PREP 2018 Scientific Program
(program as of 6/28/2018)

Submit Poster Abstracts at PREPsymposium.org

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Giorgio Carta, University of Virginia

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PREPsymposium.org
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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<td>YMC America (Silver sponsor)</td>
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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.

<table>
<thead>
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<th>Sunday, July 8</th>
<th>Workshops (Workshop registration is in addition to the symposium registration fee)</th>
<th>Instructors</th>
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</table>
| 9:00 AM - 1:00 PM | **Fundamentals of Preparative Chromatography for Biomolecule Purification by Batch and Continuous Processes**  
Focus on biomolecule chromatography, stationary phases, binding capacity and selectivity, mass transfer, modeling, design for capture and resolution, multicolumn and continuous chromatography processes. | Giorgio Carta, University of Virginia  
Alois Jungbauer, BOKU, Vienna  
Massimo Morbidelli, ETH Zurich |
| 2:00 PM - 6:00 PM | **Fundamentals of Preparative Chromatography for Purification of Small and Intermediate Size APIs by Batch Chromatography, SMB, and SFC**  
Focus on small molecule pharmaceuticals, APIs, chiral molecules, peptides, oligonucleotides, HPLC, column packing, gradient elution, overloaded chromatography, continuous chromatography, SMB, SFC, examples and industrial applications. | Olivier Dapremont, AMPAC Fine Chemicals  
Geoffrey Cox, PIC Solution |

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<th>Monday, July 9</th>
<th>Tutorial (Tutorial registration is in addition to the symposium registration fee)</th>
<th>Instructors</th>
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| 7:00 AM - 8:25 AM | **Tips, Tricks, and Troubleshooting Analytical and Overloaded Prep Chromatography**  
Focus on analytical chromatography, overloaded chromatography, HPLC, SFC, examples of small molecules, APIs, peptides. | Cecilia Mazza, AkzoNobel  
Tony Yan, Pfizer, Inc. |

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<th>Tuesday, July 10</th>
<th>Tutorial (Tutorial registration is in addition to the symposium registration fee)</th>
<th>Instructor</th>
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| 7:00 AM - 8:25 AM | **Practical Concepts on Process Characterization and Validation of Biopharmaceuticals based on Qbd Principles**  
Focus on Quality by Design, quality risk management, overall process control strategy, process characterization, application examples. | Gisela Ferreira, MedImmune |
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

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**

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<tr>
<th>Time</th>
<th>Workshop Topic</th>
<th>Location</th>
<th>Sponsor</th>
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<tr>
<td>12:30-2:00 PM</td>
<td>Workshop on Innovation Drives Changes in Antibody Purification Platforms and Efficient Transition to GMP Environment</td>
<td>Maryland Suite “COLUMBIA”</td>
<td>GE Healthcare Life Sciences</td>
<td>Must pre-register at the booth of GE Healthcare Life Sciences by Monday @ 10:50 AM</td>
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<tr>
<td>12:30-2:00 PM</td>
<td>Workshop on Light Scattering Solutions for Real-time Monitoring of Protein Purification Processes</td>
<td>Maryland Suite “FREDERICK”</td>
<td>Wyatt Technology</td>
<td>Must pre-register at the booth of Wyatt Technology by Monday @ 10:50 AM</td>
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<tr>
<td>12:30-2:00 PM</td>
<td>Workshop on Purification Solutions for Next Generation Biotherapeutics– Tools for Even the Most Demanding Challenges</td>
<td>Maryland Suite “ANNAPOLIS”</td>
<td>Thermo Fisher Scientific</td>
<td>Must pre-register at the booth of Thermo Fisher Scientific by Monday @ 10:50 AM</td>
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<tr>
<td>12:30-2:00 PM</td>
<td>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</td>
<td>Maryland Suite “COLUMBIA”</td>
<td>Purolite Life Sciences</td>
<td>Must pre-register at the booth of Purolite Life Sciences by Tuesday @ 10:40 AM</td>
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<td>12:30-2:00 PM</td>
<td>Workshop on HPLC Method Development and Scale Up of Peptides, Polypeptides and Other Biomolecules</td>
<td>Maryland Suite “FREDERICK”</td>
<td>AkzoNobel</td>
<td>Must pre-register at the booth of AkzoNobel by Tuesday @ 10:40 AM</td>
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<td>12:30-2:00 PM</td>
<td>Workshop on Accelerating Synthetic Chemistry by Removing the Purification Bottleneck</td>
<td>Maryland Suite “ANNAPOLIS”</td>
<td>Agilent Technologies</td>
<td>Must pre-register at the booth of Agilent Technologies by Tuesday @ 10:40 AM</td>
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<tr>
<td>12:30-2:00 PM</td>
<td>Workshop on Unique Functionalities to Purify Challenging Molecules</td>
<td>Maryland Suite “BALTIMORE”</td>
<td>Bio-Rad Laboratories</td>
<td>Must pre-register at the booth of Bio-Rad Laboratories by Tuesday @ 10:40 AM</td>
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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

8:40 AM  *(L-101)*  **Mechanisms of IgG1 and IgG4 LMW Formation and Strategies of LMW Mitigation in Bioprocessing.** Yuanli Song, Bristol-Myers Squibb, Devens, MA, USA


9:20 AM  *(L-103)*  **Application of Mechanistic Modeling to High Throughput Methods and Multivariate Study Designs in an Industrial Setting.** Chris Williams¹, Jessica Yang¹, Till Briskot², Ferdinand Stueckler², ¹Genentech, South San Francisco, CA, USA; ²Roche, Penzberg, GERMANY

9:40 AM  *(L-104)*  **Methods to Easily and Accurately Measure Total and Extraparticle Porosity of Preparative Chromatography Resins used for the Purification of Biopharmaceuticals.** Chris Gerberich, Andre Dumetz, Gerald Terfloth, GlaxoSmithKline, King of Prussia, PA, USA

10:00 AM  *(L-105)*  **Cathepsin L Causes Proteolytic Cleavage of CHO Expressed Proteins during Processing and Storage: Identification, Characterization, and Mitigation.** Liu Tie, Mingyan Cao, Alan Hunter, Timothy Pabst, Jiaili Du, Raymond Field, Yuling Li, William Wang, Haibin Luo, Medimmune, Gaithersburg, MD, USA

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

10:50 AM  *(L-106)*  **Conformational Changes of Antibodies upon Adsorption onto Hydrophobic Interaction Chromatography Surfaces.** Beate Beyer, Alois Jungbauer, University of Natural Resources and Life Sciences and Austrian Centre of Industrial Biotechnology, Vienna, AUSTRIA

11:10 AM  *(L-107)*  **The Effect of Multimodal Ligand Chemistry and Architecture on Ligand Conformation and Presentation in Chromatographic Systems.** Camille Bilodeau, Shekhar Garde, Steve Cramer, Rensselaer Polytechnic Institute, Troy, NY, USA

11:30 AM  *(L-108)*  **Effects of Resin Architecture and Isotherm in Modeling Protein Elution in Ion-Exchange Chromatography.** 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

11:50 AM  *(L-109)*  **Real-Time Monitoring of the Structure of a Monoclonal Antibody during Chromatographic Elution from a Protein A Affinity Column.** Charles Moore-Kelly¹, John Welsh², Tim Dafforn¹; Owen Thomas¹, ¹University of Birmingham, Birmingham, UK; ²Pall Corporation, Portsmouth, UK

12:10 PM  *(L-110)*  **Knowledge-based Downstream Process Design to Ensure Robust HCP Clearance.** Yinying Tao, Borna Ghosh, Lihua Huang, Eli Lilly and Company, Indianapolis, IN, USA
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

<table>
<thead>
<tr>
<th>2:00 PM - 3:20 PM</th>
<th>POSTER SESSION 1 - Sponsored by Bristol-Myers Squibb</th>
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<tbody>
<tr>
<td><strong>3A. Monday Parallel Session: Protein-A Fundamentals</strong></td>
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<tr>
<td>Session Chair: Shuichi Yamamoto, Yamaguchi University</td>
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<tr>
<td>Location: Constellation Ballroom C, 2nd floor</td>
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<tr>
<td><strong>3A.</strong></td>
<td>A New, First Principles Isotherm Connecting Antibody Elution pH to Binding Free Energy in Protein A Chromatography. Todd Przybycien, Carnegie Mellon University, Pittsburgh, PA, USA</td>
</tr>
<tr>
<td><strong>3A.</strong></td>
<td>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</td>
</tr>
<tr>
<td><strong>3A.</strong></td>
<td>3D Structure of the Antibody-staphylococcal Protein A Complex on Chromatography Surface by Small Angle X-ray Scattering and Molecular Simulation. Goncalo Silva(^1), Cristina Dias-Cabral(^2), Alois Jungbauer(^1,3), Rupert Tschelissnig(^1,3), ACIB – Austrian Centre of Industrial Biotechnology, Vienna, AUSTRIA; (^2)CICS-UBI Health Sciences Research Centre, University of Beira Interior, Covilha, PORTUGAL; (^3)University of Natural Resources and Life Sciences, Vienna, AUSTRIA</td>
</tr>
<tr>
<td><strong>3A.</strong></td>
<td>Protein A Affinity Chromatography: A Detailed Analysis of Elution Characteristics. Desiree Womser, Matthias Kubek, Rainer Hahn, BOKU Vienna, Vienna, AUSTRIA</td>
</tr>
<tr>
<td><strong>3B. Monday Parallel Session: Stationary Phases – I</strong></td>
<td></td>
</tr>
<tr>
<td>Session Chair: Ales Podgornik, University of Ljubljana</td>
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<tr>
<td>Location: Constellation Ballroom D, 2nd floor</td>
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<tr>
<td><strong>3B.</strong></td>
<td>Scalable High-throughput Chromatography Resins for Ultrafast Antibody Purification. Marcel Lorenz, Giuseppe Storti, Massimo Morbidelli, ETH Zurich, Zurich, SWITZERLAND</td>
</tr>
<tr>
<td><strong>3B.</strong></td>
<td>Are All Chromatography Beads Created Equal? Patrick Gilbert(^1), Hans Johansson(^2), Purolite, Llantrissant, UK; (^2)Purolite, Uppsala, SWEDEN</td>
</tr>
<tr>
<td><strong>3B.</strong></td>
<td>A Mixed-Mode Chromatography Strategy for the Purification of Recombinant Protein from E. coli Fermentate. David Frisch(^1), James Sulzberger(^2), William Rushton(^2), Hyunsic Choi(^1), Xuemei He(^2), Scarab Genomics LLC, Madison, WI, USA; (^2)Bio-Rad Laboratories, Hercules, CA, USA</td>
</tr>
<tr>
<td><strong>3B.</strong></td>
<td>Data Rich Experimental Methods for Industrial Immobilized Biocatalysis. Jacob Forstater, Gabriel Graffius, Birgit Kosjek, Shane Grosser, Merck, Rahway, NJ, USA</td>
</tr>
</tbody>
</table>

### 4:40 PM - 5:10 PM  Mixer in Constellation Exhibition Hall, 2nd floor
4A. Monday Parallel Session: Protein A Resins
Session Chair: Todd Przybycien, Carnegie Mellon 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 Nuijens², Marcel Schmidt³, Isaiah Cedillo⁴. ¹ITOCHU 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

5:50 PM  
(L-124) **Chromalites: A Novel Range of Methacrylic Polymers with High Performance in Chromatographic Bioseparations.** Benjamin Summers, Alessandra Basso, Simona Serban, Purolite Ltd., Llantrisant, UK

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  
<table>
<thead>
<tr>
<th>Location: Maryland Suite “COLUMBIA”, 2nd floor</th>
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</thead>
</table>

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](http://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  
**Isolation and Preparation of Co-eluting Impurities Present in Pharmaceutical Samples by Automated Recycling Chromatography.** Fabrice Gritti\(^1\), Qi Yan\(^2\), Sylvain Cormier\(^1\), Michael Fogwill\(^1\), Martin Gilar\(^1\), Frank Riley\(^2\), Thomas McDonald\(^1\), \(^1\)Waters Corporation, Milford, MA, USA; \(^2\)Pfizer Inc., Groton, CT, USA

8:50 AM  
**Use of Orthogonal Chromatographic Techniques to Address Early Discovery Challenging Purifications.** Tom Kazarian\(^1\), Kyung Gahm\(^2\), Wes Barnhart\(^2\), Heather Eastwood\(^2\), Larry Miller\(^1\), \(^1\)Amgen, Cambridge, MA, USA; \(^2\)Amgen, Thousand Oaks, CA, USA

9:10 AM  
**Peptide Prep Chromatography from a Small Molecule Chromatographer.** J Preston, Venkat Reddy, Phenomenex, Torrance, CA, USA

9:30 AM  
**Increasing the Robustness of SFC: Examples from Chiral and Peptide Separations.** Torgny Fornstedt\(^1\), Martin Enmark\(^1\), Emelie Glenne\(^1\), Marek Lesko\(^1,2\), Annika Weinmann\(^3\), Tomas Leek\(^3\), Krzysztof Kaczmarski\(^2\), Magnus Klarqvist\(^3\), Jorgen Samuelsson\(^1\), \(^1\)Karlstad University, Karlstad, SWEDEN; \(^2\)Rzeszow University of Technology, Rzeszow, POLAND; \(^3\)AstraZeneca, Molndal, SWEDEN

9:50 AM  
**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**
12:30-2:00 PM  
**Tuesday Free Vendor Workshops**

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

### 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.

### 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.

### 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.

### 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

2:00 PM - 3:20 PM  POSTER SESSION 2 - Sponsored by Bristol-Myers Squibb

7A. Tuesday Parallel Session: Fundamentals and Modeling
Session Chair: Alois Jungbauer, BOKU, Vienna
Location: Constellation Ballroom C, 2nd floor

3:20 PM  (L-211) Quantifying the Thermodynamic Consistency of Competitive Adsorption Isotherm Models. Julien Cousin-Saint-Remi¹, Andreas Seidel-Morgenstern², ¹Vrije Universiteit Brussel, Brussels, BELGIUM; ²Max Planck Institute for Dynamics of Complex Technical Systems, Magdeburg, GERMANY

3:40 PM  (L-212) Pitfalls to Avoid when Modelling and Scaling Up of Protein Chromatography. Wojciech Marek¹, Jakub Gac², Krystian Baran¹, Wojciech Piatkowski¹, Dorota Antos¹, ¹Rzeszow University of Technology, Rzeszow, POLAND; ²Warsaw University of Technology, Rzeszow, POLAND

4:00 PM  (L-213) Experimental Design for Parameter Estimation in Chromatography. William Heymann, Eric von Lieres, Forschungszentrum Jülich, Julich, GERMANY

4:20 PM  (L-214) When Adsorption Models Fail at Describing Ion-exchange Chromatography. David Pfister¹, Karen-Vanessa Gonzalez², Laurent David², Roger-Marc Nicoud², ¹Ypso-Facto, Cambridge, MA, USA; ²Ypso-Facto, Nancy, FRANCE

4:40 PM - 4:50 PM  Intermission

7B. Tuesday Parallel Session: Stationary Phases - III
Session Chair: Rainier Hahn, BOKU, Vienna
Location: Constellation Ballroom D, 2nd floor

3:20 PM  (L-215) Novel Protein A Chromatography Resin Enabling Purification Platforms for Bispecific Antibodies. Afshin Mahmoudi¹, Bengt Westerlund², ¹Celgene, San Diego, CA, USA; ²GE Healthcare, Upssala, SWEDEN

3:40 PM  (L-216) Capacity and Beyond: Evaluation of a Next Generation Protein A Resin. Felicia Sadikin, Chris Furcht, Brad Stanley, Engin Ayturk, Biogen, Cambridge, MA, USA

4:00 PM  (L-217) A Novel Cation Exchange Resin for the Removal of mAb Aggregate in the Flow-through Frontal Chromatography Mode of Operation. Matthew Stone¹, Kristen Cotonii¹, Jayson Stoner¹, Peter Menstell², ¹MilliporeSigma, Bedford, MA, USA; ²MilliporeSigma, Darmstadt, GERMANY

4:20 PM  (L-218) Comparative Study of Commercially Available Protein A Chromatography Resins and AsphereTM A3: Qualitative Analysis of Residual Host Cell Proteins by Means of 2D-LC/MS. 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

4:40 PM - 4:50 PM  Intermission
### 8A. Tuesday Parallel Session: Alternative Chromatographic Processes

**Session Chair:** Andreas Seidel-Morgenstern, Max-Planck Institute, Magdeburg  
**Location:** Constellation Ballroom C, 2nd floor

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Presenters</th>
<th>Institutions</th>
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<tbody>
<tr>
<td>4:50 PM</td>
<td><strong>Purification of Antibodies using Chromatofocusing Method with the Help of a 3D Process Development Tool.</strong></td>
<td>Yang Liu¹, Sevda Deldari¹, Hui Guo¹, Chittoor Narahari Rao², Ronald Bates³, Jay West², Kathleen Trejo², Ryan Swanson², Sanchayita Ghose², Zheng Jian Li², Douglas Frey¹. ¹University of Maryland Baltimore County, Baltimore, MD, USA; ²Bristol-Myers Squibb, Devens, MA, USA; ³Bristol-Myers Squibb, East Syracuse, NY, USA</td>
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<td>5:10 PM</td>
<td><strong>Reaction-mediated Desorption of Macromolecules: Novel Phenomenon Enabling Simultaneous Reaction and Separation.</strong></td>
<td>Ales Podgornik¹, Shuichi Yamoto², Yu Isakari², Noriko Yoshimoto², Yuhi Kishi². ¹University of Ljubljana, Ljubljana, SLOVENIA; ²Bio-Process Engineering Laboratory, Yamaguchi University, Ube, JAPAN</td>
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<td>5:30 PM</td>
<td><strong>Displacement Chromatography for mAb Charge Separation.</strong></td>
<td>Bengt Westerlund, Lena Karf, Eva Heldin, Tomas Bjorkman, GE Healthcare, Uppsala, SWEDEN</td>
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<td>5:50 PM</td>
<td><strong>Inexiotech Disruptive Technology Allows for the Resolution of Multicomponent Mixtures in a Serial Continuous Process.</strong></td>
<td>Alexandre Maciuk¹, Nicolas Fauquet², Frederic Cheviron². ¹University of Paris, Chatenay-Malabry, FRANCE; ²Fauquet Innovation, Montmagny, FRANCE</td>
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<td>6:10 pm</td>
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### 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

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<tr>
<th>Time</th>
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<tr>
<td>4:50 PM</td>
<td><strong>Separation of Monoclonal Antibody Variants: Comparison of Mixed-mode Cation Exchange and Weak/Strong Cation Exchange Chromatography.</strong></td>
<td>Jan Hedrich¹, Felix Seelinger¹, Romas Skudas², Michael M. Schulte², Christian Frech¹. ¹University of Applied Sciences, Mannheim, GERMANY; ²Merck KGaA, Darmstadt, GERMANY</td>
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<td>5:10 PM</td>
<td><strong>Model-based Quality by Design in Downstream Process Development.</strong></td>
<td>Thiemo Huuk¹, Maria Casais-Peralvarez¹, Tobias Hahn¹, Juergen Hubbuch². ¹GoSilico GmbH, Karlsruhe, GERMANY; ²Karlsruhe Institute of Technology, Karlsruhe, GERMANY</td>
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<td>5:30 PM</td>
<td><strong>Utilizing Mechanistic Modeling of Chromatography for Process Optimization.</strong></td>
<td>Tim Fattor, Steve Hunt, Jonathan Rocher, Bob Todd, KBI Biopharma, Boulder, CO, USA</td>
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<td>5:50 PM</td>
<td><strong>Purification of Monovalent Bispecific Antibodies.</strong></td>
<td>Matthew Aspelund, Dhanesh Gadre, MedImmune, Gaithersburg, MD, USA</td>
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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. Ljubomir 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 Stein2,4, 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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<tr>
<td>1:30 PM</td>
<td>(L-311) <strong>Using Knowledge for Downstream Process Design.</strong> Rushd Khalaf, Alexander Hanke, Lars Pampel, Novartis, Basel, SWITZERLAND</td>
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<td>1:50 PM</td>
<td>(L-312) <strong>Evolution of an Early Stage Downstream Platform towards Efficient HCP Clearance.</strong> 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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<td>2:10 PM</td>
<td>(L-313) <strong>Streamline Downstream Steps for Bioprocess Intensification using New Strategies and Aligned Single-use Technologies.</strong> 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>(L-314) <strong>Modeling Chromatographic Separation of Host Cell Proteins to Accelerate Downstream Process Development.</strong> Catherine Rose Mueschen, Ronald Colin Jaepel, Johannes Felix Buyel, Eric von Lieres, Fraunhofer IME, Aachen, GERMANY</td>
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<td>2:50 PM</td>
<td>(L-315) <strong>Optimization of a Production Process for Pharma Grade Amino Acids using Preparative Chromatography with Product Recycle.</strong> 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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<tr>
<td>3:40 PM</td>
<td>(L-316) <strong>Virus Particle Surface Characterization for Improved Sorption Processes.</strong> Caryn Heldt, Xue Mi, Michigan Tech, Houghton, MI, USA</td>
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<td>4:00 PM</td>
<td>(L-317) <strong>Adsorption and Transport of Enveloped Virus-like Particles on Polymer Grafted Ion Exchangers.</strong> Patricia Pereira Aquilar¹, Alois Jungbauer¹,², 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>(L-318) <strong>Continuous Chromatographic Purification of Therapeutic Extracellular Vesicles.</strong> Mafalda Moleirinho¹, Ricardo Silva¹, Paula Alves², Manuel Carrondo¹, Cristina Peixoto², ¹IBET, Oeiras, PORTUGAL; ²IBET/ITQB-UNL, Oeiras, PORTUGAL</td>
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<td>(L-319) <strong>Intensified Processing to Increase Production Yields of an Aggregation Prone Inactivated Polio Vaccine Candidate.</strong> 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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<td>5:00 PM</td>
<td>(L-320) <strong>Fractionation of Large Proteins and Virus-like Particles in the Centrifugal Precipitation Chromatograph.</strong> 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><strong>CLOSING REMARKS</strong> Giorgio Carta, University of Virginia, Charlottesville, VA, USA</td>
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<td>Development of Electro-Chromatography Methods and Application to Purification of Polymerized IgM.</td>
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<td>Effect of Anion Exchange Chromatography Process on the Permeability of Virus Filter.</td>
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<td>Separation of BSA Multimers on Anion Exchange Media: Equilibrium Parameters and Column Performance at Different Scales.</td>
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<td>Utilizing Mixed-mode Cation Exchanger in Streamlined Polishing Step for mAb Purification.</td>
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<td>P-M-106</td>
<td>Versatile Preparation of Surface-skinless Monolith Particles using a Well-defined Diblock Copolymer Surfactant.</td>
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<td>P-M-107</td>
<td>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.</td>
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<td>P-M-108</td>
<td>Application of Mechanistic Modeling to High Throughput Methods and Multivariate Study Designs in an Industrial Setting.</td>
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<td>P-M-109</td>
<td>Novel MicroScale Solutions for Biophysical Characterization of Biomolecules.</td>
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<td>Packing Quality Nuvia HRS Columns at Pilot and Production Scale.</td>
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<td>P-M-112</td>
<td>A New Protein A Resin based on Jetted Agarose Beads, Achieving Capacities of 80 g/l.</td>
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| P-M-113 | Separation Profiles of Antibody Drugs Analyzed by the Affinity Resin Coupling Fc Receptor III. **Yosuke Terao**, Ryoko Otake, Naoki Yamanaka, Satoshi Endo, Teruhiko Ide, Tosoh Corporation, Ayase, JAPAN |
| P-M-114 | Displacement Chromatography for mAb Charge Separation. **Bengt Westerlund**, Lena Karf, Eva Heldin, **Tomas Bjorkman**, GE Healthcare, Uppsala, SWEDEN |
| P-M-115 | Adsorption Behavior of a Monomer-Dimer Monoclonal Antibody Mixture in Ceramic Hydroxyapatite. **Yiran Wang**, Giorgio Carta, University of Virginia, Charlottesville, VA, USA |
| P-M-117 | Assessment of Prototype Protein A Affinity Chromatography Resins and Comparison to the Performance of Current Processes. **Caroline Ahrens**, Brett Kelly, John Schreffler, Amos Tsers, Mark Teeters, Janssen R&D, Malvern, PA, USA |
| P-M-118 | A Novel Filter Screening Approach for Enabling Inline Filtration of Protein A Eluate. **Weitong Sun**, Nacole Lee, Sonia Dragulin-Otto, Hai-bin Luo, Arick Brown, MedImmune, Gaithersburg, MD, USA |
| P-M-119 | Single Step Virus Purification using a New Mixed-Mode Media. **Payal Khandelwal**, Mark Snyder, Daniel Yoshikawa, Bio-Rad, Hercules, CA, USA |
| P-M-120 | Next Generation Process Development: Stop Experimenting. **Thiemo Huuk**, Tobias Hahn, Juergen Hubbuch, ¹GoSilico GmbH, Karlsruhe, GERMANY; ²Karlsruhe Institute of Technology (KIT), Karlsruhe, GERMANY |
| P-M-121 | Overcoming Challenges on the Hydrophobic Interaction Chromatography and Ultrafiltration Steps of a Shear Sensitive, Aggregation Prone, and Low pI Antibody. **Sandra Rios**, Francis Insaidoo, Sketa Patel, InKwan Han, Hong Li, Merck, Kenilworth, NJ, USA |
| P-M-122 | Virus Clearance on Kaneka KanCap(tm) Chromatography Protein A Resins. **Fuminori Konoike**, Nathaniel Macapagal, Bill Kerns, Joshua Orchard, Jennifer Dean, Hideo Kitahashi, Matthew Dickson, Harukawal Singh, Keiichi Karasugi, ¹Kaneka, Tokyo, JAPAN; ²MedImmune, Gaithersburg, MD, USA; ³Texcell-North America, Frederick, MD, USA; ⁴VielaBio, Gaithersburg, MD, USA; ⁵Kaneka US Innovation Center, Newark, CA, USA; ⁶Kaneka Corporation, New York, NY, USA |
Poster Session 1 - Monday @ 2:00 - 3:20 PM

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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 Dtemrs1, 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 Traylor2, 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 Kakaley3. 1YMC Co., Ltd., Komatsu, JAPAN; 2YMC Co., Ltd., Kyoto, JAPAN; 3YMC America, Inc., Allentown, PA, USA

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 Riley¹, 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-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 Using Process Modeling and Simulation to Design Robust Chromatography Operations. Michael Coolbaugh, Thomas Wasylenko, Jason Walther, Sanofi, Framingham, MA, USA

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 Kwiatkowski2, Chongfeng 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 Reichi2,4, 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 Matsumoto1, Shigeyuki Aoyama3, Malcolm Pluskal4, 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 Itō², 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

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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. Abimaelle 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 Kakaley², ¹YMC Co., Ltd., Kyoto, JAPAN; ²YMC Co., Ltd., Komatsu, JAPAN; ³YMC America, Inc., Allentown, PA, USA
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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 Gronke3, 1Biogen, Cambridge, MA, USA; 2Sepax Technologies, Inc., Suzhou, CHINA

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, Emelle Glenne1, Marek Lesko1,2, Annika Langborg Weinmann3, Tomas Leek3, Krzysztof Kaczmarski2, 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 Schlegel2, 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

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The Life Sciences business of GE Healthcare provides bioprocessing solutions for the development and manufacture of high-quality biotherapeutics and vaccines. Using our expertise, we support our customers in increasing speed to market, while reducing costs and improving performance in drug manufacturing. As a provider of high-quality products, technical and commercial services, as well as design and construction of complete biomanufacturing solutions, we support the biopharmaceutical industry in making health visions a reality.

INTERCHIM, INC.
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800-560-8262
http://interchiminc.com
Interchim manufactures chromatographic instruments to support Prep HPLC, MPLC and Flash. Enhanced detection includes MS, ELSD, Conductivity and RI. The column product range is comprised of Prep HPLC, Flash, MPLC, SPE, and HPLC. Columns are available for normal and reverse phase, ion-exchange, affinity and chiral chromatography.

ITOCHU CHEMICALS AMERICA, INC.
360 Hamilton Avenue 6th Floor, White Plains, NY 10601, USA
262-439-8485
www.itochu-purification.com
Itochu Chemicals America’s Separation and Purification group is the exclusive representative for ion exchange resins from Mitsubishi Chemical (Diaion, Sepabeads, MCI GEL, and Relite) and Zeochem chromatography silica (ZEOprep, ZEObead, and ZEOsphere). Mitsubishi Chemical offers a new line of resins for protein and antibody purification called ChromSpeed (ion exchange) and MabSpeed (Protein A). Zeochem offers ZEOsphere Doped Reverse Phase (DRP) mixed mode reverse phase silica for peptide, oligonucleotide, insulin, and other charged molecule purifications.

JNC AMERICA, INC. (Bronze Sponsor)
555 Theodore Fremd Avenue, Suite C-206, Rye, NY 10580, USA
914-921-5400
www.jnc-corp.co.jp/fine/en/cellufine
The Cellufine product line encompasses chromatography resins designed for the purification of proteins, enzymes, vaccines and other biomolecules. The media is based on spherical cellulose beads, exhibiting high chemical stability, high mechanical strength, and inherent bio-compatibility. Typical applications include initial capture and purification of protein and viruses, polishing steps for aggregate and trace contaminate removal and endotoxin reductions. Cellufine media is used worldwide in chromatographic purification of vaccines, therapeutic enzymes and proteins. Leachables from cellulose based media are significantly lower than for comparable polymeric beads.
Leading Exhibiting Companies at the Forefront of Preparative and Process Chromatography

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510-996-3559
http://www.bioseparation.kaneka.com
An innovation driven chemical company responding to customer needs with world class science and technology. Business activities span a broad spectrum of markets as Life Science Product : Food Supplements, Medical Devices, Pharmaceutical Intermediates, Protein A Resin. Kaneka Corporation is headquartered in Osaka-Japan, with subsidiaries in the United States, Europe, and multiple Asian countries.

LABOMATIC INSTRUMENTS AG
Ringstrasse 13, CH-4123 Allschwil, SWITZERLAND
41-61-4858000
http://www.labomatic.com
Labomatic is active in the field of liquid chromatography, especially in preparative high-performance medium pressure liquid chromatography. The main areas of application of Labomatic's products have been primarily in pharmaceutical and organic chemistry and reversed phase chromatography. There are also various other areas such as dye chemistry, the cosmetics industry, and additive production.

LCGC
485 Route 1 South, Bldg F, Suite 210, Iselin, NJ 08830, USA
203-523-7067
www.chromatographyonline.com
LCGC is the largest dedicated publication in North America serving the chromatography market, enhancing productivity, efficiency, and the overall value of separation science globally. With our commitment to editorial excellence, LCGC covers all key growth segments in the industry by providing unbiased peer-reviewed content, trusted troubleshooting advice, and best practice applications solutions. Laboratory based analytical chemists and influential chromatographers can improve productivity and enhance their proficiency through LCGC's oriented information giving them a competitive advantage for the real-world analysis they face. Visit us at www.chromatographyonline.com.

NANOTEMPER TECHNOLOGIES
400 Oyster Point Blvd., Suite 336, South San Francisco, CA 94080, USA
650-763-1658
www.nanotempevertech.com
NanoTemper Technologies is deeply committed to the best customer experience. Central to this is a strong focus on enabling researchers to easily, efficiently, and accurately perform protein characterization. With a broad offering of systems, software and consumables for evaluating binding affinities and protein stability, scientists in pharmaceutical, biotech or academic labs will find an optimized workflow, quality results and responsive customer support. Work with an experienced and globally operating team, and realize the NanoTemper experience.
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610-494-0447
www.novasep.com
Novasep is a leading worldwide provider of integrated manufacturing solutions for the Life Science industries. We design and supply a unique range of purification systems for batch and continuous chromatography processes for the purification of both synthetic and bio-molecules. With FDA-inspected facilities around the world and a wide range of advanced technologies, Novasep also offers innovative solutions for your pharmaceuticals and biologics production.

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44-1443 229 334 (UK) or 610-668-9090 (US)
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Purolite has almost 40 years’ experience providing over 1000 purification media solutions, with dedicated R&D and manufacturing facilities worldwide. Purolite Life Sciences provides the new Chromalite® methacrylic synthetic chromatographic resins for small and large molecule separations, and Praesto® agarose resins for MAb and recombinant protein purification. As a world leader in resin technology, Purolite has launched jetted agarose resins with exceptionally high capacity and superior pressure flow characteristics. Together with methacrylic and styrene/DVB, we can offer any hydrophilicity and porosity required for any biomolecule purification. To discover more about Purolite Life Sciences and our products, please visit us at booth 16.

SEPIATEC GMBH
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Sepiatec GmbH develops separation systems based on HPLC (High Performance Liquid Chromatography) and SFC (Supercritical Fluid Chromatography) technology, enabling our customers to speed up their separation and method development significantly. Sepiatec systems are used around the world by major pharmaceutical and biotechnology companies as well as by research institutes.

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### Key to Abstract and Poster Board Numbers

**AUTHOR INDEX**
- "L" preceding the abstract number = Lecture
- "P" preceding the abstract number = Poster

**KEY TO POSTER BOARD & ABSTRACT NUMBERS**
- First Symbol: P = Poster Presentation, L = Lecture Presentation
- Second Symbol: Day to present poster
  - M = Monday
  - T = Tuesday
- Last Symbol: Poster Presentation Number, Lecture Presentation Number

**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.
Recognition of Volunteer Support

Patricia Pereira Aguilar, BOKU, Vienna
Andreas Alberti, University of Virginia
Camille Bilodeau, Rensselaer Polytechnic Institute
João Cardoso, Yamaguchi University
Preston Fuks, University of Virginia
Lucas Kimerer, University of Virginia
Goncalo Silva, University of Beira, Portugal
Joey Roberts, University of Virginia
Nicole Ulmer, ETH Zurich
Yiran Wang, University of Virginia

PREP Symposium Conference History

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