BioProScale e.V.
Institut für Biotechnologie
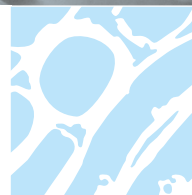Technische Universität Berlin
Bioverfahrenstechnik

Bio-PAT

IfGB
Institut für
Gärungsgewerbe
und Biotechnologie
zu Berlin

7th BioProScale Symposium

Scaling Up and Down of Bioprocesses: Technological Innovation and Cell Physiology Insights

28 TO 31 MARCH 2022
LANGENBECK-VIRCHOW-HAUS, BERLIN, GERMANY

ONLINE OPTION

In-person event with online access to the presentation sessions

Part 1: Industrial Scale – Scaling up and down – PAT
(28-29 March 2022, Mon/Tue)

Part 2: High Throughput Bioprocess Development – Advances in Software, Hardware, and Integration
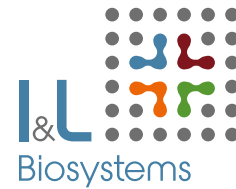(30-31 March 2022, Wed/Thu)

Online access: vlb-berlin.6connex.eu/event/virtual-conference/login

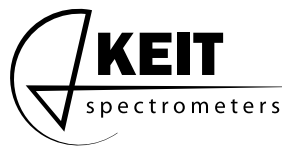VENUE: LANGENBECK-VIRCHOW-HAUS, BERLIN, GERMANY   LANGUAGE: ENGLISH

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MONDAY, 28 MARCH 2022

INDUSTRIAL SCALE – SCALING UP AND DOWN – PAT (PART 1)

WELCOME & PLENARY TALK

12:00 **Welcome address and introduction**
Peter Neubauer, TU Berlin, Germany

12:20 **Plenary Talk: Large scale production of mRNA vaccines (PL01)**
Steffen Panzner, BioNTech Delivery Technologies, Germany[1]

SESSION 1: SCALE UP AND SCALE DOWN OF BIOPROCESSES

Chair   Cees Haringa / Simon Täuber

13:05 **Dedicated single-use bioreactor designs, making cellular agriculture feasible (L01)**
Nico Oosterhuis, The Netherlands

13:30 **Assessment of Lagrangian sensor particle designs in a transparent 15,000 L acrylic glass bioreactor (L02)**
Sebastian Hofmann, Hamburg University of Technology, Germany

13:55 **CFD supported scale-up in biopharma – an overview with focus on hydrodynamic stress (L03)**
Maike Kuschel, Boehringer Ingelheim Pharma GmbH & Co.KG, Germany

14:20 *Coffe break & exhibition*

SESSION 2: BIOPROCESSES FOR A CIRCULAR ECONOMY

Chair   Krist V. Gernaey / Sebastian Riedel

14:50 **High yield bioconversion of animal by-product streams to polyhydroxyalkanoates (L04)**
Björn Gutschmann, TU Berlin, Germany

15:15 **Continuous bio-succinic acid production from alternative feedstock (L05)**
Pascal Leonov, Technical University of Denmark, Denmark

15:40 **Combining in-line FTIR spectroscopy with MIMO control and feedback linearization for a continuous *C. glutamicum* bioprocess fed with lignocellulosic waste streams (L06)**
Daniel Waldschitz, TU Wien, Austria

16:05 **Improving biochemical hydrolysis by bioaugmentation in plug-flow based reactors (L07)**
Theresa Menzel, TU Berlin, Germany

EXHIBITOR SHORT PRESENTATIONS

16:30 **Exhibitor short presentations**
Thomas Skov, SANI Membranes A/S, Denmark / Richard Salliss, Keit Spectrometers Ltd, United Kingdom / Julius Muno, aquila biolabs GmbH, Germany / Anika Bockisch, Bio-PAT e.V., Germany

16:50 *Coffee break & exhibition*

SESSION 3: BIOPROCESSES FOR A CIRCULAR ECONOMY

Chair   Howard Ramirez-Malule / Tolue Kheirkhah

17:20 **Production of methane and carboxylic acids from organic residues (L08)**
Ilmari Laaksonen, Natural Resources Institute Finland, Finland

17:40 **Production of biotechnological fish feed by microalgae and oleaginous yeast (L09)**
Stefan Junne, TU Berlin, Germany

PLENARY TALK

18:00 **Plenary Talk: Fungal biotechnology as innovation driver for a circular economy (PL02)**
Vera Meyer, TU Berlin, Germany

EVENING PROGRAMME

18:45 **Poster session, exhibition, get-together**
Langenbeck-Virchow-Haus

21:00 End of day 1

All times Central European Time (CET/MEZ)

TUESDAY, 29 MARCH 2023

INDUSTRIAL SCALE – SCALING UP AND DOWN – PAT   (PART 2)

WELCOME & PLENARY TALK

9:00 **Welcome & introduction**
Peter Neubauer, TU Berlin, Germany

9:05 **Plenary Talk: An industrial perspective on the gas-liquid flow of stirred multistage bioreactors: challenge and a novel scaling approach (PL03)**
Sören Bernauer, BASF Ludwigshafen, Germany

SESSION 4: SCALE UP AND SCALE DOWN OF BIOPROCESSES

Chair   Ralf Takors / Stefan Junne

9:50 **CFD-kinetic modelling for the scale-up of *P. putida* fed-batch fermentations (L10)**
Maryam Jamshidzadeh, Technical University of Denmark, Denmark

10:15 **Impact of local solid concentration on anaerobic digester hydrodynamics at industrial scale: a CFD study (L11)**
Liliane Megue Kamkeng, Université de Lorraine/Air Liquide, France

10:40 **Scale-down of high cell density Fab production in *E. coli* (L12)**
Florian Mayer, University of Natural Resources and Life Sciences, Vienna, Austria

11:05 *Coffee break & exhibition*

SESSION 5: SCALE UP AND SCALE DOWN OF BIOPROCESSES

Chair   Stuart Stocks / Eike Janesch

11:35 **Development of a single multi-compartment bioreactor (SMCB) for CHO scale-down studies in heterogeneous cultivation environments (L13)**
Lena Gaugler, University of Stuttgart, Germany

12:00 **Suitability of various scale-down bioreactor designs at the example of the oleaginous yeast *Yarrowia lipolytica* (L14)**
Jasmina Cziommer, TU Berlin, Germany

12:25 **Syngas fermentation: a scale-down approach to simulate large-scale gradients at lab-scale (L15)**
Lars Puiman, TU Delft, The Netherlands

12:50 **Optimization and scale-up of itaconic acid production on complex substrates (L16)**
Paul-Joachim Niehoff, RWTH Aachen, Germany

13:15 *Lunch break & exhibition*

SESSION 6: PROCESS ANALYTICAL TECHNOLOGIES

Chair   Holger Müller / Annina Kemmer

14:45 **Enabling continuous co-culture bioprocesses (C3BIO) based on oscillating environmental conditions promoting genetic and/or metabolic requirements of individual species (L17)**
Vincent Vandenbroucke, Université de Liège, Belgium

15:10 **Dead or alive: a novel PAT tool for the extremophile *Sulfolobus acidocaldarius* (L18)**
Kerstin Rastädter, TU Wien, Austria

15:35 **Population heterogeneity in *E. coli* chemostat cultivation: An investigation of alternating gene expression levels between observed phenotypes (L19)**
Julian Kopp, TU Wien, Austria

16:00 **Heavyweight data: Microscale material balancing in microfluidics (L20)**
Katharina Smaluch, UFZ Leipzig, Germany

16:25 *Coffee break & exhibition*

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SESSION 7: PROCESS ANALYTICAL TECHNOLOGIES

Chair   Anika Bockisch / Carmen Walczak***

16:55   **On-line monitoring of key metabolites in _E. coli_ fermentations by near-infrared (NIR) spectroscopy (L21)**

Jakob Forsberg, University of Copenhagen, Denmark

17:20   **Real-time inline monitoring of _Trichoderma reesei_ cultivation in industrial environment and prediction of protein folding by time-gated Raman spectroscopy (L22)**

Martin Kögler, VTT Technical Research Centre of Finland, Finland

PLENARY TALK

17:45   **Plenary Talk: Engineering, processing and application of recombinant spider silk proteins – from lab to market (PL04)**

Thomas Scheibel, University of Bayreuth, Germany

EVENING PROGRAMME

19:30   **Conference Dinner**

Lindenbräu im Sony-Center am Potsdamer Platz, Bellevuestr. 3-5, 10785 Berlin, www.bier-genuss.berlin

Access mit Dinner Voucher only!

23:00   *End of day 2*

WEDNESDAY, 30 MARCH 2022

HIGH THROUGHPUT BIOPROCESS DEVELOPMENT – ADVANCES IN SOFTWARE, HARDWARE, AND INTEGRATION (PART 1)

WELCOME & PLENARY TALK

9:00   **Welcome & introduction**

Peter Neubauer, TU Berlin, Germany

9:05   **Plenary Talk: Smart tools for high cell density perfusion process producing monoclonal antibodies (PL05)**

Veronique Chotteau, Royal Institute of Technology, Sweden

SESSION 8: BIOPROCESS DEVELOPMENT

Chair   Robert Spann*** / Sarah Westarp

9:50   **Application of a microfluidic single-cell cultivation platform for mammalian suspension cell lines in bioprocess research and development (L23)**

Julian Schmitz, Bielefeld University, Germany

10:15   **Raining fresh red blood cells: scale-up of ex vivo erythroblast expansion for transfusion purposes (L24)**

Sebastian Aljoscha Wahl, Friedrich-Alexander Universität Erlangen-Nürnberg, Germany

EXHIBITOR SHORT PRESENTATIONS

10:40   **Exhibitor short presentations**

Nico Oosterhuis, Celltainer Biotech BV, Netherlands / Mirko Fraulob, INFORS HT, Germany / Simon Lucht, I&L Biosystems GmbH, Germany / Anja Dürasch, KNAUER Wissenschaftliche Geräte GmbH, Germany / Jochen Uhlenküken, Hamilton Bonaduz AG, Germany

11:00   *Coffee break & exhibition*

SESSION 9: BIOPROCESS DEVELOPMENT

Chair   Marco Oldiges / Niels Krausch

11:30   **Development of a bioprocess for heterologous hydrogenase production in _E. coli_ (L25)**

Matthias Gimpel, TU Berlin, Germany

11:55   **Development of a scalable production for recombinant horseradish peroxidase (L26)**

Julian Ebner, TU Wien, Austria

12:20   **Innovative bioprocess strategies combining physiological control and strain engineering of _Pichia pastoris_ to improve recombinant protein production (L27)**

Xavier, Garcia-Ortega, Universitat de Vic, Universitat Central de Catalunya, Spain

12:45	**Insights into the physiology of *Streptomyces clavuligerus* by constraint-based models for the enhancement of clavulanic acid (L28)** *David Gómez-Rios, Howard Ramirez-Malule, Universidad del Valle, Colombia*
13:10	*Lunch break & exhibition*

SESSION 10: HIGH-THROUGHPUT BIOPROCESSING AND AUTOMATION

Chair	Klaus Pellicier Alboch / Katja Winkler
14:40	**Analytical imaging: non-invasive, high-throughput, multiplexed, and automatable (L29)** *Marieke Klijn, TU Delft, The Netherlands*
15:05	**Development of a filamentous defined co-culture process with high-throughput online-monitoring (L30)** *Maurice Finger, RWTH Aachen, Germany*
15:30	**Online 2D-fluorescence monitoring in microtiter plates using a fully tunable monochromator-based spectroscopical setup (L31)** *Christoph Berg, RWTH Aachen, Germany*
15:55	**Mulit-vendor test automation to support process automation (L32)** *Jan Dahinden, Sebastian Gross, wega Informatik, Germany / Switzerland*
16:20	*Coffee break & exhibition*

SESSION 11: HIGH-THROUGHPUT BIOPROCESSING AND AUTOMATION

Chair	Mario Birkholz / Lukas Kasparsetz
16:50	**Acetoin detection in alcoholic beverages and fermentation broth with a capacitive enzyme biosensor (L33)** *Melanie Welden, FH Aachen, Germany*
17:15	**Development of a multi-parameter biosensor for bioprocess monitoring based on a flow system (L34)** *Aliyeh Hasanzadeh, Technical University of Denmark, Denmark*

PLENARY TALK

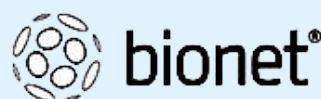|	
17:40	**Plenary Talk: Bioprocess modelling: Have we moved forward sufficiently (PL06)** *Jarka Glassey, Newcastle University, Great Britain*

EVENING PROGRAMME

18:25	**Poster session, exhibition & get-together**
21:00	*End of day 3*

**Best Presentation Award
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bioengineering

**Best Poster Award
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THURSDAY, 31 MARCH 2022

HIGH THROUGHPUT BIOPROCESS DEVELOPMENT – ADVANCES IN SOFTWARE, HARDWARE, AND INTEGRATION (PART 2)

WELCOME & PLENARY TALK

9:00 **Welcome & introduction**
Peter Neubauer, TU Berlin, Germany

9:05 **Plenary Talk: The automation of science (PL07)**
Ross King, Chalmers University of Technology, Sweden

SESSION 12: HIGH-THROUGHPUT BIOPROCESSING AND AUTOMATION

Chair Nico Oosterhuis / Marie-Therese Schermeyer

9:50 **Fast production of complex proteins (L35)**
Vicky Goralczyk, FyoniBio, Germany

10:15 **Eliminating gas-liquid mass transfer limitations in shake flasks by a new reactor design based on perforated ring walls (L36)**
Sven Hansen, Evonik Operations GmbH, Germany

10:40 *Coffee break & exhibition*

SESSION 13: MODELING BIOPROCESSES

Chair Nikolas Cruz Bournazou*** / Judith Aizpuru

11:10 **Accelerated microbial phenotyping: How process modelling and a decision policy can enhance high-throughput screening of PETase-secreting *Corynebacterium glutamicum* variants   (L37)**
Laura Marie Helleckes, Forschungszentrum Jülich, Germany

11:35 **Hybrid modelling coupled with Raman spectroscopy for enhanced bioprocess understanding via particle filtering (L38)**
Joao Alcantara, Politecnico di Milano, Italy

12:00 **Model-based optimal control of parallel mini-bioreactors (L39)**
Niels Krausch, TU Berlin, Germany

12:25 **Machine learning meets scientific understanding: New approaches for holistic process models (L40)**
Jens Smiatek, Boehringer Ingelheim Pharma GmbH & Ko.KG, Germany

12:50 *Lunch break & exhibition*

SESSION 14: MODELING BIOPROCESSES

Chair Sören Bernauer / Stefan Born

14:20 **Stochastic parcel tracking in an Euler-Lagrange compartment model for fast simulation of fermentation processes (L41)**
Cees Haringa, TU Delft, The Netherlands

14:45 **CFD based particle-tracking tools for quantifying large-scale bioreactor performance (L42)**
Dale McClure, Brunel University London, Great Britain

PLENARY TALK

15:10 **Plenary Talk: Towards automating active learning in collaborative bioprocess development (PL08)**
Ernesto Martinez, National Research Council of Argentina & KIWI Biolab, Germany

15:55 **Closing Remarks**
Peter Neubauer, TU Berlin, Germany

16:10 *End of conference*

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SCIENTIFIC POSTERS

P01: Phosphate assimilation in co-culture of *Acinetobacter tjernbergiae* and *Pseudomonas stutzeri*
Simon Täuber et al., TU Berlin, Germany

P02: Utilizing straw-derived hemicellulosic hydrolysates for feed manufacturing with *Chlorella vulgaris* – a new waste to value approach
Ricarda Kriechbaum et al., TU Vienna, Austria

P03: PHA bioplastic with tunable monomer content by flexible substrate mixtures
Lara Santolin, Isabel Thiele et al., TU Berlin, Germany

P04: Novel methanol-free expression system PDH: a potential alternative to classical *P. pastoris* promoters for recombinant protein production
Núria Bernat-Camps et al., Universitat Barcelona, Spain

P05: Influence of oxygen levels on a genome reduced *Pseudomonas putida* strain
Jesper W. Jensen et al., Technical University of Denmark

P06: *withdrawn*

P07: Parallel scale-down tool to accelerate fermenterphile selection
Jonas Bafna-Rührer et al., Technical University of Denmark

P08: Controlling *Aspergillus niger* morphology in a rocking motion bioreactor
Tolue Kheirkhah et al., TU Berlin, Germany

P09: Progress in characterisation of liquid flow in oscillatory rocked disposable bioreactors: experimental procedures and empirical models for mixing time evaluation
Mateusz Bartczak et al., Warsaw University of Technology, Poland

P10: Dynamically adjusting extracellular environmental conditions leads to robust oscillations in gene expression: toward a generalizable cell population control strategy
Lucas Henrion et al. University of Liège, Gembloux, Belgium

P11: Small scale mechanical cell disruption: A workflow to screen for ideal disruption conditions for recombinantly produced proteins in *E. coli*
Stefan Kittler et al., TU Vienna, Austria

P12: Bioprocess development for the heterologous production of a hyperthermostable 5'-methylthioadenosine phosphorylase in *E. coli*
Julia Schollmeyer et al., TU Berlin, Germany

P13: Thermostable adenosine 5'-monophosphate phosphorylase from *Thermococcus kodakarensis* forms catalytically active inclusion bodies
Sarah Kamel et al., TU Berlin, Germany

P14: XenoGlue – Scale up of a recombinant mussel protein analog as photoactivatable bioglue
Christian Schipp et al., TU Berlin, Germany

P15: Model-based rational design for aerobic industrial fermentation: *P. chrysogenum* and *S. cerevisiae* as model organisms
Wenjun Tang et al., Delft University of Technology, The Netherlands

P16: Across scales: An integrated robotic cultivation platform for accelerated bioprocess development
Lucas Kaspersetz et al., TU Berlin, Germany

P17: Analyzing growth kinetics of cyanobacterial photo-biocatalysts in microfluidic droplets
Paul Böhme et al., Helmholtz-Zentrum für Umweltforschung, Germany

P18: Beyond the average – quantifying the specific reactivity of single cells
Martin Schirmer et al., Helmholtz Centre for Environmental Research

P19: Electroporation of PUFA-producing Dinoflagellate
Stephan Hartmann et al., TU Berlin, Germany

P20: A semi-automated luciferase-based substrate screening assay for nucleoside kinases
Katja F. Winkler et al., TU Berlin, Germany

P21: Automated cell line characterization in shake flasks for multiple organisms
Rüdiger W. Maschke et al., Zurich University of Applied Sciences, Switzerland

P22: Focal molography a new real-time PAT solution for bioprocess
Volker Gatterdam, lino Biotech AG, Germany

P23: PAT for the automation of a recombinant antimicrobial peptide production process
Lisa Michel et al., University of Applied Sciences Hamburg

P24: Kuhner TOM for off-gas analysis in shake flasks
Juan Camillo Porras Correa, Kuhner Shaker GmbH, Germany

P25: Application of a novel high resolution volumetric gas measurement system for the determination of the biochemical methane potential
Marius Conrady et al., Humboldt Universität Berlin, Germany

P26: Flexibilization of two-phase digestion through monitoring of dissolved hydrogen
Eike Janesch et al., TU Berlin, Germany

P27: Raman spectroscopy as an analytic tool in upstream bio-processing
Christoph Lange et al., TU Berlin, Germany

P28: Monitoring of fermentation processes by gas chromatography-ion mobility spectrometry (GC-IMS) and machine learning
Joscha Christmann et al., Mannheim University of Applied Sciences, Germany

P29: Xcom, a multi-objective function for the metabolic modeling of microbial consortia
Xavier Marbehan et al., Laboratoire Réactions et Génie des Procédés, Vandoeuvre Cedex, France

P30: Model based real-time estimation of maximum substrate uptake capacity in microbial fermentation
Don Fabian Müller et al., TU Wien, Austria

P31: Modeling enzymatic glucose release to facilitate continuous feeding in miniaturized fermentations
Annina Kemmer et al., TU Berlin, Germany

P32: Modeling *Saccharomyces cerevisiae* central carbon metabolism at steady state and under glucose perturbations, *David Lao-Martil et al., Eindhoven University of Technology, The Netherlands*

P33: Reconstruction of a genome-scale model of *Cupriavidus* necator for PHA production
Martha Ascencio-Galvan et al., Universidad Valle, Colombia

P34: Computer simulation of the glycosylation of proteins in the Golgi apparatus
Christian Jetschni, Peter Götz, Berliner Hochschule für Technik, Germany

P35: *withdrawn*

P36: Creating educational software inspired by digital twins
Carina L. Gargalo et al., Technical University of Denmark