location: Constellation Ballroom C, 2nd floor

4:50 PM
(L-219) Purification of Antibodies using Chromatofocusing Method with the Help of a 3D Process Development Tool. Yang Liu¹, Sevda Deldari¹, Hui Guo¹, Chittoor Narahari Rao², Ronald Bates³, Jay West², Kathleen Trejo², Ryan Swanson², Sanchayita Ghose², Zheng Jiao Li², Douglas Frey¹. ¹University of Maryland Baltimore County, Baltimore, MD, USA; ²Bristol-Myers Squibb, Devens, MA, USA; ³Bristol-Myers Squibb, East Syracuse, NY, USA

5:10 PM
(L-220) Reaction-mediated Desorption of Macromolecules: Novel Phenomenon Enabling Simultaneous Reaction and Separation. Ales Podgornik¹, Shuichi Yamoto², Yu Isakari², Noriko Yoshimoto², Yuhi Kishi². ¹University of Ljubljana, Ljubljana, SLOVENIA; ²Bio-Process Engineering Laboratory, Yamaguchi University, Ube, JAPAN

5:30 PM
(L-221) Displacement Chromatography for mAb Charge Separation. Bengt Westerlund, Lena Karf, Eva Heldin, Tomas Bjorkman, GE Healthcare, Uppsala, SWEDEN

5:50 PM
(L-222) Inexiotech Disruptive Technology Allows for the Resolution of Multicomponent Mixtures in a Serial Continuous Process. Alexandre Maciuk¹, Nicolas Fauquet², Frederic Cheviron². ¹University of Paris, Chatenay-Malabry, FRANCE; ²Fauquet Innovation, Montmagny, FRANCE

6:10 pm
Pause

8B. Tuesday Parallel Session: Processes and Applied Process Modeling
Session Chair: Jose Paulo Mota, LAQV-REQUIMTE NOVA, University of Lisbon
Location: Constellation Ballroom D, 2nd floor

4:50 PM
(L-223) Separation of Monoclonal Antibody Variants: Comparison of Mixed-mode Cation Exchange and Weak/Strong Cation Exchange Chromatography. Jan Hedrich¹, Felix Seelinger¹, Romas Skudas², Michael M. Schulte², Christian Frech¹. ¹University of Applied Sciences, Mannheim, GERMANY; ²Merck KGaA, Darmstadt, GERMANY

5:10 PM
(L-224) Model-based Quality by Design in Downstream Process Development. Thiemo Huuk¹, Maria Casais-Peralvez¹, Tobias Hahn¹, Juergen Hubbuch¹, GoSilico GmbH, Karlsruhe, GERMANY; ¹GoSilico GmbH, Karlsruhe, GERMANY

5:30 PM
(L-225) Utilizing Mechanistic Modeling of Chromatography for Process Optimization. Tim Fattor, Steve Hunt, Jonathan Rocher, Bob Todd, KBI Biopharma, Boulder, CO, USA

5:50 PM
(L-226) Purification of Monovalent Bispecific Antibodies. Matthew Aspelund, Dhanesh Gadre, MedImmune, Gaithersburg, MD, USA

6:10 pm
Pause
Wednesday, July 11, 2018

7:45 AM  Symposium Registration Open
Location: Constellation Ballroom, 2nd floor

9. Wednesday Keynote: Continuous and Integrated Processing for Small Molecules
Session Chair: Olivier Dapremont, AMPAC Fine Chemicals
Location: Constellation Ballroom C/D, 2nd floor

8:30 AM  (L-301) Implementing Supercritical Extraction (SFE) and Supercritical Chromatography (SFC) in Sustainable, Production-scale Purification Processes of Natural Products. Hans-Joachim Johl1, Kathleen Mihlbachler2, Roberto Fronzoni3, 1LEWA GmbH, Leonberg, GERMANY; 2LEWA Nikkiso America Inc., Devens, MA, USA; 3K.D. Pharma Bexbach GmbH, Bexbach, GERMANY

8:50 AM  (L-302) Preparative Purification of Terpenes from E. coli Fermentation Broth by Multi-column Chromatography. Liubomir Grozdev, Sonja Berensmeier, Technical University of Munich, Garching, GERMANY


9:50 AM  (L-305) Considerations for Solvent Contaminants in SMB Process Development: When Traces can become a Problem. Ryan Woods, Adam Hatch, Olivier Dapremont, AMPAC Fine Chemicals, Rancho Cordova, CA, USA

10:10 AM  Presentation of Awards to Winners of the Best Poster Competition

10:20 AM - 10:40 AM  Break
10:40 AM (L-306) **Separation of High-value Biomolecules using Monoliths as an Alternative to Conventional Chromatographic Resins.** Mirna Gonzalez-Gonzalez, Jose Gonzalez-Valdez, Karla Mayolo-Deloisa, Marco Rito-Palomares, Tecnologico de Monterrey, Monterrey, MEXICO

11:00 AM (L-307) **Microscopic Visualization and Quantification of Protein Bind and Elute Processes to the Ion Exchange Hydrogel of a Membrane Adsorber.** Adrian Ley¹,², Dominik Stein²,³, Dana Budde²,³, Florian Taft², Juergen Hubbuch⁴, Philipp Vana¹, Volkmar Thom², ¹Georg-August University Goettingen, Goettingen, GERMANY; ²Sartorius Stedim Biotech GmbH, Goettingen, GERMANY; ³University of Bielefeld, Bielefeld, GERMANY; ⁴Karlsruhe Institute of Technology, Karlsruhe, GERMANY

11:20 AM (L-308) **Determining Binding Capacity and Displacement Effects for Aggregate Removal in Flow-through Membrane Chromatography in a HTS Robotic Set-up.** Dominik Stein¹,², Juergen Hubbuch², Volkmar Thom¹, ¹Sartorius Stedim Biotech GmbH, Goettingen, GERMANY; ²Karlsruhe Institute of Technology, Goettingen, GERMANY

11:40 AM (L-309) **In-situ, Non-destructive Enhancement of the X-ray Contrast of Chromatographic Particles using Micro-computed Tomography.** Andres Martinez, Heiko Briesen, Dariusch Hekmat, Technical University of Munich, Munich, GERMANY

12:00 PM (L-310) **A Seamless Scale-up from 1 ml Laboratory to 57 L Manufacturing Scale.** Susanne Schweiger¹, Eva Berger¹, Alan Chan², James Peyser², Christine Gebski², Tim Schroeder², Alois Jungbauer³, ¹Austrian Centre of Industrial Biotechnology, Vienna, AUSTRIA; ²Repligen Corporation, Waltham, MA, USA; ³University of Natural Resources and Life Sciences Vienna, Vienna, AUSTRIA

12:30 PM - 1:30 PM **Break**
### 11. Wednesday Plenary Session: Using Knowledge and Process Modeling for Design and Optimization

**Session Chair:** Abraham Lenhoff, University of Delaware  
**Location:** Constellation Ballroom C/D, 2nd floor

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<td>1:30 PM</td>
<td><strong>Using Knowledge for Downstream Process Design.</strong></td>
<td>Rushd Khalaf, Alexander Hanke, Lars Pampel, Novartis, Basel, SWITZERLAND</td>
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<tr>
<td>1:50 PM</td>
<td><strong>Evolution of an Early Stage Downstream Platform towards Efficient HCP Clearance.</strong></td>
<td>Elke Prade, Luisa von Wolffersdorf, Erik Arango Gutierrez, Stefan Oelmeier, Ingo Gorr, Boehringer Ingelheim Pharma GmbH &amp; Co. KG, Biberach an der Riß, GERMANY</td>
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<tr>
<td>2:10 PM</td>
<td><strong>Streamline Downstream Steps for Bioprocess Intensification using New Strategies and Aligned Single-use Technologies.</strong></td>
<td>Anja Trapp, Alexander Faude, Thilo Grob, Marlene Holder, Verena Kössler, Sabine Faust, Sven Schubert, Rentschler Biopharma SE, Laupheim, GERMANY</td>
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<tr>
<td>2:30 PM</td>
<td><strong>Modeling Chromatographic Separation of Host Cell Proteins to Accelerate Downstream Process Development.</strong></td>
<td>Catherine Rose Mueschen, Ronald Colin Jaepel, Johannes Felix Buyel, Eric von Lieres, Fraunhofer IME, Aachen, GERMANY</td>
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<tr>
<td>2:50 PM</td>
<td><strong>Optimization of a Production Process for Pharma Grade Amino Acids using Preparative Chromatography with Product Recycle.</strong></td>
<td>Nils Warmeling, Stephan Scholl, TU Braunschweig, Braunschweig, GERMANY</td>
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<td>3:10 PM - 3:40 PM</td>
<td><strong>Break</strong></td>
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### 12. Wednesday Plenary Session: Applications to Virus, VLPs, and Vaccine Purification

**Session Chair:** Marco Rito-Palomares, Technologico de Monterrey, Monterrey  
**Location:** Constellation Ballroom C/D, 2nd floor

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<td>3:40 PM</td>
<td><strong>Virus Particle Surface Characterization for Improved Sorption Processes.</strong></td>
<td>Caryn Heldt, Xue Mi, Michigan Tech, Houghton, MI, USA</td>
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<tr>
<td>4:00 PM</td>
<td><strong>Adsorption and Transport of Enveloped Virus-like Particles on Polymer Grafted Ion Exchangers.</strong></td>
<td>Patricia Pereira Aguilar¹, Alois Jungbauer¹₂, ¹University of Natural Resources and Life Sciences, Vienna, AUSTRIA; ²Austrian Centre of Industrial Biotechnology, Vienna, AUSTRIA</td>
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<tr>
<td>4:20 PM</td>
<td><strong>Continuous Chromatographic Purification of Therapeutic Extracellular Vesicles.</strong></td>
<td>Mafalda Moleirinho¹, Ricardo Silva¹, Paula Alves², Manuel Carrondo³, Cristina Peixoto², ¹IBET, Oeiras, PORTUGAL; ²IBET/ITQB-UNL, Oeiras, PORTUGAL</td>
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<tr>
<td>4:40 PM</td>
<td><strong>Intensified Processing to Increase Production Yields of an Aggregation Prone Inactivated Polio Vaccine Candidate.</strong></td>
<td>Aart G. van ’t Oever, Arjen Spiekstra, Maarten J. de Vries, Yvonne E. Thomassen, Wilfried A.M. Bakker, Intravacc, Bilthoven, NETHERLANDS</td>
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<tr>
<td>5:00 PM</td>
<td><strong>Fractionation of Large Proteins and Virus-like Particles in the Centrifugal Precipitation Chromatograph.</strong></td>
<td>Martha Knight¹, Cuiping Chen², Rodrigo Lazo-Portugal¹, Dongyu Guo³, Yoichiro Ito³, ¹CC Biotech LLC, Rockville, MD, USA; ²Vigene Bioscience, Gaithersburg, MD, USA; ³National Institutes of Health, Bethesda, MD, USA</td>
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<td>5:20 PM</td>
<td><strong>Closing Remarks</strong></td>
<td>Giorgio Carta, University of Virginia, Charlottesville, VA, USA</td>
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<td>5:30-6:30 PM</td>
<td><strong>Farewell Reception</strong></td>
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P-M-101  **Development of Electro-Chromatography Methods and Application to Purification of Polymerized IgM.** Xun Zuo, Gregory Sabtino, Morphotek Inc., Exton, PA, USA

P-M-102  **Effect of Anion Exchange Chromatography Process on the Permeability of Virus Filter.** Hironobu Shirataki1, Shota Funakubo2, Shigeyuki Aoyama3, Yoshihiro Matsumoto4, 1Asahi Kasei Medical, Tokyo, JAPAN; 2Asahi Kasei Medical, Fuji, JAPAN; 3JNC Corporation, Tokyo, JAPAN; 4JNC Corporation, Yokohama, JAPAN

P-M-103  **Separation of BSA Multimers on Anion Exchange Media: Equilibrium Parameters and Column Performance at Different Scales.** Juergen Beck1, Juliane Diedrich2, Eric Von Lieres2, Rainer Hahn1, 1BOKU, Vienna, AUSTRIA; 2Forschungszentrum, Juelich, GERMANY

P-M-104  **Utilizing Mixed-mode Cation Exchanger in Streamlined Polishing Step for mAb Purification.** Aditya Utturkar, Keith Gillette, Chia-Yun Sun, Mark Schofield, Mark Allen Pajkaliwangan, Pall Corporation, Westborough, MA, USA

P-M-105  **Evaluation of Cation Exchange Chromatography Capability for Impurity Clearance.** Haiying Bao, Sarah Laino, Jiping Zhou, Zhichao Fang, Michelle Wang, Neil Jaffe, Yan Chen, Anurag Khetan, Bristol-Myers Squibb, Pennington, NJ, USA

P-M-106  **Versatile Preparation of Surface-skinless Monolith Particles using a Well-defined Diblock Copolymer Surfactant.** Keita Sakakibara1, Yoshinobu Tsujii1, Kyoko Konishi2, Norio Ishizuka2, 1Kyoto University, Kyoto, JAPAN; 2Emaus Kyoto, Inc., Kyoto, JAPAN

P-M-107  **Evaluation of Dextran Sulfate as a Chromatography Ligand on the Surface of CellufineTM Cellulose Beads - Introduction of New Heparin Binding Protein and Enhanced Viral Capture Resins.** Kohji Nobuta1, Jyunya Toba1, Akihiro Uchida1, Shigeyuki Aoyama2, Malcolm Pluskal3, 1JNC Japan, Yokohama, JAPAN; 2JNC Japan, Tokyo, JAPAN; 3JNC America, Ltd., Littleton, MA, USA

P-M-108  **Application of Mechanistic Modeling to High Throughput Methods and Multivariate Study Designs in an Industrial Setting.** Jessica Yang1, Till Briskot2, Ferdinand Stueckler2, Chris Williams1, 1Genentech, South San Francisco, CA, USA; 2Roche, Penzberg, GERMANY

P-M-109  **Novel MicroScale Solutions for Biophysical Characterization of Biomolecules.** Wyatt Strutz, NanoTemper Technologies, Cambridge, MA, USA

P-M-110  **Chromalites: A Novel Range of Methacrylic Polymers with High Performance in Chromatographic Bio-Separations.** Benjamin Summers, Alessandra Basso, Simona Serban, Purolite Ltd., Llantrisant, UK

P-M-111  **Packing Quality Nuvia HRS Columns at Pilot and Production Scale.** Christopher Foster, Xuemei He, Bio-Rad Laboratories, Hercules, CA, USA

P-M-112  **A New Protein A Resin based on Jetted Agarose Beads, Achieving Capacities of 80 g/l.** Hans Johansson, Purolite, Uppsala, SWEDEN
**Poster Session 1 - Monday @ 2:00 - 3:20 PM**

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<td>P-M-113</td>
<td>Separation Profiles of Antibody Drugs Analyzed by the Affinity Resin Coupling Fc Receptor III.</td>
<td>Yosuke Terao, Ryoko Otake, Naoki Yamanaka, Satoshi Endo, Teruhiko Ide, Tosoh Corporation, Ayase, JAPAN</td>
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<td>P-M-114</td>
<td>Displacement Chromatography for mAb Charge Separation.</td>
<td>Bengt Westerlund, Lena Karf, Eva Heldin, Tomas Bjorkman, GE Healthcare, Uppsala, SWEDEN</td>
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<td>P-M-115</td>
<td>Adsorption Behavior of a Monomer-Dimer Monoclonal Antibody Mixture in Ceramic Hydroxyapatite.</td>
<td>Yiran Wang, Giorgio Carta, University of Virginia, Charlottesville, VA, USA</td>
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<tr>
<td>P-M-117</td>
<td>Assessment of Prototype Protein A Affinity Chromatography Resins and Comparison to the Performance of Current Processes.</td>
<td>Caroline Ahrens, Brett Kelly, John Schreffler, Amos Tsai, Mark Teeters, Janssen R&amp;D, Malvern, PA, USA</td>
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<tr>
<td>P-M-118</td>
<td>A Novel Filter Screening Approach for Enabling Inline Filtration of Protein A Eluate.</td>
<td>Weitong Sun, Nacole Lee, Sonia Dragulin-Otto, Haibin Luo, Arick Brown, MedImmune, Gaithersburg, MD, USA</td>
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<td>P-M-119</td>
<td>Single Step Virus Purification using a New Mixed-Mode Media.</td>
<td>Payal Khandelwal, Mark Snyder, Daniel Yoshikawa, Bio-Rad, Hercules, CA, USA</td>
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<td>P-M-120</td>
<td>Next Generation Process Development: Stop Experimenting.</td>
<td>Thiemo Huuk¹, Tobias Hahn¹, Juergen Hubbuch², GoSilico GmbH, Karlsruhe, GERMANY; Karlsruhe Institute of Technology (KIT), Karlsruhe, GERMANY</td>
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<td>P-M-121</td>
<td>Overcoming Challenges on the Hydrophobic Interaction Chromatography and Ultrafiltration Steps of a Shear Sensitive, Aggregation Prone, and Low pI Antibody.</td>
<td>Sandra Rios, Francis Insaidoo, Sketa Patel, InKwan Han, Hong Li, Merck, Kenilworth, NJ, USA</td>
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<td>P-M-122</td>
<td>Virus Clearance on Kaneka KanCap(tm) Chromatography Protein A Resins.</td>
<td>Fuminori Konoike¹, Nathaniel Macapagal², Bill Kerns³, Joshua Orchard⁴, Jenifer Dean⁵, Hideo Kitahashi⁶, Matthew Dickson⁷, Harkewal Singh⁸, Keiichi Karasugi⁹, Kaneka, Tokyo, JAPAN; MedImmune, Gaithersburg, MD, USA; Texcell-North America, Frederick, MD, USA; VielaBio, Gaithersburg, MD, USA; Kaneka US Innovation Center, Newark, CA, USA; Kaneka Corporation, New York, NY, USA</td>
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P-M-124  Automated High Throughput Small Scale Purification Method of Monoclonal Antibodies (mAbs) to Meet Increased Sample Demand for Clone Selection and Process Development.  Jeanna Allen, Sarah Laino, Joanne Rivera, Joseph Calzada, Colleen Sparks, Gregory Barker, Yan Chen, Zhichao Fang, Duncan L. McVey, Bristol-Myers Squibb, Pennington, NJ, USA

P-M-125  C-tag Affinity Tag. From Routine Protein Purification to use in a cGMP Production Process.  Frank Detmers¹, Pim Hermans¹, Remko Clasen¹, Jessica de Rooij¹, Bruce Dawson². ¹Thermo Fisher Scientific, Leiden, NETHERLANDS; ²Thermo Fisher Scientific, Wilmington, NC, USA

P-M-126  Size Effects on DNA Retention on Depth Filters.  Ohnmar Khanal¹, Nripen Singh², Steven Taylor², Xuankuo Xu², Sanchayita Ghose², Abraham Lenhoff¹, ¹University of Delaware, Newark, DE, USA; ²Bristol-Myers Squibb, Devens, MA, USA

P-M-127  Highly Efficient Process for the Purification of IgG.  Sheldon Broedel Jr.¹, Mike McManaway², William Barrett², ¹Athena Enzyme Systems, Baltimore, MD, USA; ²W. L. Gore & Associates, Inc., Elkton, MD, USA

P-M-128  Feasibility of Benzyl Alcohol and PAB as an Alternative Buffer for Storage and Sanitization of Affinity Chromatography Resin.  Michael Freibaum, Joonsoo Lee, Hua Qiang, Yong Wang, Shire, Lexington, MA, USA

P-M-129  Significant Hungarian Contributions, Opportunities, and Challenges in Cannabinoid Research and Development.  Laszlo Lorantfy, Dora Rutterschmid, Marton Czirok, David Nagy, RotaChrom, Dabas, HUNGARY (presented by Laszlo Nemeth)

P-M-130  Commercial-scale Chromatography Column Sanitization Enhancement through Practical Outgassing Prevention Strategies.  David Nellis, Joseph Brewer, Erik Read, AstraZeneca, Frederick, MD, USA


P-M-132  Practical Strategies for Successful Scaling from UPC2 to Preparative SFC.  Jacquelyn Runco¹, Andy Aubin², Jo-Ann Jablonski², ¹Waters Corporation, Pittsburgh, PA, USA; ²Waters Corporation, Milford, MA, USA

P-M-133  Separation of Oligonucleotides using Reversed Phase Ion-pairing Chromatography.  Noriko Shoji¹, Chie Yokoyama¹, Saoko Nozawa², Takashi Sato², Noritaka Kuroda², Naohiro Kuriyama², Jeffrey Kakaley², ¹YMC Co., Ltd., Komatsu, JAPAN; ²YMC Co., Ltd., Kyoto, JAPAN; ³YMC America, Inc., Allentown, PA, USA

P-M-134  Mass-based Purification of Natural Product Impurities using an Agilent 1260 Infinity II Preparative LC/MSD System.  Ronald Guilliet¹, Jochen Strassner², Florian Rieck², Irina Spuling², Joerg Hippler², Beate Stahl², ¹Agilent Technologies, Inc., Middelburg, NETHERLANDS; ²Agilent Technologies, Inc., Waldbronn, GERMANY
**Poster Session 1 - Monday @ 2:00 - 3:20 PM**

Posters in the P-100 series will be presented on Monday in Poster Session I @ 2:00 - 3:20 PM
Constellation Ballroom, 2nd floor

P-M-135  **Consistent and Reproducible Isocratic HPLC Separation of Common Pharmaceutical Compounds.** Naza Lahoutifard-Henry¹, Lauren Pahnke², Melanie Cathman², Jacob Milicic², Laura Simdon², ¹Gilson Purification, Saint-Ave, FRANCE; ²Gilson Inc., Middleton, WI, USA

P-M-136  **Centrifugal Partition Chromatography for Purification of Cannabidiol from Cannabis sativa.** Naza Lahoutifard-Henry¹, Lauren Pahnke², Celine Le Quémener¹, Gregoire Audo¹, Laura Simdon², ¹Gilson Purification, Saint-Ave, FRANCE; ²Gilson Inc., Middleton, WI, USA

P-M-137  **Studies on the Removal of Polyaromatic Hydrocarbons using Activated Carbon and Mesoporous Silica in Fixed Bed Adsorption Columns.** F. Murilo Luna, Celio Cavalcante, University Federal Ceara, Fortaleza, BRAZIL

P-M-138  **Proper Operational Conditions in Supercritical Fluid Chromatography of Complex Molecules, Set vs. Real Conditions.** Torgny Fornstedt¹, Martin Enmark¹, Jörgen Samuelsson¹, Anders Karlsson², ¹Karlstad University, Karlstad, SWEDEN; ²AstraZeneca, Gothenburg, SWEDEN

P-M-139  **Doping Your Own Prep Separation Power: Cycling LC.** Fabrice Gritti¹, Qi Yan², Sylvain Cormier¹, Michael Fogwill¹, Martin Gilar¹, Frank Riley², Thomas McDonald¹, ¹Waters Corporation, Milford, MA, USA; ²Pfizer, Inc., Groton, CT, USA

P-M-140  **Stationary Phases for the Process Scale Purification of Peptides and Insulin.** Lars Torstensson, Tivadar Farkas, Marc Jacob, Phenomenex, Torrance, CA, USA

P-M-141  **Casein Hydrolysate Peptide Purification Utilizing an Automated Gradient Optimization Method and a Manual Gradient Scale Up Method with Automated Delay Volume Calibration for Scale Up From Analytical HPLC to Preparative HPLC Purification with Open Bed Fraction Collection.** Lori Sandford, Michael Woodman, Agilent Technologies, Inc., Wood Dale, IL, USA

P-M-142  **Silica at its Peak: Evaluation of an Advanced Stationary Phase.** Tetsuyuki Saika¹, Katsuya Washido¹, Imre Sallay², Hidehiro Ito², ¹DAISO Fine Chem USA, Inc., Torrance, CA, USA; ²Osaka Soda Co., Ltd., Osaka, JAPAN

P-M-143  **Purification of Large Biomolecules with Tailored Anion Exchangers.** Jamie Greenwood¹, William Rushton², Hana Kim², Carsten Voss¹, ¹Bio-Rad Laboratories GmbH, Munich, GERMANY; ²Bio-Rad Laboratories Inc., Hercules, CA, USA

P-M-144  *withdrawn*

P-M-145  **Branched form PEGylates of Exenatide Variant Monomer and Homodimer: Conjugation, Separation, and In-vivo Stability and Efficacy.** E. K. Lee, Thi Ngoc Thanh Nguyen, Soi Yoon, Hanyang University-ERICA, Ansan, SOUTH KOREA

P-M-146  **Integrated Fragmentation and Purification of an IgG.** Nicole Ulmer, Dragana Ristanovic, Massimo Morbidelli, ETH Zurich, Zurich, SWITZERLAND
P-T-201  HPMA-protein Conjugates: An Alternative to Conventional PEG-protein Conjugates as Drug Carrier. Calef Sanchez-Trasvina, Karla Mayolo-Deloisa, Marco Rito-Palomares, Tecnologico de Monterrey, Monterrey, MEXICO

P-T-202  Fragment Control for Fc and Bispecific Fusion Proteins. Kamiyar Rezvani, Matthew Aspelund, Mutsa McFarlane, Alan Hunter, MedImmune, Gaithersburg, MD, USA

P-T-203  Controlling Aggregation Kinetics of Monoclonal Antibodies using Process Control Levers and Thiol Containing Redox Agents. Greg Evangelist¹, Sonal Saluja², Chris Kwiatowski², Chongfong Xu², ¹Biogen, RTP, NC, USA; ²Biogen, Cambridge, MA, USA

P-T-204  Influenza Virus Capture using Membrane Chromatography: Improving Selectivity by Matrix Design and Pseudo-affinity Ligand Interactions. Florian Taft¹, Sebastian van Teeffelen², Ana Raquel Fortuna², Michael Wolff²,³, Udo Reichl²,³, Volkmar Thom¹, ¹Sartorius Stedim Biotech GmbH, Goettingen, GERMANY; ²Max Planck Institute for Dynamics of Complex Technical Systems, Magdeburg, GERMANY; ³University of Applied Sciences, Mittelhessen, GERMANY; ⁴Otto-von-Guericke University, Magdeburg, GERMANY

P-T-205  Semi Continuous Virus Inactivation using a Multi Vessel Stirred Tank Reactor. Aditya Utturkar, Mark Schofield, Pall Life Sciences, Westborough, MA, USA

P-T-206  Tuning Pore Size of Monolithic Chromatography for Large Biomolecule Separations. Noriko Yoshimoto¹, Shuichi Yamamoto¹, Ales Podgornik², ¹Yamaguchi University, Ube, JAPAN; ²University of Ljubljana, Ljubljana, SLOVENIA

P-T-207  Capacity and Beyond: Evaluation of a Next Generation ProteinA Resin. Felicia Sadikin, Chris Furcht, Brad Stanley, Engin Ayturk, Biogen, Cambridge, MA, USA

P-T-208  Plant-derived Fusion-protein based Affinity Ligands as an Alternative to mAb Purification using Protein A. Clemens Rühl¹, Matthias Knödler², Johannes Buyel², ¹RWTH Aachen University, Aachen, GERMANY; ²Fraunhofer IME, Aachen, GERMANY

P-T-209  Development of Novel Cellulose based rProtein A Capture Resins for Improved Workflow Effective Mab Purification. Natsuki Okaniwa¹, Eri Narita¹, Naoki Yamanaka¹, Masami Shiina², Yoshihiro Matsumoto³, Shigeyuki Aoyama³, Malcolm Pluskal¹, ¹JNC Japan, Yokohama, JAPAN; ²JNC Japan, Minamata, JAPAN; ³JNC Japan, Tokyo, JAPAN; ⁴JNC America Ltd., Littleton, MA, USA

P-T-210  The Effect of Multimodal Ligand Chemistry and Architecture on Ligand Conformation and Presentation in Chromatographic Systems. Camille Bilodeau¹, Ed Lau², Shekhar Garde¹, Steve Cramer¹, ¹Rensselaer Polytechnic Institute, Troy, NY, USA; ²Lawrence Livermore National Laboratory, Livermore, CA, USA

P-T-211  Ligand Attachment Technology Impact on Bovine Serum Albumin Monomer Adsorption onto Strong Anion Exchangers. Joao Cardoso, Nanako Hoshino, Noriko Yoshimoto, Shuichi Yamamoto, Yamaguchi University, Ube, JAPAN

P-T-213  CEX Behavior of Bivalent Bispecific Antibodies. Lucas Kimerer¹, Timothy Pabst², Alan Hunter², Giorgio Carta¹, ¹University of Virginia, Charlottesville, VA, USA; ²Medimmune, Gaithersburg, MD, USA

P-T-214  Investigating Important Parameters for Packing UNOsphere S Columns at Process Scale. Christopher Foster, Xuemei He, Jie He, Bio-Rad Laboratories, Hercules, CA, USA


P-T-216  Development of scFv-immobilized Chromatographic Resin for Affinity Separation of Biopharmaceuticals. Yoichi Kumada, Jun-ichi Horiuchi, Kyoto Institute of Technology, Kyoto, JAPAN

P-T-217  Optimization of Ligand and Base Matrix for a Novel High Capacity and Alkaline Resistant Protein A Resin. Mats Ander, GE Healthcare, Uppsala, SWEDEN

P-T-218  Protein Adsorption Equilibrium and Kinetics on AEX and MM-AEX Resins based on the Nuvia Platform. Preston Fuks, Joey Roberts, Giorgio Carta, University of Virginia, Charlottesville, VA, USA

P-T-219  Dynamic Light Scattering as an Inline Method of Aggregate Monitoring for Enhanced CEX Elution Product Quality. Kevin Hill-Byrne, Joanna Pezzini, MedImmune, Gaithersburg, MD, USA


P-T-221  Intensified Processing to Increase Production Yields of an Aggregation Prone Inactivated Polio Vaccine Candidate. Aart G. van’t Oever, Arjens Spiekstra, Maarten J. de Vries, Yvonne E. Thomassen, Wilfried A.M. Bakker, Intravacc, Bilthoven, NETHERLANDS

P-T-222  Enhanced Affinity Purification Media for MAbs. Katsuya Washido¹, Tetsuyuki Saika¹, Imre Sallay², Hidehiro Ito², ¹DAISO Fine Chem USA, Inc., Torrance, CA, USA; ²Osaka Soda Co., Ltd., Osaka, JAPAN

P-T-223  Adsorption and Exchange during mAb-Aggregate Separations in Flowthrough Hydrophobic Interaction Chromatography. Steven Timmick, Jessica Molek, Nicholas Levy, Kent Goklen, Antonio Ubiera, GlaxoSmithKline, King of Prussia, PA, USA
Poster Session 2 - Tuesday @ 2:00 - 3:20 PM

Posters in the P-200 series will be presented on Tuesday in Poster Session 2 @ 2:00 - 3:20 PM
Constellation Ballroom, 2nd floor

P-T-224 Separation of High-value Biomolecules using Monoliths as an Alternative to Conventional Chromatographic Resins. Mirna Gonzalez-Gonzalez, Jose Gonzalez-Valdez, Karla Mayolo-Deloisa, Marco Rito-Palomares, Tecnologico de Monterrey, Monterrey, MEXICO

P-T-225 Adsorption Capacity and Kinetics of Recombinant Adeno-Associated Virus (AAV9) on POROS CaptureSelect. Andreas Alberti1, Alexander Berrill2, William Wellborn2, Tamara Zekovic3, John Lightholder3, Giorgio Carta1, 1University of Virginia, Charlottesville, VA, USA; 2Pfizer Inc., Chesterfield, MO, USA; 3Pfizer Inc., Morrisville, NC, USA

P-T-226 Integrating Continuous Process Steps by Desalting with Microporous Chromatographic Media. Nicole Walch1, Wolfram Fruehauf1, Alois Jungbauer2, 1Acib GmbH, Vienna, AUSTRIA; 2University of Natural Resources and Life Sciences, Vienna, AUSTRIA

P-T-227 Scale-up of Continuous Twin-Column Chromatography. Hans-Joachim Johl1, Kathleen Mihlbachler2, 1LEWA, Leonberg, GERMANY; 2LEWA Process Technologies, Devens, MA, USA

P-T-228 High Productivity Membrane Chromatography in Bioprocessing. Gary Skarja, Elena Komkova, Navneet Sidhu, MilliporeSigma, Burlington, CANADA

P-T-229 Mono-PEGylated Lysozyme Purification from PEGylation Reactions using Heparin Affinity Monolithic Chromatography. Luis Alberto Mejia-Manzano, Jose Gonzalez-Valdez, ITESM, Monterrey, MEXICO


P-T-232 Ideal Light-absorbing Solution Theory as a Tool for Selective Inline Quantification of Co-eluting Solutes in Liquid Chromatography. Abimael Chiberio, Tiago Santos, Goncalo Policarpo, Jose Mota, LAQV/REQUIMTE FCT-UNL, Caparica, PORTUGAL

P-T-233 Purification in Continuous-Flow Manufacturing: The use of Centrifugal Partition Chromatography. Robert Orkenyi1, Ferenc Faigl1, Janos Eles2, Istvan Greiner2, 1Budapest University of Technology and Economics, Budapest, HUNGARY; 2Gedeon Richter Plc., Budapest, HUNGARY

P-T-234 Development of an Improved Amylose-based Chiral Stationary Phase with Excellent Preparative Performance. Tsuyoshi Watabe1, Masahide Kobayashi1, Yoshihiko Yamada2, Takehiro Iwadate1, Junko Iwadate1, Tomoko Izukawa1, Chihiro Morita1, Saoko Nozawa1, Noritaka Kuroda1, Jeffrey Kakaley3, 1YMC Co., Ltd., Komatsu, JAPAN; 2YMC Co., Ltd., Komatsu, JAPAN; 3YMC America, Inc., Allentown, PA, USA

P-T-235 Automation of Gel Permeation Chromatography Cleanup for US EPA Method 3640A. Naza Lahoutifard-Henry1, Tim Hegeman2, Lauren Pahnke2, Laura Simdon2, 1Gilson Purification, Saint-Ave, FRANCE; 2Gilson Inc., Middleton, WI, USA
P-T-236  Centrifugal Partition Chromatography for Purification of Natural Extracts. Naza Lahoutifard-Henry¹, Celine Le Quemener¹, Gregoire Audo¹, Lauren Pahnke², Laura Simdon², ¹Gilson Purification, Saint-Ave, FRANCE; ²Gilson, Inc., Middleton, WI, USA

P-T-237  Modeling Purification Behaviors of Antisense Oligonucleotides to Structural Features. Jonas Immel-Brown¹, Hien Nguyen¹, Kris Ruanjaikaen¹, Max Moore², Robert Gronke¹, ¹Biogen, Cambridge, MA, USA; ²Ionis, Carlsbad, CA, USA

P-T-238  Peptide and Biomacromolecule Separation Using Sepax PolyRP Bulk Media. Ke Yang¹, Xueying Huang¹, Huhua Chen², Huiming Mao¹, ¹Sepax Technologies, Inc., Newark, DE, USA; ²Sepax Technologies, Inc., Suzhou, CHINA

P-T-239  Robust Operation of SFC using Peptide and Chiral Model Systems. Torgny Fornstedt¹, Martin Enmark¹, Emelie Glenne¹, Marek Lesko¹,², Annika Langbörn³, Tomas Leek³, Krzysztof Kaczmarek³, Magnus Klarqvist³, Jörgen Samuelsson¹, ¹Karlstad University, Karlstad, SWEDEN; ²Rzeszów University of Technology, Rzeszów, POLAND; ³AstraZeneca, Gothenburg, SWEDEN

P-T-240  Separation of Phosphorothioated Oligonucleotides and their Diastereomers. Torgny Fornstedt¹, Martin Enmark¹, Jörgen Samuelsson¹, Maria Rova¹, Eivor Örnskov², Anders Karlsson², ¹Karlstad University, Karlstad, SWEDEN; ²AstraZeneca, Gothenburg, SWEDEN


P-T-242  Removal of Cyanobacterial Toxins using Polymeric Nanoparticles. Sidharth Razdan, Sutapa Barua, Missouri University of Science and Technology, Rolla, MO, USA

P-T-243  Evolution of an Early Stage Downstream Platform towards Efficient HCP Clearance. Elke Prade, Luisa von Wolffersdorff, Erik Arango Gutierrez, Stefan Oelmeier, Ingo Gorr, Boehringer Ingelheim Pharma GmbH & Co. KG, Biberach an der Riß, GERMANY

P-T-244  Multi-column Displacement Chromatography for Separation of Charged Variants of Monoclonal Antibodies. Ohnmar Khanal¹, Vijesh Kumar¹, Karin Westerberg², Christian Kunert², Fabrice Schliegel², Abraham Lenhoff¹, ¹University of Delaware, Newark, DE, USA; ²Amgen, Cambridge, MA, USA

P-T-245  A Systematic Approach to Virus Filtration Process Development for Monoclonal Antibodies. Hong Zhang, Ryan Muthard, Robert Luo, GlaxoSmithKline, King of Prussia, PA, USA


P-T-247  Influence of Ligand Densities on Two-peak Elution Behavior of mAb Charge Variants in Cation Exchange Chromatography. Gabriela Sanchez Reyes, Carolin Stange, Christian Frech, Mannheim University of Applied Sciences, Mannheim, GERMANY
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## Key to Abstract and Poster Board Numbers

### AUTHOR INDEX

"L" preceding the abstract number = Lecture  
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### KEY TO POSTER BOARD & ABSTRACT NUMBERS

**First Symbol**  
- **P** = Poster Presentation  
- **L** = Lecture Presentation

**Second Symbol**  
- **M** = Monday  
- **T** = Tuesday

**Last Symbol**  
- Poster Presentation Number  
- Lecture Presentation Number

- **P-M-200**
- **P-M-100**
- **P-T-200**
- **L-200**

## Oral Presentation Guidance

- 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.

- When you are next to present in your session, please come to the podium and get your presentation set up during the question period for the previous talk.

- We recommend that you use the computer that is provided unless using your own computer is essential to avoid software/hardware compatibility issues. Computers running Windows XP will be available with PowerPoint, and Acrobat Reader software using standard default settings. Please read Lecture Guidelines posted under the link to Program at PREPsymposium.org.

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

## Best 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 distinguish the best poster contributions at PREP 2018. Posters will be evaluated on the basis of scientific content, clarity of presentation, and layout. Posters co-authored by members of the Scientific and Industrial Advisory Committees or by judges are eligible only if the main author and presenter of the poster is not a member on the above committees. Posters authored or co-authored by members of the Organizing Committee or judges are not eligible for Best Poster Awards. However, should these posters be considered of sufficient quality to be among the top prize-winning entries, they will be given an Honorable Mention. 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 his/her poster considered for a poster award, they must notify the Symposium Manager at the Symposium Registration Desk before 11:00 a.m. on Tuesday, July 10.

Presentation of awards to winners of the Best Poster Competition will take place at 10:10 a.m. on Wednesday before the mid-morning break. The winners are encouraged to be present, but it is not mandatory to be present to win.
Poster Presentation Guidance

POSTER SET UP

- ALL posters in Poster Sessions 1 & 2 must set up on Monday.
- Set up for ALL posters is Monday, July 9, between 8:30 AM to 1:00 PM.

POSTER SESSIONS

- Posters are located in the Constellation Ballroom, 2nd floor.
- Poster presentations are numbered in the scientific program to correspond with the poster board number.
- To verify the poster board number, please refer to the Author Index located in the back of the Final Program. "L" preceding the abstract number = Lecture; "P" preceding the abstract number = Poster.
- Reprint envelopes are attached to the poster boards. To request reprints of poster abstracts, please insert your business card in the envelope.
- Each day, poster presenters should look in their reprint envelopes to retrieve any business cards that may be inside the envelope.
- Presenters must be in attendance at their posters on the day and time of their poster presentations. Presenters must wear their official conference name badge in its badge holder so it is visible at all times during their poster presentations. Those with an exhibitor only badge may not present posters during poster presentation times.
- All posters are eligible for consideration for a poster award. If a presenter does not want the poster considered for a poster award, please notify the Symposium Manager at the Symposium Registration Desk before 11:00 a.m. on Tuesday, July 10. Presentation of awards to winners of the Best Poster Competition will take place at 10:10 a.m. on Wednesday before the mid-morning break. The winners are encouraged to be present, but it is not mandatory to be present to win.
- Presenters of posters in the P-100 series should stand at their posters and be available to discuss the research during Poster Session 1 on Monday from 2:00 PM to 3:20 PM.
- Presenters of posters in the P-200 series should stand at their posters and be available to discuss the research during Poster Session 2 on Tuesday from 2:00 PM to 3:20 PM.

POSTER TEAR DOWN

- ALL posters stay up on the poster boards for two days for participants to view.
- Do NOT remove any posters until Tuesday between 3:20-6:00 PM.
- Anything remaining on the poster boards after 6:00 PM will be discarded.
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