

2nd International EUROMBR Training Course Innovative microbioreactor applications in bioprocess development

We cordially invite you to the 2nd International EUROMBR Training Course – Innovative microbioreactor applications in bioprocess development held on September 09 to 13, 2019 at the Center of Pharmaceutical Engineering, Technische Universität Braunschweig, Germany.

The participants will learn about the main aspects of microbioprocess engineering and microfabrication technology and how these subjects enable microbioreactor (MBR) systems to generate reliable, reproducible and experimental data online over a long period of time.

The 2nd International EUROMBR Training Course originates from the Marie Curie Initial Training Network EUROMBR anchored in the FP7 of the European Union. Within this network, application oriented professionals from nine countries have been working together for the education, development and application of the explorative MBR technology to sustain the future progress of bio-based processes.

The EUROMBR consortium would like to make its expertise accessible to all prospective scientists who want to gain a deeper understanding of MBR technology. The 5 day workshop includes lectures and laboratory hands-on in the specific application fields of **microfabrication, sensors and inline-analytics, enzyme immobilisation/ biocatalysis/ cultivation, and computational fluid dynamics (CFD)**. The training course focuses on basic examples of key problems. Based on example data sets, the following topics will be introduced:

- Micro-/nanofluidics
- Nano and micromaterials
- Microfabrication
- Sensors and inline-analytics
- Biocatalysis
- Enzyme immobilisation
- Whole cell cultivation
- Medical applications
- Design, modelling, and simulation of microfluidic processes

There are two options for choosing a course:

	Content
Course 1	Whole lecture program Microfabrication (Lab hands-on I) Enzyme immobilisation and biocatalysis (Lab hands-on II) Computational Fluid Dynamics (Lab hands-on III)
Course 2	Whole lecture program Computational Fluid Dynamics (Lab hands-on III) Sensors and Inline-Analytics (Lab hands-on IV) Whole cell cultivation (Lab hands-on V)

Please choose **Course 1** or **Course 2** at the registration.

Special events of the EUROMBR Training Course

Monday, September 09, 2019

05:30 pm Get together

All participants (students, PhD, Profs *et al.*) of the training course are asked to bring a specialty drink or piece of dessert from their country, region or town. Each participant will be asked to briefly introduce the specialty they have brought along. This event starts the social programme.

Tuesday, September 10, 2019

05:15 pm Poster presentation and discussion

The participants will get the opportunity to present and discuss their work intensively in a 5 min presentation and in a poster discussion with the leading scientists.

Thursday, September 12, 2019

03:00 pm Social event

- City tour, meeting point Domplatz/Okercabana
- Joint barbecuing
- Award for the best poster presentation

Certificate of participation

For students the training course is equivalent to 3 ECTS-credits. The certificate of participation contains the contents of the course and the title of the poster presentation.

Accommodation

Accommodation (four-bed room) is provided for PhD and master students. Accommodation from Sunday to Friday, 8 – 13 September, 2019 (5 nights) with breakfast at

Youth hostel Braunschweig, Wendenstraße 30, 38100 Braunschweig (<https://www.jugendherberge.de/en/youth-hostels/braunschweig-727/portrait/>). The DJH is about 15 minutes walk from the Pharmaceutical Engineering Center (PVZ).

Organisation

Zentrum für Pharmaverfahrenstechnik (PVZ)

Franz-Liszt-Straße 35a, 38106 Braunschweig

Phone: 0531/391-55311

Prof. Dr. Rainer Krull (r.krull@tu-braunschweig.de)

Assoc. Prof. Torsten Mayr, Institute of Analytical Chemistry and Food Chemistry, Graz University of Technology

Dr. Gerlinde Benninger (pvz@tu-braunschweig.de)

Registration

The registration fee covers admission to the course, abstract book, welcome reception, coffee breaks and lunch, social event, and accommodation (five nights) in shared four-bed rooms in the local youth hostel.

Academia:

550 € (+ 19% VAT) including accommodation

250 € (+ 19% VAT) without accommodation

Industry:

450 € (+ 19% VAT) (without accommodation).

Registration: pvz@tu-braunschweig.de

Arriving

via *Hanover*: Airport Hanover

with line S5 to Hannover main station (HBF) (20 min), transfer at HBF Hannover to HBF Braunschweig (40 min).

via *Berlin*: HBF Berlin to HBF Braunschweig (90 min).

2nd International

EUROMBR Training Course



Applications of microbioreactors in
bioprocess development



Center of Pharmaceutical Engineering
Technische Universität Braunschweig
September 09 to 13, 2019



In cooperation with



<http://analytchem.tugraz.at/eurombr>

2nd International EUROMBR Training Course
Innovative microbioreactor applications in
bioprocess development

Monday, September 09, 2019

- 09:00 am Registration**
 Location: PVZ, Franz-Liszt-Str. 35a, 38106 Braunschweig
Center of Pharmaceutical Engineering (PVZ)
- 09:15 am Welcome addresses and organization of the Training Course**
R. Krull, ibvt, TU Braunschweig, Germany, T. Mayr, TU Graz, Austria
- 09:30 am Lecture 1: Introduction to innovative microbioreactor application in bioprocesses**
P. Žnidaršič Plazl, University of Ljubljana, Slovenia
- 10:20 am Lecture 2: Introduction to micro-nanofluidics**
A. Dietzel, IMT, TU Braunschweig, Germany
- 11:10 am Lecture 3: Nano and micromaterials for microbioreactors**
J. F. Fernández Sánchez, University of Granada, Granada, Spain
- 12:00 am Lunch (Mensa Beethovenstr.)**
- 01:30 pm Lecture 4: Microfabrication**
M. Leester-Schädel, IMT, TU Braunschweig, Germany
- 02:20 pm Lecture 5: Biocatalysis in flow: Challenges and opportunities**
M. Marques, University College London, United Kingdom
- 03:10 pm Coffee break**
- 03:30 pm Lecture 6: Immobilized enzymes as heterogeneous biocatalysts: Application in microreactors**
J. Bolivar, TU Graz, Austria
- 04:20 pm Lecture 7: An appetizer for CFD in Chemical and Biochemical Engineering**
U. Krühne, DTU, Lungby, Denmark
- 05:10 pm Get together**
 Organization of lab groups
 Mixer event (PVZ) and social programme

Tuesday, September 10, 2019

- Location: PVZ, seminar room/lab
- 09:00 am Introduction Lab III: Computational Fluid Dynamics**
U. Krühne, DTU, Denmark
- 09:30 am Lab I and Lab II** **Lab III**
 Location: PVZ lab Gauß-IT-Zentrum

Course 1: Introduction
Lab I: Microfabrication
A. Dietzel, I. Constantinou, IMT, TU Braunschweig, Germany

Course 2: CFD

- 09:45 am Course 1: Introduction** **Course 2: CFD**
Lab II: Enzyme immobilisation and biocatalysis
J. Bolivar, TU Graz, Austria, M. Marques, University College London, United Kingdom
- 10:00 am Course 1-A: Microfabrication**
Course 1-B: Enzyme immobilisation and biocatalysis

- 01:00 pm Lunch (Mensa Beethovenstr.)**
- 02:30 pm Lab I and Lab II** **Lab III**
 Location: PVZ lab Gauß-IT-Zentrum
- Course 1-A: Enzyme immobilisation and biocatalysis** **Course 2 (continuation): CFD**
Course 1-B: Microfabrication
- 05:00 pm End of Lab hands-on and Coffee break**
- 05:15 pm Poster presentation and discussion**
(participants and leading scientists), PVZ, Foyer

Wednesday, September 11, 2019

- Location: PVZ, seminar room/lab
- 09:00 am Lecture 8: Modelling-based design of bioprocesses at the micro scale**
I. Plazl, University of Ljubljana, Slovenia
- 09:50 am Lecture 9: Sensors and inline-analytics**
A. Sesay, n.n.
- 10:40 am Coffee break**
- 11:00 am Lecture 10: Microfluidic single-cell cultivation: Introduction and application**
A. Grünberger, Bielefeld University, Germany
- 11:50 am Lecture 11: Whole cell cultivation in microbioreactors**
R. Krull, ibvt, TU Braunschweig, Germany
- 12:40 pm Lunch (Mensa Beethovenstr.)**
- 02:00 pm Introduction Lab IV and Lab V** **Lab III**
 Location: PVZ lab Gauß-IT-Zentrum

- Course 2: Introduction** **Course 1: CFD**
Lab IV: Sensors and Inline-Analytics
T. Mayr, TU Graz, Austria
- 02:15 pm Course 2: Introduction**
Lab V Whole cell cultivation, A. Grünberger,
Bielefeld University, R. Krull, ibvt, TU Braunschweig, Germany

- 02:30 pm Course 2-A: Sensors and Inline-Analytics** **Course 1: CFD**
Course 2-B: Whole cell cultivation
- 05:30 pm End of Lab hands-on**

Thursday, September 12, 2019

- 09:00 am Lab IV and V** **Lab III**
 Location: PVZ lab Gauß-IT-Zentrum
- Course 2-A: Whole cell cultivation** **Course 1 (continuation): CFD**
Course 2-B: Sensors and Inline-Analytics
- 12:00 am End of Lab hands-on**
- 12:30 pm Lunch (Mensa Beethovenstr.)**
- 03:00 pm Social event (all)**
 City tour, meeting point Domplatz/Okercabana
 Joint barbecuing
 Award for the best poster presentation

Friday, September 13, 2019

- Location: PVZ, seminar room
- 09:00 am Lecture 12: Microfluidic systems for cell culture and biological applications**
J. Bahnmann, TCI, LU Hanover, Germany
- 09:50 pm Lecture 13: Microfluidic platforms for cell imaging and cell sorting**
I. Constantinou, IMT, TU Braunschweig, Germany
- 10:40 am Coffee break**
- 11:00 pm Lecture 14: New electrokinetic analytical methods for whole-cell biocatalyst studies**
M. Viefhues, Bielefeld University, Germany
- 11:50 am Lecture 15: Cell handling and analysis in microfluidic devices for bio-medical applications**
G. Perozziello, University of Magna Graecia of Cantazarro, Cantazarro, Italy
- 12:40 pm Lecture 16: Microfluidics for cell therapies and beyond**
N. Szita, University College London, United Kingdom
- 01:30 am Concluding remarks**
R. Krull, ibvt, TU Braunschweig, Germany, T. Mayr, TU Graz, Austria
- 01:35 pm Snack**
- 02:00 pm End of the workshop**