

Scientific CV

Junior Prof. Dr. Dietrich Kohlheyer

Personal Data

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IBG-1: Biotechnology
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Experience

11.2014 - present

Junior Professor “Microscale Bioengineering” at the Faculty of Mechanical Engineering, AVT.MSB, RWTH Aachen University

01.2010 - present

Group leader „Microscale Bioengineering Group“, IBG1: Institute of Biotechnology, Forschungszentrum Jülich GmbH, Germany

- Research and development: Single-Cell Analysis of Microbial Production Strains in Microfluidic Bioreactors
- Independent funding 2014-2019, Helmholtz Young Investigator

02.2009 – 07.2009

Postdoctoral visitor, National Institute for Nanotechnology, University of Alberta, Edmonton, Canada

- Point-of-Care Diagnostics, Lab-on-a-chip, Microfluidics
- At the Analytical Chemistry chair head by Prof. Dr. Jed Harrison

08.2008 – 12.2009

Postdoctoral R&D Engineer, Medimate BV, Enschede, The Netherlands (in direct cooperation with University of Twente, The Netherlands)

- Point-of-care-diagnostics, Lab-on-a-chip, Portable lithium detector for blood analysis

08.2004 – 07.2008

PhD Research Associate, MESA⁺ Institute for Nanotechnology, University of Twente, The Netherlands

- Development of a miniaturized microfluidic free-flow electrophoresis
- Dissertation:: Microfluidic Free-Flow Electrophoresis for Proteomics-on-a-Chip
- “BIOS The-lab-on-a-chip-group” head by Prof. Albert van den Berg

06.2003 – 07.2004

Internship and final thesis project, MESA⁺ Institute for Nanotechnology, University of Twente, The Netherlands

- Final Thesis: Development of an electroosmotically driven fully adjustable microfluidic reactor
- “BioChip Group” head by Dr. Richard Schasfoort

07.2000 – 06.2004

Studies of Mechatronics Engineering (Dipl. Ing. FH), Aachen University of Applied Sciences, Germany

- Majors: Microsystems and automation technology

Citation report

- h-index* 18
- Number of citations* 1055

*Source: Google Scholar, May 2017

Web profiles

- Google scholar <https://scholar.google.de/citations?user=arDXf6sAAAAJ&hl=de>
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Peer reviewed journal contributions (active DOI hyperlinks)

1. Dennis Binder, Thomas Drepper, Karl-Erich Jaeger, Frank Delvigne, Wolfgang Wiechert, Dietrich Kohlheyer, Alexander Grünberger, *Homogenizing bacterial cell factories: Analysis and engineering of phenotypic heterogeneity*, **Metabolic Engineering**, submitted 2017
2. P. Frank, D. Gräfe, C. Probst, S. Häfner, M. Elstner, D. Appelhans, D. Kohlheyer, B. Voit, and A. Richter, *Autonomous, self-sufficient circuits for chip-level microfluidic flow control utilizing a chemo-fluidic transistor*, *Advanced Functional Materials*, *in press*
3. Christoph Westerwalbesloh, Alexander Grünberger, Wolfgang Wiechert, Dietrich Kohlheyer and Eric von Lieres, *Coarse graining bacteria colonies for modelling critical solute distributions in single-cell bioreactors*, Manuscript ID MICROBIO-2016-256-RA, **Microbial Biotechnology** **2017**, DOI: [10.1111/1751-7915.12708](https://doi.org/10.1111/1751-7915.12708)
4. Christian Sachs, Alexander Grünberger, Dietrich Kohlheyer and Katharina Nöh, *Image-based Single Cell Profiling: High-Throughput Processing of Mother Machine Experiments*, **PLOS One** **2016**, DOI: 10.1371/journal.pone.0163453
5. Peter M. Kusen, Georg Wandrey, Christopher Probst, Alexander Grünberger, Martina Holz, Sonja Meyer zu Berstenhorst, Dietrich Kohlheyer, Jochen Büchs, and Jörg Pietruszka, *Optogenetic Regulation of Tunable Gene Expression in Yeast Using Photo-Labile Caged Methionine*, **ACS Chemical Biology** **2016**, DOI:10.1021/acscchembio.6b00462
6. Christina Krämer, Wolfgang Wiechert, Dietrich Kohlheyer, *Time-resolved, single-cell analysis of induced and programmed cell death by non-invasive propidium iodide and counterstain perfusion*, **Nature Scientific Reports** **2016**, **6**, Article number 32104, DOI:10.1038/srep32104
7. Dennis Binder, Jonas Frohwitter, Regina Mahr, Claus Bier, Alexander Grünberger, Anita Loeschcke, Petra Peters-Wendisch, Dietrich Kohlheyer, Jörg Pietruszka, Julia Frunzke, Karl-Erich Jaeger, Volker F. Wendisch and Thomas Drepper, *Light-controlled cell factories – Employing photocaged IPTG for light-mediated optimization of lac-based gene expression and (+)-valencene biosynthesis in Corynebacterium glutamicum*, **Applied and Environmental Microbiology** **2016**, **82**(20), 6141-6149, DOI:10.1128/AEM.01457-16
8. Pfeifer, Eugen; Hünnefeld, Max; Popa, Ovidiu; Polen, Tino; Kohlheyer, Dietrich; Baumgart, Meike; Frunzke, Julia *Silencing of cryptic prophages in Corynebacterium glutamicum*, **Nucleic Acids Research** **2016**, DOI: 10.1093/nar/gkw692
9. Dennis Binder, Christopher Probst, Alexander Grünberger, Fabienne Hilgers, Anita Lösckke, Karl-Erich Jäger, Dietrich Kohlheyer and Thomas Drepper, *Comparative single-cell analysis of different E. coli expression systems during microfluidic cultivation*, **Plos One** **2016**, DOI: 10.1371/journal.pone.0160711

10. Alexander Grünberger, Katja Schöler, Christopher Probst, Georg Kornfeld, Timo Hardiman, Wolfgang Wiechert, Dietrich Kohlheyer and Stephan Noack, *Real-time monitoring of fungal growth and morphogenesis at single-cell resolution*, **Engineering in Life Sciences** **2016**, DOI: 10.1002/els.20160083
11. Dennis Binder, Claus Bier, Alexander Grünberger, Dagmar Drobiez, Jennifer Hage-Hülsmann, Georg Wandrey, Jochen Büchs, Dietrich Kohlheyer, Anita Loeschcke, Wolfgang Wiechert, Karl-Erich Jaeger, Jörg Pietruszka, and Thomas Drepper, *Photocaged Arabinose – A Novel Optogenetic Switch for Rapid and Gradual Control of Microbial Gene Expression*, **ChemBioChem**, **2016**, DOI: 10.1002/cbic.201500609
12. Christina Krämer, Wolfgang Wiechert and Dietrich Kohlheyer, *Artificial fluorogenic substrates in microfluidic devices for bacterial diagnostics in biotechnology*, **Journal of flow chemistry** **2016**, 6, 1, DOI: 10.1556/1846.2015.00035
13. Christina E. M. Krämer, Abhijeet Singh, Stefan Helfrich, Alexander Grünberger, Wolfgang Wiechert, Katharina Nöh, Dietrich Kohlheyer, *Non-Invasive Microbial Metabolic Activity Sensing at Single Cell Level by Perfusion of Calcein Acetoxymethyl Ester*, **PLOS One** **2015**, DOI: 10.1371/journal.pone.0141768
14. Christoph Westerwalbesloh, Alexander Grünberger, Birgit Stute, Sophie Weber, Wolfgang Wiechert, Dietrich Kohlheyer, and Eric von Lieres, *Modeling and CFD simulation of nutrient distribution in picoliter bioreactors for bacterial growth studies on single-cell level*, **Lab on a Chip**, **2015**, 15, 4177-4186, DOI: 10.1039/C5LC00646E
15. Alexander Grünberger, Christopher Probst, Stefan Helfrich, Arun Nanda, Birgit Stute, Wolfgang Wiechert, Eric von Lieres, Katharina Nöh, Julia Frunzke and Dietrich Kohlheyer, *Spatiotemporal microbial single-cell analysis using a high-throughput microfluidics cultivation platform*, **Journal of Cytometry A**, **2015**, 87(12), 1101–1115, DOI: 10.1002/cyto.a.22779
16. Stefan Helfrich, Eugen Pfeifer, Christina Krämer, Christian Carsten Sachs, Wolfgang Wiechert, Dietrich Kohlheyer, Katharina Nöh and Julia Frunzke, *Live cell imaging of SOS and prophage dynamics in isogenic bacterial populations*, **Molecular Microbiology**, **2015**, 98(4), 636-650, DOI: 10.1111/mmi.13147
17. S. Helfrich, C. Azzouzi, C. Probst, J. Seiffarth, A. Grünberger, W. Wiechert, D. Kohlheyer, K. Nöh, *Vizardous: Interactive Analysis of Microbial Populations with Single Cell Resolution*, **Bioinformatics**, **2015**, 31(23), 3875-3877, DOI: 10.1093/bioinformatics/btv468
18. C. Dusny, A. Grünberger, C. Probst, W. Wiechert, D. Kohlheyer and A. Schmid, *Technical bias of microcultivation environments on single-cell physiology*, **Lab on a Chip**, **2015**, 15(8), DOI: 10.1039/C4LC01270D
19. C. Probst, A. Grünberger, S. Helfrich, N. Braun, K. Nöh, W. Wiechert and D. Kohlheyer, *Rapid inoculation of single bacteria into parallel picoliter fermentation chambers*, **Analytical Methods**, **2015**, 7(1), 91-98 DOI: 10.1039/C4AY02257B
20. D. Binder, A. Grünberger, A. Loeschcke, C. Probst, C. Bier, J. Pietruszka, W. Wiechert, D. Kohlheyer, K.-E. Jaeger, T. Drepper, *Light-responsive control of bacterial gene expression: Precise triggering of the lac promoter activity using photocaged IPTG*, **Integrative Biology** **2014**, 6, 755-765 DOI: 10.1039/C4IB00027G
21. A. Grünberger, W. Wiechert and D. Kohlheyer, *Single-Cell Microfluidics: Opportunity for Bioprocess Development*, **Current Opinion in Biotechnology** **2014**, 29, 15-23, DOI: 10.1016/j.copbio.2014.02.008
22. N. Mustafi ,A. Grünberger, R. Mahr, S. Helfrich, K. Nöh, B. Blombach, D. Kohlheyer, J. Frunzke, *Application of a genetically encoded biosensor for live cell imaging of L-valine production in pyruvate dehydrogenase complex-deficient Corynebacterium glutamicum strains*. **Plos One** **2014**, DOI: 10.1371/journal.pone.0085731
23. A. Nanda, A. Heyer, C. Krämer, A. Grünberger, D. Kohlheyer and J. Frunzke, *SOS-induced spontaneous prophage induction in Corynebacterium glutamicum - An analysis at the single-cell level*, **Journal of Bacteriology** **2014**, 196(1), 180-188, DOI: 10.1128/JB.01018-13
24. S. Unthan, A. Grünberger, J. van Ooyen, J. Gätgens, J. Heinrich, N. Paczia, W. Wiechert, D. Kohlheyer, S. Noack, *Beyond growth rate 0.6: What drives Corynebacterium glutamicum to higher growth rates in defined medium*. **Biotechnology & Bioengineering** **2014**, 111(2), 359-371, DOI: 10.1002/bit.25103

25. G. Schendzielorz, M. Dippong, A. Grünberger, D. Kohlheyer, A. Yoshida, S. Binder, C. Nishiyama, M. Nishiyama, M. Bott, and L. Eggeling, *Taking control over control: Use of product sensing in single cells to remove flux control at key enzymes in biosynthesis pathways*, **ACS Synthetic Biology** **2014**, 3(1), 21-29, DOI: 10.1021/sb400059y
26. A. Grünberger, C. Probst, A. Heyer, W. Wiechert, J. Frunzke and D. Kohlheyer, *Microfluidic Picoliter Bioreactor for Microbial Single Cell Analysis: Fabrication, System Setup and Operation*, **Journal of Visualized Experiments** **2013**, 82, 50560, DOI:10.3791/50560
27. C. Probst, A. Grünberger, W. Wiechert, D. Kohlheyer, *Polydimethylsiloxane (PDMS) Sub-Micron Traps for Single-Cell Analysis of Bacteria*. **Micromachines** **2013**, 4(4), 357-369 DOI: 10.3390/mi4040357
28. C. Probst, A. Grünberger, W. Wiechert, D. Kohlheyer, *Microfluidic growth chambers with optical tweezers for full spatial single-cell control and analysis of evolving microbes*. **Journal of Microbiological Methods** **2013**, 95(3), 470-476, DOI:10.1016/j.mimet.2013.09.002
29. A. Grünberger, J. van Ooyen, N. Paczia, P. Rohe, G. Schindzielorz, L. Eggeling, W. Wiechert, D. Kohlheyer, Stephan Noack, *Beyond growth rate 0.6: C. glutamicum cultivated in highly diluted environments*, **Biotechnology & Bioengineering** **2013**, 110(1), 220-228, DOI:10.1002/bit.24616
30. A. Grünberger, N. Paczia, C. Probst, G. Schendzielorz, L. Eggeling, W. Wiechert and D. Kohlheyer, *A disposable picoliter bioreactor for cultivation and investigation of industrially relevant bacteria on single cell level*, **Lab on a Chip** **2012**, 12, 2060-2068, DOI:10.1039/C2LC40156H
31. N. Mustafi, A. Grünberger, D. Kohlheyer, M. Bott and J. Frunzke, *The development and application of a single-cell biosensor for the detection of l-methionine and branched-chain amino acids*, **Metabolic Engineering** **2012**, 14 (4), 449-457, DOI:10.1016/j.ymben.2012.02.002
32. A. Floris, S. Staal, S. Lenk, E. Staijen, D. Kohlheyer, J. Eijkel and A. van den Berg, *A prefilled, ready-to-use electrophoresis based lab-on-a-chip for monitoring lithium in blood*, **Lab on a Chip** **2010**, 10, 1799-1806 DOI: 10.1039/C003899G
33. G. Krishnamoorthy, E. T. Carlen, D. Kohlheyer, R.B.M. Schasfoort, and A. van den Berg, *Integrated Electrokinetic Sample Focusing and Surface Plasmon Resonance Imaging System for Measuring Biomolecular Interactions*, **Analytical Chemistry** **2009** 81, 1957-1963, DOI: 10.1021/ac802668z
34. D.R. Zalewski, D. Kohlheyer, S. Schlautmann and J.G.E. Gardeniers, *Synchronized, continuous flow zone electrophoresis*. **Analytical Chemistry** **2008**, 80, 6228–6234, DOI: 10.1021/ac800567n
35. D. Kohlheyer, J.C.T. Eijkel, S. Schlautmann, A. van den Berg, and R.B.M. Schasfoort, *Bubble-free operation of a microfluidic free-flow electrophoresis chip with integrated Pt electrodes*. **Analytical Chemistry** **2008**, 80, 4111–4118, DOI: 10.1021/ac800275c
36. D. Kohlheyer, J.C.T. Eijkel, A. van den Berg, and R.B.M. Schasfoort, *Miniaturizing Free-Flow Electrophoresis - A critical Review*. **Electrophoresis** **2008**, 29, 977-993 DOI: 10.1002/elps.200700725
37. D. Kohlheyer, S. Unnikrishnan, G. Besselink, S. Schlautmann, and R. Schasfoort, *A microfluidic device for array patterning by perpendicular electrokinetic focusing*. **Microfluidics and Nanofluidics** **2008**, 4, 557-564, DOI: 10.1007/s10404-007-0217-9
38. D. Kohlheyer, J.C.T. Eijkel, S. Schlautmann, A. van den Berg, and R. Schasfoort, *Microfluidic High-Resolution Free-Flow Isoelectric Focusing*. **Analytical Chemistry**, **2007**. 79(21): p. 8190 – 8198, DOI: 10.1021/ac071419b
39. D. Kohlheyer, G.A.J. Besselink, S. Schlautmann, and R.B.M. Schasfoort, *Free-flow zone electrophoresis and isoelectric focusing using a microfabricated glass device with ion permeable membranes*. **Lab on a Chip**, **2006**. 6(3): p. 374-380. DOI: 10.1039/B514731J
40. D. Kohlheyer, G.A.J. Besselink, R.G.H. Lammertink, S. Schlautmann, S. Unnikrishnan, and R.B.M. Schasfoort, *Electro-osmotically controllable multi-flow microreactor*. **Microfluidics & Nanofluidics**, **2005**. 1(3): p. 242-248. DOI: 10.1007/s10404-004-0031-6