

list of publications & press releases

selected press releases & youtube videos



Mit Biotech die Welt retten. Geht das?

Online-Wissensmagazin zur Bio-Innovation für nachhaltige Zukünfte
Konzept: Futurium | Produktion: Februar Film | Moderation: Barbara Scherle

Folge 1: Mit Biotech die Welt retten. Geht das? | Faktencheck

Begriffe erklären, Konzepte verstehen: Was könnte Biotechnologie ändern? Was sind die Innovationen, an die wir heute noch nicht einmal denken, die in 50 Jahren zu unserem Alltag gehören könnten? Werden sie ökologisch, sozial und wirtschaftlich nachhaltig sein?

Mit: Anneli Rodriguez (Produktdesignerin bei „Onno Bruu“), Daniela Thrän (Helmholtz-Zentrum für Umweltforschung), Dörte Rother (Forschungszentrum Jülich) und Siegfried Behrendt (Institut für Zukunftsstudien und Technologiebewertung)

<https://www.youtube.com/playlist?list=PL1IO4YK4FC3ht0p1L77nqKF6sjdNkUk03>

<https://www.facebook.com/futuriumD/videos/786937728749330/>

Video "MyScience", RWTH Aachen University: Prof. Dörte Rother

<https://www.youtube.com/watch?v=Nil-j8a218w>

DECHEMA Price 2019. Press release of DECHEMA:

https://dechema.de/Presse/Pressemitteilungen/1_2019+DECHEMA_Preis+Rother-p-20113665.html

Author Interview Newsletter (26.03.2019):

<https://dechema.wordpress.com/2019/03/26/wettbewerbsfahige-enzymkaskaden/>

Die Meisterin der Enzyme. Portrait in: **Helmholtz Perspektiven**- Das Forschungsmagazin der Helmholtz-Gemeinschaft. 01/2019: 40-42

10 Köpfe für unsere Zukunft – Nachwuchsforscher aus NRW. **Bild online**. 18.10.2017.
<http://www.bild.de/regional/ruhrgebiet/forschung/10-koepfe-fuer-unsere-zukunft-53561054.bild.html>

Publications in peer-reviewed journals

Claaßen C, Mack M, Rother D. **2019**. Benchtop NMR for online reaction monitoring of the biocatalytic synthesis of aromatic amino alcohols. *ChemCatChem*. 12(4): 1190-1199

Contente M L, Dall'Oglio F, Annunziata F, Molinari F, Rabuffetti M, Romano D, Tamborini L, Rother D, Pinto A. **2019**. Stereoselective reduction of prochiral cyclic 1,3-diketones using different biocatalysts. *Catalysis Letters* 1-10

Erdmann V, Sehl T, Frindi-Wosch I, Simon R C, Kroutil W, Rother D. **2019**. Methoxamine Synthesis in a Biocatalytic 1-Pot 2 Step Cascade Approach. *ACS Catal.* 9 (8): 7380-7388

Claaßen C, Gerlach T, Rother D. **2019**. Stimulus-Responsive Regulation of Enzyme Activity for One-Step and Multi-Step Syntheses. *Adv. Synth. Catal.* 361(11): 2387–2401

Kulig J, Sehl T, Mackfeld U, Wiechert W, Pohl M, Rother D. **2019**. An Enzymatic 2-Step Cofactor and Co-Product Recycling Cascade towards a Chiral 1,2-Diol. Part I: Cascade Design. *Adv. Synth. Catal.* 10.1002/adsc.201900187

Oeggel R, Neumann T, Gätgens J, Romano D, Noack S, Rother D. **2018**. Citrate as Cost-efficient NADPH regenerating agent. *Front. Bioeng. Biotechnol.* 6 (196)

Oeggel R, Maßmann T, Jupke A, Rother D. **2018**. Four Atom Efficient Enzyme Cascades for All 4-Methoxyphenyl-1,2-propanediol Isomers Including Product Crystallization Targeting High Product Concentrations and Excellent *E*-Factors. *ACS Sustainable Chem. Eng.* 6 (9): 11819–11826

Zhang W, Fernández-Fueyo E, Ni Y, van Schie M, Gacs J, Renerie R, Wever R, Mutti F, Rother D, Alcalde M, Hollmann F. **2018**. Selective aerobic oxidation reactions using a combination of photocatalytic water oxidation and enzymatic oxyfunctionalisations. *Nature Catal.* 1 (1): 55-62

Döbber J, Gerlach T, Offermann H, Rother D, Pohl M. **2018**. Closing the gap for efficient immobilization of biocatalysts in continuous processes: HaloTag TM fusion enzymes for a continuous enzymatic cascade towards a vicinal chiral diol. *Green Chem.* 20: 544 - 552

Erdmann V, Lichman B R, Zhao J, Simon R C, Kroutil W, Ward J M, Hailes H C, Rother D. **2017**. Enzymatic and chemoenzymatic 3-step cascades for the synthesis of stereochemically complementary trisubstituted tetrahydroisoquinolines. *Angew. Chem. Int. Ed.* 56 (41): 12503-12507

Maugeri Z and Rother D. **2017**. Reductive Amination of Ketones Catalyzed by Whole Cell Biocatalysts Containing Imine Reductases (IREDs). *J. Biotechnol.* 258: 167 - 170

Schmidt S, de Almeida T P, Rother D, Hollmann F. **2017**. Towards environmentally acceptable synthesis of chiral α -hydroxy ketones via oxidase-lyase cascades. *Green Chem.* 19 (5): 1226-1229

Sehl T, Bock S, Marx L, Maugeri Z, Walter L, Westphal R, Vogel C, Menyes U, Erhardt M, Müller M, Pohl M, Rother D. **2017**. Asymmetric synthesis of (*S*)-phenylacetylcarbinol—closing a gap in C–C bond formation. *Green Chem.* 19: 380-384

Wachtmeister J, Jakoblinnert A, Rother D. **2016**. Stereoselective Two-Step Biocatalysis in Organic Solvent: Toward All Stereoisomers of a 1,2-Diol at High Product Concentrations. *Org. Process Res. Dev.* 20 (10): 1744–1753

Buchholz P C F, Vogel C, Reusch W, Pohl M, Rother D, Spieß A, Pleiss J. **2016**. BioCatNet: a database system for the integration of enzyme sequences and biocatalytic experiments. *ChemBioChem* 17 (21): 2093–2098

Wachtmeister J, Rother D. **2016**. Recent advances in whole cell biocatalysis techniques bridging from investigative to industrial scale. *Curr. Opin. Biotechnol.* 42: 169–177.

Maugeri Z and Rother D. **2016**. Application of imine reductases (IREDs) in micro-aqueous reaction systems. *Adv. Syn. Catal.* 358 (17): 2745-2750

Beigi M, Gauchenova E, Walter L, Waltzer S, Bonina F, Stillger T, Rother D, Pohl M, Müller M. **2016**. Regio- and Stereoselective Aliphatic-Aromatic Cross-Benzoin Reaction: Enzymatic Divergent Catalysis. *Chem. Eur. J.* 22 (39): 13000-14005

Wachtmeister J, Mennicken P, Hunold A, Rother D. **2016**. Modularized Biocatalysis: Immobilization of whole cells for preparative applications in micro-aqueous organic solvents. *ChemCatChem* 8 (3): 607-614

García-Junceda E, Lavandera I, Rother D, Schrittwieser J H. **2015**. (Chemo)enzymatic cascades – Nature's synthetic strategy transferred to the laboratory. *J. Mol. Cat. B: Enzym.* 114: 1-6.

Sehl T, Maugeri Z, Rother D. **2015**. Multi-step synthesis strategies towards 1,2-amino alcohols with special emphasis on phenylpropanolamines. *J. Mol. Cat. B: Enzym.* 114: 65-71.

Holec C, Sandkuhl D, Rother D, Kroutil W, Pietruszka J. **2015**. Chemoenzymatic Synthesis towards the Active Agent Travoprost. *ChemCatChem* 7: 3125-3130

Westphal R, Vogel C, Schmitz C, Pleiss J, Müller M, Pohl M, Rother D. **2014**. A Tailor-made Chimeric Thiamine Enzyme for the Direct Asymmetric Synthesis of (*S*)-Benzoin. *Angew. Chem. Int. Ed.* 53 (35): 9376-9379.

Ein maßgeschneidertes chimäres Thiamindiphosphat-abhängiges Enzym zur direkten asymmetrischen Synthese von (*S*)-Benzoinen. *Angew. Chem.* 126 (35): 9530-9533.

Erdmann V, Mackfeld U, Rother D, Jakoblinnert A. **2014**. Enantioselective, continuous (*R*)- and (*S*)-2-butanol synthesis: achieving high space-time-yields with recombinant *E. coli* cells in a micro-aqueous, solvent-free reaction system. *J. Biotechnol.* 191: 106-112.

Jakoblinnert A, Rother D. **2014**. A two-step biocatalytic cascade in micro-aqueous medium: using whole cells to obtain high concentrations of a vicinal diol. *Green Chem.* 16: 3472-3482.

Sehl T, Hailes H C, Ward J M, Menyes U, Pohl M, Rother D. **2014**. Efficient two-step biocatalytic strategies for the synthesis of all nor(pseudo)ephedrine isomers. *Green Chem.* 16: 3341-3348.

Wachtmeister J, Jakoblinnert A, Kulig J, Offermann H, Rother D. **2014**. Whole Cell Teabag Catalysis for the Modularisation of Synthetic Enzyme Cascades in Micro-Aqueous Systems. *ChemCatChem*. 6 (4): 1051-1058.

Man H, Kedziora K, Kulig J, Frank A, Lavandera-García I, Gotor-Fernández V, Rother D, Hart S, Turkenburg J P, Grogan G. **2014**. Structures of alcohol dehydrogenases from *Ralstonia* and *Sphingobium* spp. reveal the molecular basis for their recognition of 'bulky-bulky' ketones. *Top. Catal.* 57:356-365.

Baraibar A G, von Lieres E, Wiechert W, Pohl M, Rother D. **2014**. Effective (*S*)- α -hydroxy ketone production: a reaction engineering approach. *Top. Catal.* 57: 401-411

Sehl T, Hailes H C, Ward J M, Wardenga R, von Lieres E, Offermann H, Westphal R, Pohl M, Rother D. **2013**. Two Steps in One Pot: Enzyme Cascade for the Synthesis of Nor(pseudo)ephedrine from Inexpensive Starting Materials. *Angew. Chem. Int. Ed.* 52 (26):6772-6775.

Zwei Schritte in einem Reaktionsgefäß: Enzymkaskaden zur selektiven Synthese von Nor(pseudo)ephedrin aus kostengünstigen Ausgangsmaterialien. *Angew. Chem.* 125 (26): 6904-6908.

Hailes H, Rother D, Müller M, Westphal R, Ward J M, Pleiss J, Pohl M. **2013**. Engineering Stereoselectivity of ThDP-dependent Enzymes. *FEBS J.* 280 (24): 6374-6394.

Baraibar A G, von Lieres E, Wiechert W, Pohl M, Rother D. **2013**. Effective (*S*)- α -hydroxy ketone production: a reaction engineering approach. *Top. Catal.* 57: 401-411

Westphal R, Jansen S, Vogel C, Pleiss J, Müller M, Rother D, Pohl P. **2013**. MenD from *Bacillus subtilis*: A potent catalyst for the enantiocomplementary asymmetric synthesis of functionalized α -hydroxy ketones. *ChemCatChem*. 6 (4): 1082–1088.

Man H, Kedziora K, Kulig J, Frank A, Lavandera-García I, Gotor-Fernández V, Rother D, Hart S, Turkenburg J P, Grogan G. **2013**. Structures of alcohol dehydrogenases from *Ralstonia* and *Sphingobium* spp. reveal the molecular basis for their recognition of 'bulky-bulky' ketones. *Top. Catal.* 57:356-365.

Westphal R, Hahn D, Mackfeld U, Waltzer S, Beigi M, Widmann M, Vogel C, Pleiss J, Müller M, Rother D, Pohl P. **2013**. Tailoring (S)-selectivity of MenD from *Escherichia coli*. ChemCatChem. 5 (12): 3587-3594.

Westphal R, Waltzer S, Mackfeld U, Widmann M, Pleiss J, Beigi M, Müller M, Rother D, Pohl P. **2013**. (S)-selective MenD variants from *Escherichia coli* provide access to new functionalized chiral α -hydroxy ketones. Chem. Commun. 49: 2061-2063.

Kulig J, Frese A, Kroutil W, Pohl M, Rother D. **2013**. Biochemical characterization of an alcohol dehydrogenase from *Ralstonia sp.* Biotech. Bioeng. 110 (7): 1838-1848.

Sehl T, Simon R C, Hailes H C, Ward J M, Schell U, Pohl M, Rother D. **2012**. TTC-based screening assay for ω -transaminases: a rapid method to detect reduction of 2-hydroxy ketones. J. Biotechnol., 159: 188-194.

Kulig J, Simon R C, Rose C A, Husain S M, Häckh M, Lüdeke S, Zeitler K, Kroutil W, Pohl M, Rother D. **2012**. Stereoselective synthesis of bulky 1,2-diols with alcohol dehydrogenases. Catal. Sci. Technol., 2: 1580-1589.

Gerhards T, Mackfeld U, Bocola M, von Lieres E, Wiechert W, Pohl M, Rother D. **2012**. Influence of organic solvents on enzymatic asymmetric carbonylations. Adv. Synth. Catal., 354: 2805-2820.

Rother D, Kolter G, Gerhards T, Berthold CL, Gauchenova E, Knoll M, Pleiss J, Müller M, Schneider G, Pohl M. **2011**. (S)-selective mixed benzoin condensation by structure-based design of the pyruvate decarboxylase from *Acetobacter pasteurianus*. ChemCatChem 3 (10): 1587-1596.

Khatri NK, Gocke D, Trentmann O, Neubauer P, Hoffmann F. **2011**. Single-chain antibody fragment production in *Pichia pastoris*: Benefits of prolonged pre-induction glycerol feeding. Biotechnol. J. 6 (4): 452-462.

Gocke D, Kolter G, Müller M, Pohl M. **2010**. Entwicklung einer Enzym-Plattform für die biokatalytische C-C Verknüpfung. Chem. Ing. Tech. 82: 81-86.

Gocke D, Graf T, Brosi H, Frindi-Wosch I, Walter L, Müller M, Pohl M. Comparative characterisation of thiamin diphosphate-dependent decarboxylases. **2009**. J. Mol. Catal. B: Enzym. 61: 30-35.

Müller M, Gocke D, Pohl M. **2009**. Thiamin diphosphate in biological chemistry: Exploitation of ThDP-dependent enzymes for asymmetric chemoenzymatic synthesis. FEBS J. 276 (11): 2894-2940.

Gocke D, Walter L, Gauchenova E, Kolter G, Knoll M, Berthold CL, Schneider G, Pleiss J, Müller M, Pohl M. **2008**. Rational protein design of ThDP-dependent enzymes: engineering stereoselectivity. ChemBioChem 9: 406-412.

Gocke D, Nguyen CL, Pohl M, Stillger T, Walter L, Müller M. **2007**. Branched-chain keto acid decarboxylase from *Lactococcus lactis* (KdcA), a valuable thiamine diphosphate-dependent enzyme for asymmetric C-C bond formation. Adv. Synth. Catal. 349: 1425-1435.

Berthold CL, Gocke D, Wood MD, Leeper FJ, Pohl M, Schneider G. **2007**. Crystal structure of the branched-chain keto acid decarboxylase (KdcA) from *Lactococcus lactis* provides insights into the structural basis for the chemo- and enantioselective carbonylation reaction. Acta Crystallogr. Sec. D: Biol. Crystallogr. 63: 1217-1224.

Spaepen S, Versées W, Gocke D, Pohl M, Steyaert J, Vanderleyden J. **2007**. Characterization of phenylpyruvate decarboxylase, involved in auxin production of *Azospirillum brasilense*. J. Bacteriol. 189 (21): 7626-7633.

Domínguez de María P, Pohl M, Gocke D, Gröger H, Trauthwein H, Walter L, Müller M. **2007**. Asymmetric synthesis of aliphatic 2-hydroxy ketones by enzymatic carbonylation of aldehydes. Eur. J. Org. Chem.: 2940-2944.

Hischer T, Gocke D, Fernandez M, Hoyos P, Alcantara AR, Sinisterra JV, Hartmeier W, Ansorge-Schumacher MB. **2005**. Stereoselective synthesis of novel benzoin catalysed by benzaldehyde lyase in a gel-stabilised two-phase system. *Tetrahedron* 61(31): 7378-7383.

monographs

Sehl T, Kulig J, Westphal R, Rother D. **2015**. Synthetic enzyme cascades for valuable diols and amino alcohols – smart composition and optimization strategies. Grunwald P, editor. *Industrial Biocatalysis*. Pan Stanford Publishing Pte. Ltd., Singapore, ISBN 978-981-4463-88-1 (Hardcover), 978-981-4463-89-8 (eBook)

Pohl M, Gocke D, Müller M. **2008**. Thiamin-based Enzymes for Biotransformations. Anastas PT, Crabtree RH, editors. *Handbook of Green Chemistry – Green Catalysis*. Weinheim: WILEY-VCH Verlag GmbH & Co. KGaA. S. 75-114.

Gocke D. **2008**. New and optimised thiamine diphosphate (ThDP)-dependent enzymes for carbonylation - Creation of a toolbox for chiral 2-hydroxy ketones. Institute of Molecular Enzyme Technology, Heinrich-Heine-University Düsseldorf, PhD-thesis.

patents

Sehl T, Baraibar A G, Pohl M, Rother D. Verfahren zur Herstellung von Cathin durch Kopplung einer (S)-selektiven Lyase und einer (S)-selektiven Transaminase. patent filed: 10.06.2013

PCT/EP patent 3008198, patent granted: 10.05.2017

US-patent 9,890,406, patent granted: 13.02.2018

Japanese patent 6427176, granted: 02.11.2018

Indian patent 317326, granted: 31.07.2019

Sehl T, Marx L, Westphal R, Pohl M, Rother D. Lyase und für die DNA kodierende DNA, die DNA enthaltenden Vektoren sowie Verfahren zur asymmetrischen Synthese von (S)-Phenylacetylcarbinol. reference file: 10 2014 013 644.2. patent filed 16.09.2014

US-patent 10,006,061, patent granted: 26.06.2018

PCT/EP patent 3194587, patent granted: 14.08.2019