

ETH

Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

ICB

Institute for Chemical
and Bioengineering



Workshop on

CONTINUOUS CHROMATOGRAPHY FOR BIOTHERAPEUTICS

4th – 9th September 2016

Swiss Federal Institute of Technology ETH, Zürich, Switzerland

Course Director: Prof. Massimo Morbidelli

Sponsors:



Short course in CONTINUOUS CHROMATOGRAPHY FOR BIOTHERAPEUTICS

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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

This workshop does not cover 4-zone SMB, chiral and small molecule separations; please contact us if you are interested in future workshops in this area.

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.

The participant list is restricted to 16 participants to ensure small participant/tutor and participant/equipment ratios.

FORMAT

The course will be led by Professor Massimo Morbidelli. It takes the form of presentations and interactive workshops using novel laboratory-scale Contichrom CUBE twin column separation & purification systems. Supervisors and graduate assistants will support the participants during the interactive workshops and data analysis sessions. Participants will receive a confirmation of participation at the end of the course.

VENUE

The course will be held at ETH Zürich, (ETH Hönggerberg site). Located on the edge of picturesque Lake Zurich and bordered by the majestic Swiss alps, Zürich is the largest town in Switzerland. 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.



Massimo Morbidelli Ph.D., Professor of Chemical Reaction Engineering at the Institute for Chemical and Bioengineering, ETH Zurich. A pioneer in preparative chromatography and an evangelist for SMB technology as a purification process for the pharma industry, Prof. Morbidelli has co-authored over 300 publications. He serves on the Editorial Board of the Cambridge University Press Series in Chemical Engineering and on the Scientific Advisory Board of the Max-Planck Institute for Dynamics and Complex Technical Systems (Germany).

COURSE PROGRAM

Sunday, September 4th

- 17:30-19:00 **Presentation: General Introduction (Prof M. Morbidelli)**
General Introduction to Chromatography for biomolecules
- 19:00-21:00 **Reception**

Monday, September 5th

- 08:30-10:30 **Presentations: Basics of continuous chromatography**
Introduction to continuous chromatography concepts with respect to purification of biopharmaceuticals
- Introduction to CaptureSMB process
 - Brief introduction to the twin-column equipment
- 10:30-12:00 **Lab workshop: Introduction to the twin-column equipment**
- Hardware and software overview
 - Programming and running a breakthrough curve
 - Analysis of the breakthrough curve
 - Design of CaptureSMB process
 - Optional: CaptureSMB with membrane adsorbers
- 12:00-13:00 **Lunch**
- 13:00-17:00 **Interactive lab demo: Continuous chromatography workshop**
- Performing a batch reference run
 - Running and sampling CaptureSMB including control
 - Optional: CaptureSMB with membrane adsorbers
 - Evaluation of the recorded data

Tuesday, September 6th

- 08:30-10:00 **Presentations: Performance evaluation of continuous chromatography**
- Performance parameters, calculations, paretos
 - Optimizing the performance
- 10:00-11:00 **Workshop: CaptureSMB evaluation**
- Using data from previous day
- 11:00-12:00 **Interactive lab demo: Continuous chromatography workshop (MCSGP process)**
- Running a batch design gradient
- 12:00-13:00 **Lunch**

Tuesday, September 6th (continued)

- 13:00-17:00 **Interactive lab demo: Continuous chromatography workshop (MCSGP)**
Design of MCSGP, performing a MCSGP process run

Wednesday, September 7th

- 08:30-10:00 **Presentation: Integrated continuous chromatography**
- Introduction and concepts
- 10:00-11:00 **Presentation: MCSGP evaluation**
- Using data from previous day
- 11:00-12:00 **Interactive lab demo: Continuous chromatography workshop (N-Rich process)**
- 12:00-13:00 **Lunch**
- 13:00-17:00 **Interactive lab demo: Continuous chromatography workshop**
- Design of N-Rich, performing an N-Rich process run

Thursday, September 8th

- 08:30-10:00 **Presentation: Scale-up of continuous chromatography**
- Introduction and concepts
- 10:00-11:00 **Presentation: N-Rich evaluation**
- Using data from previous day
- 11:00-12:00 **Presentation: Workshop wrap up**
- 12:00-13:00 **Lunch**

For further information about the course program contact: Prof. Massimo Morbidelli, Dept of Chemical and Bioengineering, ETH Zurich, Vladimir-Prelog-Weg 1, 8093 Zurich, massimo.morbidelli@chem.ethz.ch

Registration and fees: The course fee is CHF 4,000. This includes lecture summaries in paper and electronic formats, materials used during the workshop and lunch. It does not include accommodation or travel costs. If you need hotel suggestions please contact the organizers.

Confirmation: A confirmation of participation will be provided to each participant after completing the course.

Cancellation policy: Cancellations must be made in writing. Cancellations made after 15th Aug 2016 will be subject to a 50% cancellation fee. Cancellations made after the 31st August 2016 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.

Registration form: Continuous Chromatography for Biotherapeutics, 4th – 9th September 2016, Swiss Federal Institute of Technology ETH, Zürich, Switzerland: Please e-mail your completed form by 30th April 2015 to christine.missak@chem.ethz.ch to register and receive payment details.

Name: Dr. , Mr. , Ms. _____

Company: _____

Address: _____

City / State / Postcode _____

Telephone: (____) _____ Email _____

Payment: CHF4,000 excluding transport and accommodation.

Payment instructions will be provided after receipt of the completed registration form.

REGISTRATION IS ONLY COMPLETE AFTER PAYMENT