CV Stefan Pflügl

Personal Details

Name: Ass.-Prof. Dr.nat.techn. Stefan Pflügl
Date & place of birth: 04.05.1983 in Munich, Germany
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Research interests

- Industrial biotechnology at the interface of microbiology, fermentation technology, genetic engineering and systems biology
- Development of carbon- and energy-efficient bioproduction scenarios
- Metabolic and bioprocess engineering of non-model microorganisms
- Sustainable bioprocessing based on microbial gas fermentation and conversion of liquid one-carbon feedstocks
- Metabolism and physiology of acetogens and thermophilic bacteria
- Adaptive laboratory evolution to breed and improve robust production strains
- Process integration, monitoring and control

Education

06/10-10/13 **PhD study "Biotechnology"** at the University of Natural Resources and Life Sciences BOKU, Vienna, Austria

10/13 **Ph.D. degree (Dr. nat. techn.)** graduated with distinction

Thesis title: "Heading for industrial production of 1,3-propanediol from glycerol with *Lactobacillus diolivorans*"
PhD Supervisor: Prof. Michael Sauer (BOKU)

10/05-09/09 **Study "Biotechnology"** at the Weihenstephan University of Applied Sciences, Germany

09/09 Diploma (Dipl.-Ing FH)
03/09-09/09 Diploma thesis at BOKU, Vienna

Professional Experience

01/16-present Research Area "Biochemical Engineering" at **TU Wien**, Vienna, Austria

since 07/23 **Assistant Professor**
since 01/23 **Tenure track** position "Industrial Biotechnology"
since 01/16 **Group leader** "Sustainable Bioprocess Solutions"
01/16-06/23 **University Assistant**

07/14-06/15 **Visiting Postdoc** at the University of Kent, School of Biosciences, Prof. M. Warren, UK

10/13-12/15 **Post-Doc** at the Department of Biotechnology, University of Natural Resources and Life Sciences (BOKU), Austria

Awards

06/22 **FWF START prize** – highest basic research award in Austria (1.2 M€, 6 years)

06/22 **3rd place „Pro Didactica" teaching awards** organized by students of the Faculty Technical Chemistry at TU Wien in the category "Best supervision & documents"

2020 **1st place „Pro Didactica" teaching awards** organized by students of the Faculty Technical Chemistry at TU Wien in the categories "Best practical laboratory course" and "Best supervision & documents"

2020 **1st prize, ICEBE project award** (TU Wien internal), project: CO_2Refinery

2017 **1st prize, ICEBE project award** (TU Wien internal), project: gas-to-products

Teaching

Since 2016 Lecturer – BSc level – Seminar "Biochemistry" (Enzymes/kinetics, Fermentation), Technische Universität Wien, Austria

Since 2016 Lecturer – BSc level – Practical Course "Chemical engineering" (Bioreactors), Technische Universität Wien, Austria

Since 2018 Lecturer – MSc level – Practical Course "Bioprocess Technology and Bioanalytics", Technische Universität Wien, Austria

Since 2019 Lecturer – MSc level – Lecture "Biology and genetics of industrial microorganisms" (lecture on physiology and biochemistry of C1 utilizing microorganisms), Technische Universität Wien, Austria

Since 2019 Lecturer – BSc level – Practical Course "Biochemistry and Biotechnology", Technische Universität Wien, Austria

Projects (total funding acquired = 3.2 million Euros)

Project summary[1]:

FWF	1 project (1,200 k€)
FFG	3 projects (912 k€)
CD Laboratory	1 project, work package leader (599 k€)
Industrial R&D	5 projects (477 k€)

List of active projects

11/22-10/28 PI of the FWF START prize project "FORBIX – formate-based acetogenic bioproduction of fuels and chemicals"

01/22-09/23 Work package leader and PI in the CD laboratory "CAZy" with CIRCE Biotechnologie GmbH

06/21-05/25 PI and faculty member of the doctoral school "CO_2Refinery" at TU Wien

04/20-03/24 PI and work package leader of the FFG project "Up-Whey" for microbial whey upgrading, with tbwr GmbH, TU Graz, FH Nordwestschweiz, NÖM, Prolactal

10/19-03/23 PI and consortium leader of the FFG project "SUJECO – sustainable jetfuel from CO_2" with OMV, voestalpine, Austrian Airlines, K1-MET, Montanuniversität Leoben

[1] FWF: Austrian Science Fund, basic research, FFG: Austrian Research Promotion Agency, applied research, CD Laboratory (Christian Doppler Society), applied basic research.

Reviewing and editorial activities and memberships in scientific societies

Reviewing and editing:

2016 –	Reviewer, FEMS Microbiology Letters
2017 –	Reviewer, Bioresource Technology
2017 –	Reviewer, Photosynthesis Research
2017 –	Reviewer, Applied Biochemistry and Biotechnology
2017 –	Reviewer, Biomass Conversion and Biorefinery
2018 –	Reviewer, Journal of Environmental Chemical Engineering
2018 –	Reviewer, Journal of Biotechnology
2019 –	Reviewer, Nature Scientific Reports
2019 –	Reviewer, Microbial Cell Factories
2019 –	Reviewer, Journal of Agricultural and Food Chemistry
2020 –	Reviewer, Microorganisms
2020 –	Reviewer, Microbial Biotechnology
2020 –	Guest Editor, International Journal of Environmental Research and Public Health “Industrial Microbiology”
2021 –	Reviewer, Essays in Biochemistry
2021 –	Guest Editor, Fermentation, “Process Intensification in Microbial Biotechnology”
2022 -	Guest Editor, Frontiers in Bioengineering, “Aerobic and Anaerobic Fermentation of Gaseous and Liquid One Carbon Feedstocks to Produce Food, Feed, Biopolymers and Value-added Products”
2022 -	Reviewer Editor, Frontiers in Microbiology

Memberships in scientific societies:

2015 –	Member, Austrian Association of Molecular Life Sciences and Biotechnology (ÖGMBT), Austria
2019 –	Member, Society of Industrial Microbiology and Biotechnology (SIMB), USA

Scientific dissemination and supervision

Dissemination:

SCI-publications:	27	Patents:	1
First author:	3	Patent applications:	1
Last/corresponding author:	20	Book chapters:	1
h-index:	15	Talks at int. conferences:	7
Citations:	950	Poster at int. conferences:	>20

(google scholar: 26/07/2023)

https://scholar.google.com/citations?user=qzyPL5IAAAAJ&hl=de

Direct supervision and co-supervision of completed and ongoing academic theses/projects:

BSc theses:	13 (1)	MSc theses:	25 (3)
PhD theses:	13 (6)	Postdocs:	2 (1)

(number) indicates current supervisions.

Publication list: Stefan Pflügl

Research articles in peer-reviewed journals

* corresponding author, articles in **bold** are most relevant for this proposal.

1. Hocq R., Bottone S., Gautier A., **Pflügl S. ***. A fluorescent reporter system for anaerobic thermophiles. Frontiers in Bioengineering, 2023, 11. https://doi.org/10.3389/fbioe.2023.1226889
2. Mainka T., Herwig C., **Pflügl S. ***. Optimized Operating Conditions for a Biological Treatment Process of Industrial Residual Process Brine Using a Halophilic Mixed Culture. Fermentation, 2022, 8(6), 246. https://doi.org/10.3390/fermentation8060246
3. Mainka T., Herwig C., **Pflügl S. ***. Reducing Organic Load From Industrial Residual Process Brine With a Novel Halophilic Mixed Culture: Scale-Up and Long-Term Piloting of an Integrated Bioprocess. Frontiers in Bioengineering and Biotechnology, 2022, 10, 896576. https://www.frontiersin.org/articles/10.3389/fbioe.2022.896576/full
4. Vees C. A., Herwig C., **Pflügl S. ***. Mixotrophic co-utilization of glucose and carbon monoxide boosts ethanol and butanol productivity of continuous *Clostridium carboxidivorans* cultures. Bioresource Technology, 2022, 353, 127138. https://doi.org/10.1016/j.biortech.2022.127138
5. Neuendorf C. S., Vignolle G., Derntl C., Tomin T., Novak K., Mach R. L., Birner-Grünberger R., **Pflügl S**. *****. A quantitative metabolic analysis reveals *Acetobacterium woodii* as a flexible and robust host for formate-based bioproduction. Metabolic Engineering, 2021, 68, 68-85. https://doi.org/10.1016/j.ymben.2021.09.004
6. Boecker S., Harder B.-J., Kutscha R., **Pflügl S.**, Klamt S. Increasing ATP turnover boosts productivity of 2,3-butanediol synthesis in *Escherichia coli*. Microbial Cell Factories, 2021, 20(1). https://doi.org/10.1186/s12934-021-01554-x
7. Mainka T., Weirathmüller D., Herwig C., **Pflügl S. ***. Potential applications of halophilic microorganisms for biological treatment of industrial process brines contaminated with aromatics. Journal of Industrial Microbiology and Biotechnology, 2021, https://doi.org/10.1093/jimb/kuab015
8. Novak K., Neuendorf C. S., Kofler I., Kieberger N., Klamt S., **Pflügl S.** *. Blending industrial blast furnace gas with H_2 enables *Acetobacterium woodii* to efficiently co-utilize CO, CO_2 and H_2. Bioresource Technology, 2021, 323, 124573. https://doi.org/10.1016/j.biortech.2020.124573
9. Novak K., Kutscha R., **Pflügl S.** * Microbial upgrading of acetate into 2,3-butanediol and acetoin by *E. coli* W. Biotechnology for Biofuels, 2020, 13(1), 177. https://doi.org/10.1186/s13068-020-01816-7
10. Novak K., Baar J., Freitag P., **Pflügl S.** *. Metabolic engineering of *Escherichia coli* W for isobutanol production on chemically defined medium and cheese whey as alternative raw material. Journal of Industrial Microbiology and Biotechnology, 47(12), pp. 1117–1132. https://doi.org/10.1007/s10295-020-02319-y
11. Kutscha R., **Pflügl S**.* Microbial upgrading of acetate into value-added products—examining microbial diversity, bioenergetic constraints and metabolic engineering approaches. International Journal of Molecular Sciences, 2020, 21(22), pp. 1–30, 8777. https://doi.org/10.3390/ijms21228777
12. Vees C. A., Neuendorf C. S., **Pflügl S**.* Towards continuous industrial bioprocessing with solventogenic and acetogenic clostridia: challenges, progress and perspectives.

Journal of Industrial Microbiology and Biotechnology, 2020, 47(9-10), pp. 753–787. https://doi.org/10.1007/s10295-020-02296-2
13. Erian A. M., Freitag P., Gibisch M., **Pflügl S**.* High rate 2,3-butanediol production with *Vibrio natriegens*. Bioresource Technology Reports, 2020. https://doi.org/10.1016/j.biteb.2020.100408
14. Vees C. A., Veiter C., Sax F., Herwig C., **Pflügl S**.* A robust flow cytometry-based biomass monitoring tool enables rapid at-line characterization of *S. cerevisiae* physiology during continuous bioprocessing of spent sulfite liquor. Analytical and Bioanalytical Chemistry, 2020. https://doi.org/10.1007/s00216-020-02423-z
15. Mainka T., Mahler N., Herwig C. **Pflügl S**.* Soft Sensor-Based Monitoring and Efficient Control Strategies of Biomass Concentration for Continuous Cultures of *Haloferax mediterranei* and Their Application to an Industrial Production Chain. Microorganisms, 2019. https://doi.org/10.3390/microorganisms7120648
16. Erian A. M., Gibisch M., **Pflügl S.*** Engineered *E. coli* W enables efficient 2,3-butanediol production from glucose and sugar beet molasses using defined minimal medium as eco-nomic basis. Microbial Cell Factories, 2018. https://doi.org/10.1186/s12934-018-1038-0
17. Novak K., **Pflügl S.*** Towards biobased industry: Acetate as a promising feedstock to enhance the potential of microbial cell factories. FEMS Microbiology Letters, 2018. https://doi.org/10.1093/femsle/fny226
18. Novak K., Flöckner L., Erian A. M., Freitag P., Herwig C., **Pflügl S.*** Characterizing the effect of expression of an acetyl-CoA synthetase insensitive to acetylation on co-utilization of glucose and acetate in batch and continuous cultures of *E. coli* W. Microbial Cell Factories, 2018. https://doi.org/10.1186/s12934-018-0955-2
19. Kamravamanesh D., Kovacs T., **Pflügl S.***, Druzhinina I., Kroll P., Lackner M., Herwig C. Increased poly-B-hydroxybutyrate production from carbon dioxide in randomly mutated cells of cyanobacterial strain *Synechocystis* sp. PCC 6714: Mutant generation and Characterization. Bioresource Technology, 2018. https://doi.org/10.1016/j.biortech.2018.06.057
20. Mahler N., Tschirren S., **Pflügl S.***, Herwig C. Optimized bioreactor setup for scale-up studies of extreme halophilic cultures. Biochemical Engineering Journal, 2018. 130: p. 39-46. https://doi.org/10.1016/j.bej.2017.11.006
21. Kamravamanesh D., **Pflügl S.***, Nischkauer W., Limbeck A., Lackner M., Herwig C. Photosynthetic poly-β-hydroxybutyrate accumulation in unicellular cyanobacterium *Synechocystis* sp. PCC 6714. AMB Express, 2017, 7(1). https://doi.org/10.1186/s13568-017-0443-9
22. Nocon J., Steiger M. G., Pfeffer M., Sohn S. B., Kim T. Y., Rußmayer H., **Pflügl S.**, Haberhauer-Troyer C., Ortmayr K., Koellensperger G., Gasser G., Lee S. Y., Mattanovich D. Metabolic model-based prediction of engineering targets for increased production of heterologous proteins. New Biotechnology, 2014. https://doi.org/10.1016/j.nbt.2014.05.947
23. Nocon J., Steiger M. G., Pfeffer M., Sohn S. B., Kim T. Y., Maurer M., Rußmayer H., **Pflügl S.**, Ask, M., Haberhauer-Troyer C., Ortmayr K., Hann S., Koellensperger G., Gasser G., Lee S. Y., Mattanovich D. Model based engineering of *Pichia pastoris* central metabolism enhances recombinant protein production. Metabolic Engineering, 2014, 24, pp. 129-138. https://doi.org/10.1016/j.ymben.2014.05.011

24. **Pflügl S.**, Marx H., Mattanovich D., Sauer M. Heading for an economic industrial upgrading of crude glycerol from biodiesel production to 1,3-propanediol by *Lactobacillus diolivorans*. Bioresource Technology, 2013, 152, pp. 499-504. https://doi.org/10.1016/j.biortech.2013.11.041
25. Dragosits M., **Pflügl S.**, Kurz S., Razzazi-Fazelli E., Wilson I. B. H., Rendic D. Recombinant *Aspergillus* ß-galactosidases as a robust glycomic and biotechnological tool, Applied Microbiology and Biotechnology, 2014, 98 (8), pp. 3553-67. https://doi.org/10.1007/s00253-013-5192-3
26. **Pflügl S.**, Marx H., Mattanovich D., Sauer M. Genetic engineering of *Lactobacillus diolivorans*. FEMS Microbiology Letters, 2013, 344 (2), pp. 152-158. https://doi.org/10.1111/1574-6968.12168
27. **Pflügl S.**, Marx H., Mattanovich D., Sauer M. 1,3-Propanediol production from glycerol with *Lactobacillus diolivorans*. Bioresource Technology, 2012, 119, pp. 133-40. https://doi.org/10.1016/j.biortech.2012.05.121

Patent

1. Pflügl S., Horvath, J., Hocq, R. Acetogenic fermentation of carbon monoxide gas. Application number: A50333/2023, filed 03.05.2023.
2. Sauer M., Marx H., **Pflügl S**., Mattanovich D. Fermentation process for producing chemicals. patent owner: Vogelbusch GmbH, publication number: EP2738266 A3, 27.08.2014

Book chapter

1. Marx H., **Pflügl S**., Mattanovich D., Sauer M., Synthetic biology assisting metabolic pathway engineering. Book chapter in “Synthetic biology”, Springer, 2016, pp. 255-280 https://doi.org/10.1007/978-3-319-22708-5_7