

PROGRAMME

13 – 17 September 2021 · Online Event

German Conference on Synthetic Biology (GCSB 2021) Engineering Living Systems

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Monday, 13 September 2021

10:50 **Opening and Technical Remarks**

Keynote Lectures

*Chair: W. Wiechert, Forschungszentrum Jülich GmbH/D*10:55 **KEYNOTE LECTURE 1**
Hidden protein functions and their relevance for Synthetic Biology
P. Schwillé¹; ¹ Max-Planck-Institut für Biochemie, Martinsried/D11:30 **Discussion**11:35 **KEYNOTE LECTURE 2**
Synthetic genetics: beyond DNA and RNA
P. Holliger¹; ¹ UKRI, Cambridge/UK12:10 **Discussion**12:15 **Lunch Break and Meet your Colleagues on Platform Wonder***Chair: K. Schürle, DECHEMA e.V., Frankfurt am Main/D*13:45 **Poster Flash Talks I (P5.01, P2.03, P6.03, P4.02, P2.05, P3.02, P3.01, P6.01)**14:15 **Coffee Break**14:25 **Poster Flash Talks II (P6.02, P4.01, P7.01, P2.02, P2.06, P2.01, P2.07, P2.04)**14:55 **Coffee Break***Chair: W. Wiechert, Forschungszentrum Jülich GmbH/D*15:05 **KEYNOTE LECTURE 3**
Engineering microbes to grow materials with DNA-programmed functionalities
T. Ellis¹; ¹ Imperial College London/UK15:40 **Discussion**

SynBioArt

*Chair: V. Meyer, Technische Universität Berlin/D*15:45 **KEYNOTE LECTURE 4**
Biofabricating fantastic synthetic life stories
O. Catts¹; ¹ SymbioticA, The University of Western Australia, Perth/AUS16:20 **The colors of microlife: exploring color as a path to human empathy for microorganisms**
S. Sharma¹; V. Meyer¹; ¹ TU Berlin/D16:40 **KEYNOTE LECTURE 5**
The practical genesis of modern biological meaning
P. Ross¹; ¹ MycoWorks, Emeryville, CA/USA17:15 **Discussion**17:30 **Coffee Break**

Keynote Lecture

*Chair: H. Wagner, Universität Freiburg/D*17:40 **KEYNOTE LECTURE 6**
Computational design of reprogrammed and new protein functions
T. Kortemme¹; ¹ University of California in San Francisco, CA/USA18:15 **Discussion**18:20 **Closing of the day 1**

Tuesday, 14 September 2021

09:30	Opening and Technical Remarks
	Smart Materials and Synthetic Protocells
	<i>Chair: M. Zurbriggen, Heinrich-Heine Universität, Düsseldorf/D</i>
09:35	KEYNOTE LECTURE 7 Synthetic biological strategies to design functional materials W. Weber ¹ ; ¹ Universität Freiburg/D
10:10	Living therapeutic materials – hydrogel-confined bacteria for smart drug delivery S. Sankaran ¹ ; P. Dhakane ¹ ; S. Bhusari ¹ ; S. Dey ¹ ; M. Blanch Asensio ¹ ; F. Riedel ¹ ; A. del Campo ¹ ; ¹ INM - Leibniz Institute for New Materials, Saarbrücken/D
10:30	Discussion
10:40	Coffee Break
	Biomedical Applications
	<i>Chair: G. Hensel, Heinrich-Heine Universität, Düsseldorf/D</i>
10:50	KEYNOTE LECTURE 8 Organoids for disease modelling in gastrointestinal cancer D. Stange ¹ ; ¹ Uniklinikum Dresden/D
11:25	Living therapeutic materials for sustained drug release P. Dhakane ¹ ; S. Sankaran ¹ ; A. del Campo ¹ ; ¹ INM - Leibniz Institute for New Materials, Saarbrücken/D
11:45	Living therapeutic devices: marrying synthetic biology with materials science S. Bhusari ¹ ; S. Sankaran ¹ ; A. del Campo ¹ ; ¹ INM - Leibniz Institute for New Materials, Saarbrücken/D
12:05	Discussion
12:20	Lunch Break and Meet your Colleagues on Platform <i>Wonder</i> <i>Chair: G. Hensel, Heinrich-Heine Universität, Düsseldorf/D</i>
13:20	KEYNOTE LECTURE 9 Harnessing the CRISPR toolbox to engineer biology R. Platt ¹ ; ¹ ETH Zurich/CH
13:55	DTPA-Receptor – a novel reporter gene system for specific and sensitive in vivo imaging using positron emission tomography (PET) V. Morath ¹ ; K. Fritschle ¹ ; M. Zivanic ¹ ; M. Anneser ¹ ; S. Robu ¹ ; L. Krumwiede ¹ ; S. Dötsch ¹ ; L. Warmuth ¹ ; T. Bozoglu ¹ ; S. Kossatz ¹ ; C. Kupatt ¹ ; K. Steiger ¹ ; M. Schwaiger ¹ ; D. Busch ¹ ; A. Skerra ¹ ; W. Weber ¹ ; ¹ Technical University of Munich/D
14:15	Discussion
14:25	Coffee Break <i>Chair: G. Westmeyer, Technische Universität München/D</i>
14:35	Metabolic engineering of <i>Corynebacterium glutamicum</i> for production of scyllo-inositol, a drug candidate against Alzheimer's disease P. Ramp ¹ ; A. Lehnert ¹ ; S. Matamouros ¹ ; A. Wirtz ¹ ; M. Baumgart ¹ ; M. Bott ¹ ; ¹ Forschungszentrum Jülich GmbH/D
14:55	Engineered living electrospun meshes for therapeutic applications M. Puertas Bartolomé ¹ ; A. del Campo ¹ ; ¹ INM - Leibniz Institute for New Materials, Saarbrücken/D
15:15	KEYNOTE LECTURE 10 Talking to cells: biomolecular engineering for noninvasive imaging and control of cellular function M. Shapiro ¹ ; ¹ California Institute of Technology, Pasadena, CA/USA
15:50	Discussion
16:05	Coffee Break
	From Lab to Market
	<i>Chair: S. Lindner, MPI Molecular Plant Physiology, Potsdam/D</i>
16:15	Bioprocesses for vitamin production C. Acevedo-Rocha ¹ ; ¹ Biosyntia ApS, Copenhagen/DK
16:35	4GENE: Aroma glucosides from lab to market W. Schwab ¹ ; ¹ Technische Universität München, Freising/D
16:55	DNA synthesis for mRNA therapeutics – how to ensure good results by choosing the right DNA N. Netuschil ¹ ; ¹ Thermo Fisher Scientific GENEART GmbH, Regensburg/D
17:15	Enzymatic solutions from nature to tackle industrial challenges A. Scholtissek ¹ ; T. Klumpp ¹ ; B. Kelety ¹ ; A. Pelzer ¹ ; ¹ BRAIN Biotech AG, Zwingenberg/D
17:35	Leveraging photosynthesis via synthetic biology to address climate change and produce low cost sustainable chemicals and fuels B. Dannenberg ¹ ; ¹ Phytonix Corporation, Black Mountain, NC/USA
17:55	Discussion
18:10	Closing of the day 2

Wednesday, 15 September 2021

09:00 **Opening and Technical Remarks**

Keynote Lectures

*Chair: W. Wiechert, Forschungszentrum Jülich GmbH/D*09:05 **KEYNOTE LECTURE 11**
Synthetic devices for dynamic signal processing and decoding
M. Khammash¹; ¹ ETH Zurich, Basel/CH09:40 **KEYNOTE LECTURE 12**
A system of coupled oscillators driving the cell cycle?
M. Heinemann¹; ¹ Universität Groningen/NL10:15 **Discussion**10:25 **Coffee Break**

Automation, Bioinformatics, Data Science, and Systems Biology

*Chair: A. Kremling, TU München/D*10:35 **KEYNOTE LECTURE 13**
Strategies to combat COVID-19 are determined by heterogeneity in human-human interaction networks**
E. Klipp¹; ¹ HU Berlin/D11:10 **Quantitative autonomous experimentation – are we there yet?**
M. Osthege¹; L. Helleckes¹; C. Müller¹; N. Tenhaef¹; J. Hemmerich¹; W. Wiechert¹; M. Oldiges¹; ¹ Forschungszentrum Jülich GmbH/D11:30 **Discussion**11:40 **KEYNOTE LECTURE 14**
Structure-based computational enzyme engineering
H. Gohlke¹; ¹ Heinrich Heine University Düsseldorf/D12:15 **Automating strain engineering: accelerating the rational and untargeted approach**
N. Tenhaef¹; R. Stella¹; W. Wiechert¹; J. Frunzke¹; S. Noack¹; ¹ Forschungszentrum Jülich GmbH/D12:35 **Discussion**12:45 **Lunch Break and Meet your Colleagues on Platform Wonder***Chair: G. Westmeyer, Technische Universität München/D*13:45 **KEYNOTE LECTURE 15**
Learning cellular state and dynamics in single cell genomics
F. Theis¹; ¹ Helmholtz Zentrum München/D14:20 **Accelerated production and screening of catalytically active inclusion body libraries via automated workflows**
K. Küsters¹; C. Wagner¹; L. Helleckes¹; R. Saborowski¹; W. Wiechert¹; M. Oldiges¹; ¹ Forschungszentrum Jülich GmbH/D14:40 **Discussion**14:50 **Poster Session on platform Wonder**16:20 **Closing of the day 3**

Thursday, 16 September 2021

10:30	Opening and Technical Remarks
	Methods and Technologies
	<i>Chair: G. Hensel, Heinrich-Heine Universität, Düsseldorf/D</i>
10:35	KEYNOTE LECTURE 16 Coiled-coils for the design of cellular logic circuits and new protein folds R. Jerala ¹ ; ¹ National Institute of Chemistry, Ljubljana/SLO
11:10	In-situ rewiring of membrane receptors and signal transduction by light M. Sánchez ¹ ; S. Els-Heindl ² ; A. Beck-Sickingher ² ; R. Wieneke ¹ ; R. Tampé ¹ ; ¹ Goethe University Frankfurt/D; ² Leipzig University/D
11:30	Discussion
11:40	Coffee Break
	<i>Chair: G. Hensel, Heinrich-Heine Universität, Düsseldorf/D</i>
11:50	Spatiotemporally confined red light-controlled gene delivery at single-cell resolution using adeno-associated viral vectors M. Hörner ¹ ; C. Jerez-Longres ¹ ; A. Hudek ¹ ; S. Hook ² ; O. Yousefi ¹ ; W. Schamel ¹ ; C. Hörner ³ ; M. Zurbriggen ⁴ ; H. Ye ⁵ ; H. Wagner ¹ ; W. Weber ¹ ; ¹ University of Freiburg/D; ² Hannover Medical School/D; ³ Paul-Ehrlich-Institut, Langen/D; ⁴ Heinrich Heine University Düsseldorf/D; ⁵ East China Normal University, Shanghai/PRC
12:10	From strain to screening: Automated workflows for identifying the best signal peptide for target protein secretion via split GFP assay C. Müller ¹ ; L. Helleckes ¹ ; T. Griesbach ¹ ; V. Waffenschmidt ¹ ; M. Osthege ¹ ; W. Wiechert ¹ ; M. Oldiges ¹ ; ¹ Forschungszentrum Jülich GmbH/D
12:30	Discussion
12:40	Lunch Break and Meet your Colleagues on Platform <i>Wonder</i>
	<i>Chair: A. Tissier, Leibniz-Institut für Pflanzenbiochemie, Halle(Saale)/D</i>
14:10	IPP / DMAPP methyltransferases as a tool to expand the chemical structure space of terpenoids P. Haque ¹ ; L. Drummond ¹ ; J. Jung ¹ ; H. Schewe ¹ ; M. Buchhaupt ¹ ; ¹ DECHEMA-Forschungsinstitut, Frankfurt/D
14:30	Modular synthetic biology toolkit for filamentous fungi L. Mözsik ¹ ; C. Pohl ² ; ¹ Rijksuniversiteit Groningen/NL; ² TU Berlin/D
14:50	Discussion
15:00	A chemical toolbox for labeling and degrading engineered cas proteins X. Cheng ¹ ; R. Gama-Brambila ¹ ; J. Chen ¹ ; ¹ Goethe University Frankfurt/D
15:20	Inducible expression systems based on xenogeneic counter-silencing J. Wiechert ¹ ; C. Gätgens ² ; J. Frunzke ² ; ¹ Forschungszentrum Jülich GmbH & Heinrich-Heine-Universität Düsseldorf/D; ² Forschungszentrum Jülich GmbH/D
15:40	Discussion
15:50	Coffee Break
	Keynote Lectures
	<i>Chair: T. Erb, MPI for Terrestrial Microbiology, Marburg/D</i>
16:00	KEYNOTE LECTURE 17 Engineering next-generation CAR-T cells for cancer immunotherapy Y. Chen ¹ ; ¹ University of California, Los Angeles, CA/USA
16:35	Discussion
16:40	KEYNOTE LECTURE 18 By & beyond 2032 — methods & tools for synthetic biology's fifth binade** D. Endy ¹ ; ¹ Stanford School of Engineering, CA/USA
17:15	Discussion
17:20	Closing of the day 4

Friday, 17 September 2021

09:00 **Opening and Technical Remarks****Environmental Applications***Chair: M. Zurbruggen, Heinrich-Heine Universität, Düsseldorf/D*

09:05 **KEYNOTE LECTURE 19**
Synthetic biology and production of white hydrogen with cyanobacteria
 A. Schmid¹; K. Bühler¹; S. Klähn¹; B. Bühler¹; C. Dusny¹; J. Krömer¹; ¹ Helmholtz-Zentrum für Umweltforschung - UFZ, Leipzig/D

09:40 **KEYNOTE LECTURE 20**
Solar energy and carbon dioxide-based production of high value natural products in chloroplasts
 B. Lindberg-Møller¹; ¹ University of Copenhagen/DK

10:15 **Employing enzyme engineering in synthetic one-carbon metabolism**
 M. Nattermann¹; S. Burgener¹; P. Pfister¹; A. Chou²; L. Schulz¹; S. Lee²; N. Paczia¹; J. Zarzycki¹; R. Gonzales²; T. Erb¹;
¹ MPI Marburg/D; ² University of South Florida, Tampa, FL/USA

10:35 **Discussion**10:50 **Coffee Break****Natural Products***Chair: A. Tissier, Leibniz-Institut für Pflanzenbiochemie, Halle(Saale)/D*

11:00 **KEYNOTE LECTURE 21**
Engineering of non-ribosomal peptide synthetases for the production of novel natural products
 H. Bode¹; ¹ Max-Planck-Institut für terrestrische Mikrobiologie, Marburg/D

11:35 **Engineering DNA-templated nonribosomal peptide synthesis**
 H. Kries¹; ¹ Leibniz-Institut für Naturstoff-Forschung und Infektionsbiologie - Hans-Knöll-Institut e.V., Jena/D

11:55 **Discussion**12:05 **Lunch Break and Meet your Colleagues on Platform Wonder****Plants***Chair: M. Zurbruggen, Heinrich-Heine Universität, Düsseldorf/D*

13:05 **KEYNOTE LECTURE 22**
Harnessing the chemistry plant natural products
 S. O'Connor¹; ¹ Max Planck Institute for Chemical Ecology, Jena/D

13:40 **Design and implementation of synthetic orthogonal regulatory circuits for signal propagation in plants**
 A. Tissier¹; T. Schreiber¹; A. Prange¹; ¹ Leibniz-Institut für Pflanzenbiochemie, Halle (Saale)/D

14:00 **Discussion****Industrial Applications***Chair: A. Tissier, Leibniz-Institut für Pflanzenbiochemie, Halle(Saale)/D*

14:10 **Production of the natural sweetener 5-ketofructose with strains of *Pseudomonas putida***
 K. Wohlers¹; M. Baumgart¹; M. Bott¹; ¹ Forschungszentrum Jülich GmbH/D

14:30 **Activating fungal secondary metabolism using coexpression networks and synthetic gene switches**
 T. Cairns¹; P. Schäpe¹; M. Kwon¹; C. Pohl¹; C. Steiniger¹; V. Meyer¹; ¹ TU Berlin/D

14:50 **Discussion**

15:00 **General Assembly** (participation on special invitation)
 Chair: W. Wiechert, Forschungszentrum Jülich GmbH/D / M. Zurbruggen, Heinrich-Heine Universität, Düsseldorf/D

- P2.01 **A wholistic approach to autonomous strain characterization: Automation of cryo- and pre-cultures in high-throughput phenotyping**
D. Puchta¹; L. Helleckes¹; C. Müller¹; H. Czech¹; W. Wiechert¹; M. Oldiges¹; ¹ Forschungszentrum Jülich GmbH/D
- P2.02 **Bayesian optimisation meets robotic workflows: data-efficient phenotyping of catalytically active inclusion bodies**
L. Helleckes¹; M. Osthege¹; K. Küsters¹; C. Wagner¹; W. Wiechert¹; M. Oldiges¹; ¹ Forschungszentrum Jülich GmbH/D
- P2.03 **Streamlining the correction of mass isotope labeling data through integration and automation**
M. Beyß¹; K. Nöh¹; ¹ Forschungszentrum Jülich GmbH/D
- P2.04 **Developing a semi-automated cloning workflow: approaches to accelerate strain library generation**
V. Waffenschmidt¹; C. Müller¹; W. Wiechert¹; M. Oldiges¹; ¹ Forschungszentrum Jülich GmbH/D
- P2.05 **Automated and distributed parameter space sampling for inverse problems in systems biology**
J. Jadebeck¹; R. Paul¹; K. Nöh¹; ¹ Forschungszentrum Jülich GmbH/D
- P2.06 **Computational combinatorial analysis of carbon fixation pathways**
J. Garcia Lima¹; H. Löwe¹; A. Kremling¹; ¹ Technische Universität München, Garching/D
- P2.07 **Post processing Helixer: combining Deep Learning with HMMs for state-of-the-art gene calling**
F. Stiehler¹; A. Bolger²; C. Günther³; N. Kiel³; B. Usadel²; A. Weber³; A. Denton³; ¹ Hamburg/D; ² Forschungszentrum Jülich GmbH/D; ³ Heinrich Heine University Düsseldorf/D
- P3.01 **Living microcapsules for delivery of therapeutics to the gut**
H. Kalari¹; ¹ Leibniz Institute for New Materials, Saarbrücken/D
- P3.02 **Modulation of cell surface glycosylation using novel hexosamine analogues**
S. Parashar¹; A. Tasneem²; J. Rautela²; S. Aittan²; K. Raza¹; S. Sampathkumar²; ¹ Central University of Rajasthan, Kishangarh, Ajmer/IND; ² National Institute of Immunology, New Delhi/IND
- P4.01 **Thermoresponsive living therapeutic materials - Darobactin-releasing bacterial hydrogels for treating chronic pathogenic infections**
S. Dey¹; S. Sankaran¹; ¹ Leibniz Institute for New Materials, Saarbrücken/D
- P4.02 **Light-regulated release of recombinant Nerve Growth Factor from bacterial hydrogels**
M. Blanch Asensio¹; S. Sankaran¹; ¹ Leibniz Institute for New Materials, Saarbrücken/D
- P5.01 **Metabolic engineering of *Vibrio natriegens* for anaerobic succinate production**
F. Thoma¹; C. Schulze¹; C. Gutierrez Coto¹; M. Hädrich¹; J. Huber¹; C. Gunkel¹; R. Thoma¹; B. Blombach¹
¹ TU Munich, Straubing/D
- P6.01 **Construction, characterization and application of tailor-made catalytically active inclusion bodies for L-valine synthesis utilizing automated, high-throughput technologies**
N. Schillings¹; K. Küsters¹; W. Wiechert¹; M. Oldiges¹; ¹ Forschungszentrum Jülich GmbH/D
- P6.02 **Rational engineering of anti-CRISPR proteins for genome editing applications**
J. Mathony¹; Z. Hartevelde²; C. Schmelas³; M. Hoffmann⁴; J. Upmeier zu Belzen⁵; S. Aschenbrenner⁶; W. Sun⁷; C. Stengl⁸; A. Scheck²; S. Georgeon²; S. Rosset²; Y. Wang⁷; D. Grimm³; R. Eils⁵; B. Correia²; D. Niopek⁶; ¹ TU Darmstadt/D; ² École Polytechnique Fédérale de Lausanne (EPFL)/CH; ³ University Hospital Heidelberg/D; ⁴ Berman Cancer Research Center (DKFZ), Heidelberg/D; ⁵ Charité Berlin/D; ⁶ Technical University Darmstadt/D; ⁷ Chinese Academy of Sciences, Beijing/PRC; ⁸ University of Heidelberg/D
- P6.03 **Development of a non-invasive HTS-compatible exon-specific isoform expression reporter system**
D. Truong¹; ¹ Helmholtz Centre Munich, Freising/D
- P7.01 **A timed off-switch for dynamic control of gene expression in *Corynebacterium glutamicum***
D. Siebert¹; J. Altenbuchner²; B. Blombach¹; ¹ TUM Campus Straubing/D; ² University of Stuttgart/D

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