ETH zürich

Short course on

Continuous Chromatography for Biotherapeutics

8th – 12th September 2019

Aim

The aim of this course is to provide an introduction to continuous chromatography with hands-on practice with novel capture and polishing processes for biomolecules. These processes lead to improvements in productivity and manufacturing costs and may be even enabling in difficult purification challenges, such as antibody-drug conjugates or biosimilars. Attendees will acquire the basic tools to design, run and evaluate multicolumn processes and to quantify these improvements, serving as basis for an economic evaluation. As the least complex of all multi-column processes, the workshop is focused on twin column chromatography.

Scope

- Introduction to continuous chromatography for biomolecules
- Theory of multi-column chromatography
- Design of multi-column chromatography processes
- Hands-on training on twin column equipment capture and polishing applications
- Process performance evaluation and scale-up

This workshop does not cover 4-zone SMB, chiral and small molecule separations.

Who should attend

This course is aimed at industry and academic separation scientists and bioprocess development engineers who already have some familiarity with single column chromatography and who want to broaden their understanding of chromatographic processes and look at new and more efficient ways to separate and polish biomolecules.

Format

The course takes the form of presentations and interactive workshops using laboratory-scale Contichrom CUBE Combined twin column separation & purification systems. Supervisors and graduate assistants will support the participants during the interactive workshops and data analysis sessions.

"The continuous chromatography course had an excellent balance of theoretical content and laboratory based exercises. It was great to explore the significant gains observed in productivity, buffer consumption and resin utilization over batch chromatography."

PhD. Theresa Ahern, Eli Lilly (IE)

ICB Institute for Chemical and Bioengineering

Course leaders

Massimo Morbidelli *Ph.D., Professor of Chemical Reaction and Separation Technologies in the Department of Chemistry and Applied Biosciences, ETH Zurich.*

A pioneer in preparative continuous chromatography and in particular in the application of multicolumn technologies for protein purification in the pharma industry, Prof. Morbidelli has co-authored over 500 research articles and four books. He serves as associate editor for the Industrial & Engineering Chemical Research journal of the ACS and is the recipient of the 2005 RH Wilhelm award from the AIChE and of the 2014 Gerhard Damkoehler medal of DECHEMA. He is a co-founder of ChromaCon AG in Zurich.

Thomas Müller-Späth, *Ph.D., Chief Operating Officer at ChromaCon AG in Zurich.*

After an assignment at Bayer Healthcare, Thomas completed his doctoral work on continuous chromatography of biomolecules in the group of Prof. Morbidelli, and co-founded ChromaCon AG to bring the technology to the market. He has been working on internal and external research projects with industrial partners, development of chromatography processes and equipment, and IP management. He has presented on numerous workshops and conferences on continuous chromatography and has co-authored over 20 publications and patents.

Paolo Arosio, *Ph.D., Tenure-Track Assistant Professor of Biochemical Engineering in the Department of Chemistry and Applied Biosciences, ETH Zurich.*

Paolo obtained his doctoral degree from ETH Zurich in the group of Prof. Morbidelli, working on the stability of therapeutic proteins during bioprocessing. After a postdoctoral period in protein science at the Department of Chemistry at the University of Cambridge, UK, with Prof. T.P.J. Knowles, he came back to ETH in 2016. He is recipient of the ETH medal award for outstanding Ph.D. theses, the Swiss National Science Foundation (SNSF) fellowship for Early Postdoc Mobility, and the European Marie Curie Fellowship scheme for career development. He was named as “Influential Researcher 2018” by the Ind. Eng. Chem. Res., ACS. He has co-authored over 60 publications and patents.

Supervisors and tutors

To be defined

Venue

The course will be held at ETH Zürich (ETH Hönggerberg site) at the modern and well-equipped chemistry building.

Zürich is the largest town in Switzerland and well-connected to the rest of Europe. ETH is minutes from both the main international railway station Zürich Hauptbahnhof, and Zurich International Airport.

Note: As the workshops will take place in a laboratory environment we ask that participants dress appropriately. Safety glasses and lab coats will be provided.

Course program

Sunday, September 8th

Lecture 1: General introduction

Reception and dinner

Monday, September 9th

Lecture 2: Basics of continuous chromatography

Lab workshop 1: Batch capture

Lecture 3: Insight into continuous capture processes

Evaluation workshop 1: Batch capture

Lab workshop 2: Continuous Capture

Tuesday, September 10th

Lecture 4: Performance evaluation of continuous chromatography

Evaluation workshop 2: Continuous Capture

Lab workshop 3: Gradient Batch

Presentation of BT, Batch and CSMB results by groups

Lecture 5: Continuous polishing of biomolecules

Lab workshop 4: MCSGP

Evening program

Wednesday, September 11th

Lecture 6: Integrated continuous chromatography

Simulation Workshop: Process simulation

Evaluation Workshop 3 and 4: Polishing

Presentation of polishing results by groups

Lecture 7: Modelling and simulations

Lecture 8: Flow-Through Polishing

Thursday, September 12th - until 2 pm

Lecture 9: N-Rich process for impurity isolation

Lecture 10: Scale-up of continuous chromatography

Lecture 11: Course wrap up

This program might be subject to minor changes.

Course fees
The course fee is CHF 4'000 (CHF 2'500 for students). This includes lecture summaries in paper and electronic formats, materials used during the workshop, internet access (wifi), lunch and coffee breaks as well as two dinners. It does not include accommodation, travel costs or catering other than indicated above.

Terms of condition
Confirmation: A confirmation of participation will be provided to each participant after completing the course.
Number of participants: A minimum of 8 and a maximum of 12 participants will be accepted in the course.
Cancellation policy: Cancellation of registration must be submitted in writing or via email and is valid only with acknowledgement of receipt by the course officer.
Cancellations made after 1st Aug 2019 will be subject to a 50% cancellation fee.
Cancellations made after 15th August 2019 will be subject to the total fee. A colleague or associate may be substituted without penalty. Full refunds will be made in the case that the course is cancelled due to insufficient enrolment.

Accommodation
Travel and accommodation are not included in the course fee; however we have sourced a special accommodation rate at the following 3* town hotels:

Hotel Leoneck (www.leoneck.ch)
Single room @ CHF 165, double room @ CHF 205
Booking code: **"ETH CCB"**

Hotel Coronado (www.welcomehotels.ch/de/coronado/)
Single room @ CHF 152, double room @ CHF 187
Booking code: **"ETHZRH"**

All prices indicated are per night and breakfast included. To benefit from a special discount, use the codes indicated above (offer valid until July 31st, 2019).

"Great to learn all the potential and application of the different ways of using continuous chromatography and learn that this is not just a smart way of working in research, but that it can be implemented in large scale production."

PhD. Mercedes Ferreras, Novo Nordisk (DK)

Disclaiming statements
ETH and the course organisers will not assume responsibility for medical expenses of participants or damage caused by participants.
All participants are urged to ensure that they are covered by their own travel, health and liability insurance policies while traveling to and from and while attending the course.
ETH and the course organisers are not responsible for private possessions lost or stolen at a course.

Registration
Please use the following link for registration:
https://www.ethz.ch/content/associates/continuing-education/de/programme-und-kurse/suche-angebote.html?polycourseId=1636

Registration is only complete after payment.

Registration is binding unless the minimum of participants cannot be reached.

Only participants with industry and academic affiliation can be accepted, no vendors.

Registration deadline is May 31th, 2019.

To register past the deadline, please write to the course officer at ccb@chem.ethz.ch to check if places are still available.

Sponsors

ChromaCon

MERCK

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