



Institut für Biotechnologie
Technische Universität Berlin
Bioverfahrenstechnik

BioProScale
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IfGB

Institut für
Gärungsgewerbe
und Biotechnologie
zu Berlin

9th BioProScale Symposium

Scaling Down and Up of Bioprocesses: Process Heterogeneities, Robustness, and Analytics

APRIL 20-22, 2026

LANGENBECK-VIRCHOW-HAUS, BERLIN, GERMANY

- Scale Up and Industrial Scale Processes
- Bioprocess Scale Down Models for Heterogeneities
- Process-Driven Cell Performance
- Integrated Bioprocesses
- Process Analytical Technologies (PAT) and FAIR Data Management



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VENUE: LANGENBECK-VIRCHOW-HAUS, BERLIN, GERMANY

LANGUAGE: ENGLISH



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MONDAY, 20 APRIL 2026

WELCOME ADDRESS AND PLENARY TALK

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

SESSION 1: MASS TRANSFER, SCALE-UP & MODELLING (I)

Chair Robert Spann / Isabel Thiele

12:20 **Plenary Talk: The dilemma of scale-up/down and the promise of scaling out/modularized biomanufacturing (P01)***Andreas Worberg, Center for Biosolutions DTU, Denmark*13:05 **From pilot to production: development and application of a hybrid model across scales (L01)***Marc Lemperle, Technical University of Denmark, Denmark*13:30 **Lessons learned on dynamic simulation of heterogeneities using compartment models (L02)***Hector Maldonado de Leon, TU Delft, The Netherlands*13:55 **Industry promotion talks**14:15 *Coffee break & exhibition*

SESSION 2: MASS TRANSFER, SCALE-UP & MODELLING (II)

Chair Ralf Takors / Rosa Haßfurth

14:45 **Challenges in oxygen mass transfer measurement for industrial-scale aerated stirred tank bioreactors (L03)***Nicolas Nickel, Hamburg University of Technology, Germany*15:10 **Using CFD-based compartment models to resolve spatial heterogeneities in industrial bioprocesses (L04)***Johan Le Nepvou De Carfort, Technical University of Denmark, Denmark*15:35 **Numerical scale-up and experimental validation of gas-liquid bioleaching reactors using LB-LES CFD modelling : from 2 L to 2000 L (L05)***Saranath Sripriya, Bureau de Recherches Géologiques et Minières Orléans, France*16:00 **Coupling genome-scale models with compartment bioreactor models to study intracellular responses under fluctuating conditions (L06)***Titania Insani Sugiarto, RWTH Aachen, Germany*16:25 **Scale-up challenges in *Pichia pastoris* fermentation processes (L07)***Anamari Brdar, Sanofi Aventis Deutschland GmbH, Germany & Hannah Singer, Sanofi Aventis Deutschland GmbH, Germany*16:50 *Coffee break & exhibition*

SESSION 3: MASS TRANSFER, SCALE-UP & MODELLING (III)

Chair Howard Ramirez Malule / Simon Täuber

17:20 **Multivariate population balance model resolution for bioreactor simulation (L08)***Benjamin Casale, Toulouse Biotechnology Institute, France*17:45 **Morphology-based scale-up of *Streptomyces* species cultivations using CFD simulations (L09)***Philipp Eibl, SimVantage GmbH, Austria & Gesa Brauneck, RWTH Aachen, Germany*18:10 **Balancing yield and sustainability: Modelling operational strategies for scaled cultivated meat production (L10)***Ben Tumulero, TU Delft, The Netherlands*

EVENING PROGRAM

18:35 **Melody of the genome 2.0 – The sound of DNA***Langenbeck-Virchow-Haus, Foyer
Artistic Contribution*19:00 **Poster Session, Exhibition, Get-together for all participants***Langenbeck-Virchow-Haus, Foyer
We encourage all poster authors to be at their posters at least from 19:30-20:15 (even poster numbers) and 20:15-21:00 (odd poster numbers).*

21:00 End of day 1

TUESDAY, 21 APRIL 2026

9:00 **Welcome note***Peter Neubauer, TU Berlin, Germany***SESSION 4: SCALING OF BIOPROCESSES**Chair *Regine Eibl / Johannes Nicklisch*9:05 **Plenary Talk: Process modeling strategies for successful biopharmaceutical development (P02)***Thomas Wucherpennig, Boehringer Ingelheim Pharma GmbH & Co. KG, Germany*9:50 **Hybrid modelling to assist scaling of mAb production processes (L11)***Sally Gras, University of Melbourne, Australia*10:15 **Model-based scaling of recombinant protein production in *Escherichia coli* fed-batch processes: Knowledge-based optimization of secretion performance and cell viability (L12)***Fabian Schröder-Kleeberg, TU Berlin, Germany*10:40 **Industry promotion talks**10:55 *Coffee break & exhibition***SESSION 5: BIOPROCESS INTEGRATION (I)**Chair *Alvaro Lara / Fatemeh Nejati*11:25 **FerroFlow: unlocking simulation software for end-to-end bioprocess design – A fermentation case-study (L13)***Pierre Guilloteau, Technical University of Denmark, Denmark*11:50 **Towards understanding the effect of upstream process parameters on the properties and downstream performance of inclusion bodies (L14)***Mohamed Elshazly, TU Wien, Austria*12:15 **Two-dimensional protein denaturation surfaces as a process development tool for solubilization and refolding of bacterial inclusion bodies (L15)***Robert Klausser, TU Wien, Austria & Martin Voigtmann, Boehringer Ingelheim RCV GmbH & Co KG, Vienna, Austria*12:40 *Lunch break, poster session & exhibition***SESSION 6: BIOPROCESS SCALE-DOWN**Chair *Peter Neubauer / Tolve Kheirkhah*13:50 **Bioreactor simulation from the cellular perspective: application in scaling from cell cultures to syngas fermentation (P03)***Cees Haringa, TU Delft, The Netherlands*14:35 **BioProScale Lifetime Achievement Award***Awardee: Matthias Reuss, Prof. Emeritus of University of Stuttgart, Germany*15:00 **Predictive scale-down using AI-designed 3D-printed bioreactors (L16)***Lena Achleitner, print4biotech GmbH, Obersdorf, Germany*15:25 **Beyond mixing times: From industrial to lab-scale bioreactors using cell trajectories (L17)***Ryan Rautenbach, Technical University Hamburg, Germany*15:50 *Coffee break & exhibition*

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SESSION 7: PROCESS ANALYTICAL TECHNOLOGY (I)

Chair Krist Gernaey / Saskia Waldburger

16:20 **Unlocking the potential of inline process analytical technology (PAT) for advanced bioprocess development, scale-up, and control (L18)***Katharina Dahlmann, Hamilton Bonaduz AG, Switzerland*16:45 **Smart feeding: Raman-based glucose control for enhanced malic acid fermentation (L20)***Luca Antonia Grebe, RWTH Aachen, Germany*17:10 **Machine learning spatially offset time-gated Raman spectroscopy (TG-SORS) in-line sensors for endoglucanase production in *T. reesei* bioprocesses (L21)***Martin Kögler, VTT Finland, Finland*17:35 **From fed-batch to repetitive fed-batch: Soft-sensor-driven control of phosphate-regulated Fab production in *E. coli* (L22)***Rüdiger Lück, TU Wien, Austria*18:00 *End of presentation program***EVENING PROGRAM**19:30 **Conference Dinner***Conference Dinner: Brauhaus Georgbräu im Nikolaiviertel, Berlin (with voucher only)*22:30 *End of day 2**L19 canceled on the short term***WEDNESDAY, 22 APRIL 2026**9:00 **Welcome note***Peter Neubauer, TU Berlin, Germany***SESSION 8: BIOPROCESS INTEGRATION (II)**

Chair Jerome Morchain / Linda Cai

9:05 **Plenary Talk: Intensified fermentation with *E. coli* effects on the economic and ecological footprint (P04)***Oliver Spadiut, TU Wien Austria*9:50 **Hybrid modeling as a life cycle support solution of bioprocesses: from process development to manufacturing operations (L23)***Niels Krausch, DataHow AG, Zurich, Switzerland*10:15 **Development and application of an ANN-perception-based autonomous control system for an *Escherichia coli* cultivation process (L24)***Nikolai Mushnikov, T&J Bioengineering, Shanghai, China*10:40 *Coffee break & exhibition***SESSION 9: PROCESS ANALYTICAL TECHNOLOGY (II)**

Chair Katharina Dahlmann / Lara Santolin

11:10 **A novel view into aerated stirred tanks: Magnetic resonance imaging (L25)***Till Lenczyk, Technical University Hamburg, Germany*11:35 **Integration of online HPLC analytics into chemostat-based polyhydroxyalkanoate production from dark fermentation effluent (L26)***Saskia Waldburger, TU Berlin, Germany*12:00 **Integrating microfluidic analysis and MRI-based flow characterization for the scale-up of a novel bioelectrochemical reactor (L27)***Selma Iraqi Houssaini, Hamburg University of Technology, Germany & Daniel Bauer, Hamburg University of Technology, Germany*12:25 *Lunch break, poster session & exhibition*

SESSION 10: INTENSIFIED AND CONTINUOUS PROCESSES

Chair Regine Eibl / Eike Janesch

14:00 **Plenary Talk: Process intensification in microbial and enzymatic conversions (P05)***Helen de Wever, VITO, Belgium*14:45 **Lipid production in *Schizochytrium limacinum* SR21 from biogenic residues (L28)***Simon Täuber, TU Berlin, Germany & Anne Kathrine Clausen, Aalborg University, Denmark*15:10 **A cell-machine interface for monitoring plasmid-loss events and population stability during continuous bioproduction of plasmid DNA (L29)***Hannah Sehart, University of Liège, Belgium*15:35 **Paving the way for continuous bioprocessing: Building robust *Pichia pastoris* strains for long-term cultivation (L30)***Arnau Gasset, Universitat Autònoma de Barcelona, Spain*16:00 **Award ceremony best talks and posters & Closing remarks***Peter Neubauer, TU Berlin, Germany & Stefan Junne, Aalborg University, Denmark*16:20 *End of symposium*

Attendance fees

	Full conference ticket
Participant from industry	1390 € incl. VAT
Participant from a scientific institution	750 € incl. VAT
PhD/MSc Student (against valid proof)	380 € incl. VAT

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SCIENTIFIC POSTERS

- P1: Real-time CFD: Emulating 3D bioreactor gradients in milliseconds**
Victor Puig I Laborda, Novo Nordisk Foundation Center for Biosustainability / TU Denmark, et al.
- P2: Machine learning-based 2D and hybrid 3D modeling for process intensification in iPSC expansion**
Muriel M. Zumbihl, Zurich University of Applied Sciences, Switzerland, et al.
- P3: Machine-Learning framework for instantaneous prediction of the mixing time in a mechanical stirred bioreactor at both lab and industrial scales**
Nathan Nourdin, Université de Lorraine, France, et al.
- P4: Physics-informed neural network surrogates for bioreactor hydrodynamics: Opportunities and current limitations**
Veronika Trávníková, RWTH Aachen University, Germany, et al.
- P5: Physics-informed neural network framework for optimizing PHA bioreactor performance**
Monesh Kumar Thirugnanasambandam, Universidade NOVA de Lisboa, Portugal, et al.
- P6: Deep hybrid modelling and control of microbiome evolution**
José Pinto, Universidade NOVA de Lisboa, Portugal, et al.
- P7: A standardized template for modeling and simulation of upstream bioprocesses**
Dingchang Xu, TU Berlin, Germany, et al.
- P8: withdrawn**
- P9: Development of a digital twin for a novel gas fermentation process**
Maximilian Klein, Hamburg University of Technology, Germany, et al.
- P10: Dynamic 1D gas-liquid model to simulating heterogeneous bioreactor – in various cultivation modes**
Julian Federico Sanchez Caldas, Université de Toulouse, France, et al.
- P11: Kinetic modelling of complex co-culture yoghurt fermentation**
Susanne Musters, Delft University of Technology, The Netherlands, et al.
- P12: Dynamic feed strategies in *S. cerevisiae* fed-batch fermentation guided by model-based design of experiments: an in silico study**
Ana H. V. Caetano, Technical University of Denmark, Denmark, et al.
- P13: Computational scale-up analysis of bioreactor design for cultivated meat production**
Pieter Brorens, Delft University of Technology, The Netherlands, et al.
- P14: Agent-based simulation of N-glycosylation: Model parameter estimation using a genetic algorithm**
Christian Jetschni, Peter Götz, Berliner Hochschule für Technik, Germany
- P15: Model-based strain selection using an industrial KPI**
Okyanus Yazgin, TU Berlin, Germany, et al.
- P16: Towards a comprehensive decision support system for microbial strain discovery**
Marco Anteghini, Lifeglimmer GmbH, Germany, et al.
- P17: withdrawn**
- P18: Engineering robust strains: Scale-down approaches for industrial optimization of *Pseudomonas putida***
Gaffney Aoife, Stuttgart University, Germany, et al.
- P19: Scale-down characterization of an *E. coli* L-tyrosine producer in an STR-PFR simulator using transcriptomic iModulon analysis**
Mykhaylo Semenov Petrov, Technical University of Denmark (DTU), Denmark, et al.
- P20: Investigation of the L-tyrosine crystallization kinetics under fermentation conditions**
Deborah Pfaff, Technical University of Denmark, Denmark, et al.
- P21: Lifeline analysis of environmental perturbations in industrial bioreactors: A multi-organism, multi-reactor comparative study**
Mario Balogh / Ralf Takors, University of Stuttgart, Germany
- P22: Heterogeneity amplification effect on cell environment feedback loop induced by metabolic burden**
Tiphaine Gallet de Saint Aurin, University of Liège, Belgium, et al.
- P23: Reduced viscosity mutants of *Trichoderma reesei* with improved industrial fermentation characteristics**
Fernando Silva, IFF, The Netherlands
- P24: From high-throughput microreactors to bench-scale: Modelling tunable recombinant protein production in a 2-feed *E. coli* process**
Philipp Pably, Technical University of Denmark (DTU), Denmark, et al.
- P25: Co-cultivation dynamics of the filamentous microorganisms *Aspergillus niger* and *Streptomyces coelicolor* in a rocking motion bioreactor**
Tolue Kheirkhah, TU Berlin, et al.
- P26: From shake flasks to bioreactor: assessing *Vibrio natriegens* for biotechnological plasmid DNA production**
A. Rita Silva-Santos, Universidade de Lisboa, Portugal, et al.
- P27: Scale-down characterization of plasmid DNA production in *Escherichia coli* for digital twin development and process optimization**
Sofia O. D. Duarte, Universidade de Lisboa, Portugal, et al.
- P28: Optimizing pDNA production in *Vibrio natriegens* via automated high-throughput process development**
Rosa Hassfurth, TU Berlin, Germany, et al.
- P29: Enhancing efficiency in kombucha fermentation: A study on scaling up, fermentation time and sensory properties.**
Alexander J. Gantenbein, TU Berlin, Germany, et al.
- P30: Foam as a source of bioprocess heterogeneity: A scale-down platform for automated foam decay analysis**
Laura Barth, RWTH Aachen University, Germany, et al.
- P31: Control of lactic acid bacteria and yeast co-cultures in micro-aerated cultures**
Anne Kathrine Clausen, Stefan Junne, Aalborg University, Denmark
- P32: Uncovering a population-level safety mechanism for bioprocesses handling inhibiting substrates**
Maximilian Sehr, Frank Delvigne, University of Liège, Belgium
- P33: Scalability of in-situ gas supply via hydrophobic membranes to autotrophic biofilm systems**
Andreas Netsch, Karlsruhe Institute of Technology, Germany, et al.
- P34: Benefits of off-gas analysis – Using OUR and CER as parameters for reliable “Batch-End-Detection”**
Garry Schulze, BlueSens gas sensor GmbH, Germany, et al.

- P35: Local Oxygen limitation in multiphase bioreactors: A method for optical quantification**
Katharina Zörner, Hamburg University of Technology, Germany, et al.
- P36: Scalable micro-sparger modifications to support improved oxygen supply within intensified upstream processing**
Karl Scheibenbogen, Sartorius Stedim Biotech, Germany, et al.
- P37: Evaluation of a novel oxygen injection system on pilot scale for the production of single cell protein**
Koen J.A. Verhagen, dsm-firmenich, The Netherlands, et al.
- P38: Precise measurements of high mass transfer coefficients in Single Use Bioreactors in microbial processes**
Mustafa Salli, Hamburg University of Technology, Germany, et al.
- P39: Novel 96 well screening tool for time-resolved, independent and non-invasive determination of the oxygen transfer rate**
Juan C. Porras, Kuhner Shaker GmbH, Germany, et al.
- P40: Three-angled X-ray tomography for investigating gas-phase dynamics in scalable bubble columns**
Rik Volger, Delft University of Technology, The Netherlands, et al.
- P41: Multi-spectral fiber systems for life science applications**
Viacheslav Artyushenko, Ulm University, Germany, et al.
- P42: Advances in fluid dynamic stirred tank characterization – opportunities of using MRI**
Noah von Schnitzler, Hamburg University of Technology, Germany, et al.
- P43: Low-cost PAT and feedstocks for scalable biohydrogen production**
Andrés Barrera, Universidad del Valle, Colombia, et al.
- P44: Smart multi-column chromatography for scaleable continuous bioprocessing**
Sebastian Thürmann, Tosoh Bioscience GmbH, Germany, et al.
- P45: Spectroscopy-assisted Bayesian optimization for efficient refolding of inclusion body proteins**
Florian Gisperg, TU Wien, Austria, et al.
- P46: Scale-up and optimization of recombinant protein production in E. coli in controlled conditions**
Vlad-Constantin Tofan, Cantacuzino National Military Medical Institute for Research and Development, Romania, et al.
- P47: Driving performance and process reproducibility in recombinant protein manufacturing through optimal selection of yeast-derived bionutrients**
Burcin Boran, Ohly GmbH, Germany, et al.
- P48: Scale-down bioreactor studies on heterologous protein production in stringent response modulated E. coli chassis.**
Sidharth Jaya Sankar, University of Stuttgart, Germany, et al.
- P49: Biotechnological process development for amphiphilic elastin-like proteins**
Anzhelika Yashukova, Stefan M. D. Schiller, Goethe University Frankfurt, Germany
- P50: High-yield production of Cupriavidus necator soluble NAD⁺-reducing hydrogenase in E. coli for sustainable biocatalysis**
Qin Fan, TU Berlin, Germany, et al.
- P51: Scaling of a fed-batch process for efficient heterologous production of active recombinant [NiFe]-hydrogenase**
Francisco De La Fuente, TU Berlin, Germany, et al.
- P52: Comparative evaluation of feeding strategies for glucose oxidase production in Pichia pastoris using a small-scale multi-bioreactor system**
Julia Schollmeyer, TU Berlin, Germany, et al.
- P53: Enhanced production of phenazine-1-carboxylic acid using a genetically modified Pseudomonas chlororaphis strain**
Julie Mathiesen, Aalborg University, Denmark, et al.
- P54: Carbon-to-phosphorus ratio optimization for PHA production in high cell density cultivation under phosphorus limitation condition**
Johannes T. Nicklisch, Berliner Hochschule für Technik, Germany, et al.
- P55: Modulating PHA molecular weight in Cupriavidus necator through overexpression of native depolymerases**
Paul Cornehl, TU Berlin, Germany, et al.
- P56: Why optimized bioprocesses fail at scale: an integrated framework for robust dextran EPS production**
Nicolás Armendáriz, National Centre for Food Technology and Safety (CNTA), Spain, et al.
- P57: Biotechnological production of human milk oligosaccharides**
Anastasia Setiadi, Chr. Hansen HMO GmbH, Germany, et al.
- P58: Life cycle assessment of acetate production using gas fermentation with different CO₂ sources**
Ramya Preethi Surendran, NORCE Norwegian Research Centre, Norway, et al.
- P59: Upcycling waste apples into platform chemicals: pilot-scale production of lactic and succinic acids**
Laís Portugal Rios da Costa Pereira, Leibniz Institute for Agricultural Engineering and Bioeconomy, Germany, et al.
- P60: Valorization of cassava wastewater via acidogenic fermentation: Process intensification and scale-relevant analytics for sustainable VFA production**
Howard Ramírez-Malule, Universidad del Valle, Colombia, et al.
- P61: E-waste bioleaching in a bioreactor: Experimental and numerical studies of particles suspensions**
Marc-Antoine Besch, Université de Lorraine, France, et al.
- P62: Sustainable bioprocess development for upcycling of industrial waste streams**
Tanja Caspary, TU Wien, Austria, et al.
- P63: Microbial population shifts during compost-mediated degradation of anthropogenic polymers**
Marcin Damian Jasiak, Wrocław University of Environmental and Life Sciences, Poland, et al.
- P64: Integrating microbial biodegradation of polymers into circular waste management frameworks**
Julia Alicja Dybka, Wrocław University of Environmental and Life Sciences, Poland, et al.
- P65: SSF biodegradation of smoked cigarette butts and other hazardous cellulosic support materials**
Hassan Sreenath, H.K.S Consulting LLC, USA
- P66: Managing deployable bioprocess soft sensors: A FAIR registry approach**
David Camilo Corrales, Université de Toulouse, France, et al.
- P67: An ontology-based digital interlinked blueprint of the KIWI-biolab to support experimental reproducibility and traceability**
Ana S. Lodos, TU Berlin, Germany, et al.
- P68: A Blockchain based digital thread for FAIR, trustworthy, and human-centric bioprocess development**
Jonas M. Karsten, TU Berlin, Germany, et al.
- P69: From off-line to real-time: Probe-integrated electrochemical glucose sensing for bioprocess monitoring**
Aliyeh Hasanzadeh, Technical University of Denmark, et al.