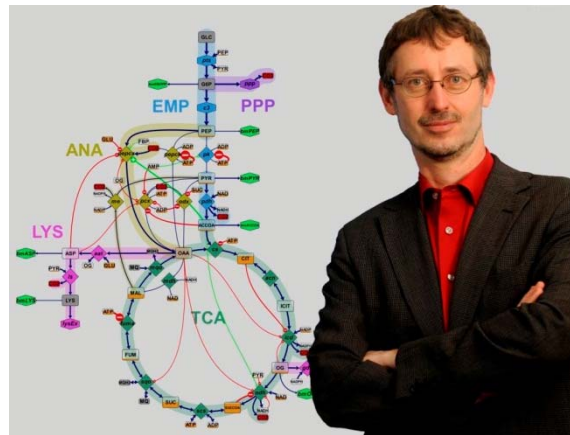# Curriculum vitae

Prof. Dr. Wolfgang Wiechert
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Born: March 3, 1960
married, 3 children

Motivation

Biotechnology is a key discipline of the 21st century. Molecular biological mechanisms will be utilized for human benefit in an ever increasing extent and will contribute to the development of sustainable industrial production processes. Biotechnology is also a highly complex research field in which scientists of different disciplines must cooperate to achieve new insights and technical innovations. As a systems scientist I'm fascinated by the challenge to understand complex living systems as a whole, to manipulate them and, finally, to make technical use of them. In this context, my role is to make complexity understandable, to establish an interdisciplinary research culture, to help young scientists seeing the bigger picture and to find the most productive way from a wealth of possibilities. There are only few research fields in which basic research and application lie so close to each other. Revolutionary developments take place frequently and open completely new perspectives. If we want to shape the future we must ourselves think and act dynamically.

Scientific Career

1979-85	Diploma in Mathematics and Computer Science, University of Bonn
1985-90	PhD in Theoretical Biology and Biotechnology, University of Bonn
1990-96	PostDoc at the Institute of Biotechnology, Forschungszentrum Jülich
1995	Habilitation in Theoretical Biology, University of Bonn
1996-02	C3 professor for Simulation, University of Siegen
2002-09	C4 professor for Simulation and Computer Science in Mechanical Engineering, University of Siegen
2006	Guest professor, ETH Zürich
2009	Director at IBG-1, Forschungszentrum Jülich and Professor for Systems Biology, University of Düsseldorf
2011	Professor for Computational Systems Biology, RWTH Aachen University

Awards and Stipends

1978	Winner German National Mathematics Competition (Bundeswettbewerb Mathematik)
1979-85	Stipend German National Academic Foundation (Studienstiftung)
1985	Diploma „With Distinction"
1988-91	DECHEMA-Stipend „Applied Biotechnology"
1991	PhD „With Distinction"
2001	C4 call, University of Tübingen
2003	Bellman Award of the Journal „Mathematical Biosciences"

2008	DECHEMA-Award of the Max-Buchner-Foundation
2008	W3 call for director at IBG-1, Forschungszentrum Jülich
2012	Selected as a member of the German national academy of technical sciences (acatech)

Diverse best poster awards at international conferences

Board Memberships and activities in scientific societies

1998-2008	Spokesman FOMAAS Research Center, University of Siegen (modeling, analysis, simulation, and optimization of complex systems)
2001-2008	Board Member ASIM Simulation Society
2002-2008	2nd Spokesman „International Postgraduate Programme Multi Sensorics" at University of Siegen
since 2007	Chairman DECHEMA special interest group „Systems Biology and Synthetic Biology"
since 2009	Spokesman Advisory Board of Department "Chemistry and Biotechnology", FH Aachen/Jülich
since 2012	Member of German academy of technical sciences (acatech) and of acatech special interest group biotechnology
since 2012	Member Steering Committee „Molecular Science & Engineering" (MSE), RWTH Aachen
since 2012	Member GAMM Committee "Computational Science and Engineering"
since 2012	Member of International Metabolic Engineering Society (IMES)
since 2014	Member Executive Board of the Bioeconomy Science Center (BioSC GD)
2014-2017	Representative of Helmholtz Association in the national Coordination Committee Biotechnology 2020+ (BMBF)
since 2014	Coordinator Helmholtz strategy project "Molecular Interaction Engineering" (MIE) in the BMBF strategy process 2020+
since 2014	Editorial Board Member "Metabolic Engineering Communications"
since 2017	Founding director of JARA Center for Simulation and Data Sciences (JARA-CSD), Competence Center of RWTH Aachen and Forschungszentrum Jülich
since 2018	Member of the Editorial Board of Metabolic Engineering

Organizer, coorganizer and session chair in diverse conferences and scientific events.

Research Focus

Industrial Biotechnology: Production of bulk chemicals, fine chemicals, pharmaceuticals and proteins by using micro organisms and biocatalysts

Systems Metabolic Engineering: Development of industrial production strains and bioprocesses based on Systems Biology methods

Synthetic Biology: Using and functionalizing biological components to gain biological insight and to develop new processes

Modeling and Simulation of biochemical networks: model based experimentation, data analysis and visualization in System Biology

Single cell analysis and Optogenetics: Using tailor-made microfluidic devices for analyzing single microbial cells with integrated genetically encoded biosensors

Raw data evaluation for Omics Technologies: Generating meaningful information for metabolic flux analysis, quantitative metabolomics and proteomics, single cell analysis

Automated Experimentation: Accelerating bioprocess development by intelligent lab robotics and integrated experimental design

Teaching

2018-	Lecture „Computational Systems Biotechnology 2" (CSB2), RWTH Aachen
2012-	Lecture „Computational Systems Biotechnology", RWTH Aachen University
2012-	Lecture „Computational Biotechnology", RWTH Aachen University
2011-15	Course „Systems Biotechnology", Studienstiftung des Deutschen Volkes
2010-11	Lecture "Systems Biology", University of Düsseldorf
2002-08	Lecture „Modeling & Simulation 1-5", University of Siegen
2002-08	Lecture „Introduction to Programming" (for mechanical engineers), University of Siegen

Diverse lectures in seminar series and graduate schools

Selected Publications 2009-2014

Total	more than 100 publications in peer reviewed journals
	more than 80 publications in peer reviewed conference volumes

Binder D, Grünberger A, Loeschcke A, Probst C, Bier C, Pietruszka J, Wiechert W, Kohlheyer D, Jaeger K-E, Drepper T: Light-responsive control of bacterial gene Expression: precise triggering of the lac promoter activity using photocaged IPTG. *Integrative Biology* 2014, 6:755-765.

Gómez Baraibar Á, von Lieres E, Wiechert W, Pohl M, Rother D: Effective Production of (S)-α-Hydroxy ketones: An Reaction Engineering Approach. *Topics in Catalysis* 2014, 57:401-411.

Grünberger A, Wiechert W, Kohlheyer D: Single-cell microfluidics: opportunity for bioprocess development. *Current Opinion in Biotechnology* 2014, 29:15 - 23.

Käß F, Junne S, Neubauer P, Wiechert W, Oldiges M: Process inhomogeneity leads to rapid side product turnover in cultivation of Corynebacterium glutamicum. *Microbial Cell Factories* 2014, 13:6

Küppers T, Steffen V, Hellmuth H, O´Connel T, Bongaerts J, Maurer K-H, Wiechert W: Developing a new Production Host from a Blueprint: Bacillus pumilus as an industrial Enzyme producer. *Microbial Cell Factories* 2014, 13:1-11.

Noack S, Wiechert W: Quantitative metabolomics: a phantom? *Trends in Biotechnology* 2014, 32:238 - 244.

Radek A, Krumbach K, Gätgens J, Wendisch VF, Wiechert W, Bott M, Noack S, Marienhagen J: Engineering of Corynebacterium glutamicum for minimized carbon loss during utilization of D-xylose containing substrates. *Journal of Biotechnology* 2014, 192:156 - 160.

Unthan S, Baumgart M, Hans S, Krämer R, Seibold G, Frunzke J, Kalinowski J, Rückert C, Wendisch VF, Noack S, et al.: Chassis organism from Corynebacterium glutamicum - a top-down Approach to identify and delete irrelevant gene clusters. *Biotechnology Journal* 2014, 9

Unthan S, Grünberger A, van Ooyen J, Gätgens J, Heinrich J, Paczia N, Wiechert W, Kohlheyer D, Noack S: Beyond growth rate 0.6: What drives Corynebacterium glutamicum to higher growth rates in defined medium. *Biotechnology & Bioengineering* 2014, 111:359–371.

Hanke T, Nöh K, Noack S, Polen T, Bringer-Meyer S, Sahm H, Wiechert W, Bott M: Combined Fluxomics and Transcriptomics Analysis of Glucose Catabolism via a Partially Cyclic Pentose Phosphate

Pathway in Gluconobacter oxydans 621H. *Applied and Environmental Microbiology* 2013, 79:2336-2348.

Schmitz K, Peter V, Meinert S, Kornfeld G, Hardiman T, Wiechert W, Noack S: Simultaneous utilization of glucose and gluconate in Penicillium chrysogenum during overflow metabolism. *Biotechnology & Bioengineering* 2013, 110:3235 - 3243.

Weitzel M, Nöh K, Dalman T, Niedenführ S, Stute B, Wiechert W: 13CFLUX2-high-performance software suite for 13C-metabolic flux analysis. *Bioinformatics* 2013, 29:143 – 145

Wiechert W, Nöh K: Isotopically non-stationary metabolic flux analysis: complex yet highly informative. *Current Opinion in Biotechnology* 2013, 24:979 - 986.

Wiechert W, Nöh K, Weitzel M: Metabolic isotopomer labeling systems. Part III: Path tracing. *Mathematical Biosciences* 2013, 244:1-12.

Droste P, Wiechert W, Nöh K: Semi-automatic drawing of Metabolic networks. *Information Visualization* 2012, 11:171 - 187.

Gerhards T, Mackfeld U, von Lieres E, Wiechert W, Pohl M, Rother D: Influence of organic solvents on enzymatic asymmetric carboligations. *Advanced Synthesis & Catalysis* 2012, 354:2805–2820.

Grünberger A, Paczia N, Probst C, Schendzielorz G, Eggeling L, Noack S, Wiechert W, Kohlheyer D: A disposable picolitre bioreactor for cultivation and investigation of industrially relevant bacteria on the single cell level. *Lab on a Chip* 2012, 12:2060 - 2068.

Paczia N, Nilgen A, Lehmann T, Gätgens J, Wiechert W, Noack S: Extensive exometabolome analysis reveals extended overflow metabolism in various microorganisms. *Microbial Cell Factories* 2012, 11:122.

Rühl M., Rupp B., Nöh K., Wiechert W., Sauer U., Zamboni N.: Collisional Fragmentation of Central Carbon Metabolites in LC-MS/MS Increases Precision of 13C Metabolic Flux Analysis. *Biotechnology and Bioengineering* 109 (2012) 763 – 771.

Tillack J, Paczia N, Nöh K, Wiechert W, Noack S: Error Propagation Analysis for Quantitative Intracellular Metabolomics. *Metabolites* 2012, 2:1012 - 1030.

Bartek T, Blombach B, Lang S, Eikmanns BJ, Wiechert W, Oldiges M, Nöh K, Noack S: Comparative 13C-metabolic flux analysis of pyruvate dehydrogenase complex-deficient L-valine-producing Corynebacterium glutamicum. *Applied and Environmental Microbiology* 2011, 77:6644 – 6652

Droste P, Miebach S, Niedenführ S, Wiechert W, Nöh K: Visualizing multi-omics data in metabolic networks with the software Omix - A case study. *Biosystems* 2011, 105:154 - 161.

Hou B-H, Takanaga H, Grossmann G, Chen L-Q, Qu X-Q, Jones AM, Lalonde S, Schweissgut O, Wiechert W, w WB: Optical sensors for monitoring dynamic changes of intracellular metabolite levels in mammalian cells. *Nature Protocols* 2011, 6:1818 – 1833

Noack S, Nöh K, Moch M, Oldiges M, Wiechert W: Stationary versus non-stationary 13C-MFA: A comparison using a consistent dataset. *Journal of Biotechnology* 2011, 154:179 - 190.

Nöh K, Wiechert W: The benefits of being transient: isotope-based metabolic flux analysis at the short time scale. *Applied Microbiology and Biotechnology* 2011, 91:1247 - 1265.

Okrob D, Paravidino M, Orru R, Wiechert W, Hanefeld U, Pohl M: Hydroxynitrile lyase from Arabidopsis thaliana: Identification of reaction parameters for enantiopure cyanohydrin synthesis by pure and immobilized catalyst. *Advanced Synthesis & Catalysis* 2011, 353:2399 - 2408.

Wiechert W, Noack S: Mechanistic pathway modeling for industrial biotechnology: challenging but worthwhile. *Current Opinion in Biotechnology* 2011, 22:604 - 610.

Wiechert W., Noack S., Elsheikh A.: Modeling Languages for Biochemical Network Simulation: Reaction versus Equation Based Approaches. *Advances in Biochemical Engineering/Biotechnology* 121 (2010) 109 – 138.

Hadlich F, Noack S, Wiechert W: Translating biochemical network models between different kinetic formats. *Metabolic Engineering* 2009, 11:87 - 100.