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Conference Program

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Sunday, July 14, 2019

13:30 – 15:30 Conference Check-in (Mali Foyer)

15:30 – 15:50 **Welcome from the conference chairs**

Session I: Discovery, Development and Production of Emerging and Current Products: Biologic Therapeutic Products

Session Chairs: Corinne Hoesli, McGill University, Canada
Sandra Rios, Merck, USA

15:50 – 15:55 Introduction by Session Chairs

15:55 – 16:15 **Back to the future: A back and forth manufacturing process journey from monoclonal antibodies to viral vectors for cell and gene therapy**
Rene Gantier, Pall Biotech, USA

16:15 – 16:40 **Living Bacterial Hydrogels as Therapeutic Biomaterials**
Noemie-Manuelle Dorval Courchesne, McGill University, Canada

16:40 – 17:00 **Optimization of *E. coli* SoluPro™ using synthetic biology to generate a high performance chassis microbe for scalable production of protein therapeutics**
Johan A. Kers, AbSci, USA

17:00 – 17:30 Coffee Break

17:30 – 17:55 **Computational methods for cell culture media optimization and product quality control (Invited)**
Wai Lam Ling, Merck, USA

17:55 – 18:15 **The separation of red blood cells based solely on intrinsic magnetization: Clinical and commercial implications**
Jeff Chalmers, Ohio State University, USA

18:15 – 18:35 **Encapsulation bioprocesses for diabetes cellular therapy**
Corinne Hoesli, McGill University, Canada

18:35 – 18:55 **Development of phospho-tau specific antibodies: Validation and engineering of specificity**
Yongku P. Cho, University of Connecticut, USA

18:55 – 19:00 Remarks by Session Chairs

19:00 – 20:00 **Keynote 1**
Lessons from the Iron Ring
Sandra Poole, Independent Director, USA

20:00 – 22:00 Buffet Dinner

Monday, July 15, 2019

06:30 – 08:00 Buffet Breakfast

Session II: Current Technology Challenges and Opportunities: Fitting Biology into a Technological World

Chairs: Gargi Seth, Genentech, USA
Nicole Borth, University of Natural Resources and Life Sciences, Austria

08:00 – 08:05 Introduction by Session Chairs

08:05 – 08:30 **Engineering next generation therapeutics to combat infectious diseases (Invited)**

Jennifer Maynard, The University of Texas at Austin, USA

08:30 – 08:50 **Designing an artificial Golgi reactor for cell-free glycosylation**

Ignacio Moya Ramírez, Imperial College London, United Kingdom

08:50 – 09:10 **Inhibition of productive/competitive endocytic pathways enhances siRNA delivery and cell specific targeting**

S. Patrick Walton, Michigan State University, USA

09:10 – 09:30 **Developing the calcium-dependent conformational behavior of the RTX peptide domain for novel protein capture and recovery applications**

Scott Banta, Columbia University, USA

09:30 – 09:35 Remarks by Session Chairs

09:35 – 09:50 Remarks by Panel Chairs (Mike Betenbaugh and Kristala Jones Prather)

09:50 – 10:20 Coffee Break

Session III: Systems Metabolic Engineering: From Systems Biology To Synthetic Evolution

Chairs: Julia Frunzke, Forschungszentrum Jülich, Germany
Radhakrishnan Mahadevan, University of Toronto, Canada
Kyongbum Lee, Tufts University, USA

10:20 – 10:25 Introduction by Session Chairs

10:25 – 10:50 **CRISPR-guided DNA polymerase enabling diversification of all nucleotides in a tunable window (Invited)**

John Dueber, University of California, Berkeley, USA

10:50 – 11:15 **Small-molecule biosensors for high-throughput metabolic engineering (Invited)**

Michael K. Jensen, Novo Nordisk Center at Technical University of Denmark, Denmark

11:15 – 11:35 **High-throughput enzyme engineering for commercial-scale production of natural products**

Jacy Humphries, Amyris, Inc., USA

11:35 – 11:55 **Engineering *Corynebacterium glutamicum* to produce the biogasoline isopentenol from plant biomass hydrolysates**

Thomas T. Eng, Lawrence Berkeley Labs, USA

Monday, July 15, 2019 (continued)

- 11:55 – 12:15 **Yarrowia lipolytica: A versatile microbial workhorse for expanding nature's biosynthetic capacity**
Peng Xu, University of Maryland, USA
- 12:15 – 12:20 Remarks by Session Chairs
- 12:20 – 13:50 Lunch
- Session IV: Discovery, Development and Production of Emerging and Current Products: Molecular Engineering of Plants and Plant-Derived Products**
Chairs: Christie Peebles, Colorado State University, USA
Tim Whitehead, University of Colorado Boulder, USA
- 13:50 – 13:55 Introduction by Session Chairs
- 13:55 – 14:20 **Solution of the multi-step assembly of catharanthus roseus anticancer alkaloids (Invited)**
Vincenzo De Luca, Brock University, Canada
- 14:20 – 14:45 **Plant cell culture platforms for production of bioscavengers for biodefense (Invited)**
Karen McDonald, University of California at Davis, USA
- 14:45 – 15:05 **Metabolic engineering of *Saccharomyces cerevisiae* for high level production of aromatic chemicals**
Yun Chen, Chalmers University of Technology, Sweden
- 15:05 – 15:25 **Engineered metabolic pathways for the microbial synthesis of plant natural products**
Ramon Gonzalez, University of South Florida, USA
- 15:25 – 15:45 **Tailoring *Corynebacterium glutamicum* towards efficient production of plant polyphenols**
Jan Marienhagen, Forschungszentrum Jülich GmbH, Germany
- 15:45 – 15:50 Remarks by Session Chairs
- 15:50 – 16:20 Coffee Break
- 16:20 – 17:20 **Keynote 2**
A Novel Anti-diabetic Metabolite from Plants: Biosynthesis, Gene Discovery, and Metabolic Engineering of Montbretin A
Jörg Bohlmann, Professor and Distinguished University Scholar, Michael Smith Laboratories, University of British Columbia, Canada
- Session V: Current Technology Challenges and Opportunities: Sophisticated Technology to Understand and Make Use of Biology**
Chairs: Mike Betenbaugh, Johns Hopkins University, USA
Himadri Pakrashi, Washington University in St. Louis, USA
- 17:20 – 17:25 Introduction by Session Chairs

Monday, July 15, 2019 (continued)

- 17:25 – 17:50 **Evolution of a modular, multi-functional targeted delivery nanoparticle
(Invited)**
James Swartz, Stanford University, USA
- 17:50 – 18:10 **A platform technology for dynamic control of cell behavior**
Laura Segatori, Rice University, USA
- 18:10 – 18:35 **New synthetic biology tools for dynamic modulation of cellular phenotypes
(Invited)**
Wilfred Chen, University of Delaware, USA
- 18:35 – 18:55 **Recording temporal data with minutes resolution into DNA**
Keith Tyo, Northwestern University, USA
- 18:55 – 19:00 Remarks by Session Chairs
- 19:00 – 20:30 **Rapid-fire posters/** Dinner
Chairs: Karin Anderson, Pfizer, USA
 S. Patrick Walton, Michigan State University, USA

(Posters 7, 15, 16, 18, 24, 25, 31, 36, 38)
- 20:30 – 22:30 **Poster session/**Dessert, Social Period
Sponsored by NIMBL
Chairs: Wendy Hsu, Genentech, USA
 Noemie-Manuelle Dorval Courchesne, McGill University, Canada

Tuesday, July 16, 2019

- 06:30 – 08:00 Breakfast
- Session VI: Microbial Consortia: Novel Mechanisms and Applications**
Chairs: Arul Jayaraman, Texas A&M University, USA
Volker F. Wendisch, Bielefeld University, Germany
Andrea Herold, BASF
- 08:00 – 08:05 Session Introduction by Session Chairs
- 08:05 – 08:30 **Developing and applying a microdroplet co-cultivation and omics toolbox for elucidating complex microbiomes (Invited)**
Nina Lin, University of Michigan, USA
- 08:30 – 08:55 **Exploiting anaerobic consortia as new tools for biomass breakdown and sustainable chemistry (Invited)**
Michelle O'Malley, University of California, Santa Barbara, USA
- 08:55 – 09:15 **Direct cell-to-cell exchange of matter in synthetic clostridium syntrophies enabling CO₂ fixation and an expanded metabolic space.**
Terry Papoutsakis, University of Delaware, USA
- 09:15 – 09:35 **Design, construction and application of *E. coli* - *C. glutamicum* synthetic consortia**
Volker Wendisch, Bielefeld University, Germany
- 09:35 – 09:40 Remarks by Session Chairs
- 09:40 – 10:10 Coffee Break
- 10:10 – 11:10 **Keynote 3**
Genome editing and synthesis platforms which facilitate the Construction of cell factories
Akihiko Kondo, Graduate School of Science, Technology and Innovation, Kobe University, RIKEN Center for Sustainable Resource Science
- 11:10 – 11:40 **Rapid-fire posters**
Chairs: Karin Anderson, Pfizer, USA
S. Patrick Walton, Michigan State University, USA

(Posters 43, 44, 46, 51, 53, 54, 56, 60, 68)
- 11:40 – 13:00 **Poster Session/ Lunch**
Sponsored by Genentech, Inc., A Member of the Roche Group
Chairs: Wendy Hsu, Genentech, USA
Noemie-Manuelle Dorval Courchesne, McGill University, Canada
- Session VII: Emerging Technologies: Applications of Knowledge Engineering and Big Data Approaches in Synthetic and Systems Biology**
Chairs: Yinjie Tang, Washington University in St. Louis, USA
Marcella Yu, Boehringer-Ingelheim, Germany
- 13:00 – 13:05 Introduction by Session Chairs

Tuesday, July 16, 2019 (continued)

- 13:05 – 13:30 **Metabolomics process modeling: A systems biology approach to understand variability in commercial biologics cell culture processes (Invited)**
Amanda Lewis, Bristol-Myers Squibb, USA
- 13:30 – 13:50 **Applying metabolic models for control in order to enhance algal growth and lipid production**
Mike Betenbaugh, Johns Hopkins University, USA
- 13:50 – 14:15 **An adaptive laboratory evolution platform for strain construction and engineering parts (Invited)**
Adam Feist, University of California San Diego, USA
- 14:15 – 14:35 **Validation and stabilization of a prophage lysin of *Clostridium perfringens* by yeast surface display and co-evolutionary models**
Ben Hackel, University of Minnesota, USA
- 14:35 – 14:55 **Unraveling the metabolic and machinery constraints on protein secretion through a novel systems biology framework**
Nathan Lewis, University of California San Diego, USA
- 14:55 – 15:00 Remarks by Session Chairs
- 15:00 Free time for networking, recreation
- Dinner on your own

Wednesday, July 17, 2019

06:30 – 08:00 Breakfast

Session VIII: Emerging Technologies: Optogenetic and Epigenetic Control Of Cell Function

Chairs: Brigitte Gasser, University of Natural Resources and Life Sciences, Austria
Ravi Kane, Georgia Institute of Technology, USA
José L. Avalos, Princeton University, USA

08:00 – 08:05 Introduction by Session Chairs

08:05 – 08:30 **Optogenetics for intracellular codebreaking: How ERK dynamics control gene expression and cell fate (Invited)**
Jared Toettcher, Princeton University, USA

08:30 – 08:55 **Manipulating phenotypes by epigenetic mechanism (Invited)**
Nicole Borth, University of Natural Resources and Life Sciences, Austria

08:55 – 09:15 **High-throughput multicolor optogenetics for the systematic manipulation of cell behavior**
Lukasz Bugaj, University of Pennsylvania, USA

09:15 – 09:35 **Optogenetic modulation of insulin function in pancreatic beta-cells**
Emmanuel Tzanakakis, Tufts University, USA

09:35 – 09:55 **Towards electrogenetics: Integrating biofabrication, synthetic biology, and microelectronics**
Bill Bentley, University of Maryland, USA

09:55 – 10:00 Remarks by Session Chairs

10:00 – 10:30 Coffee Break

Workshop on Modeling and Analysis of Big Data

Chairs: Ranjan Srivastava, University of Connecticut, USA
Nathan Lewis, University of California San Diego, USA

10:30 – 11:15 **K-FIT: Parameterizing kinetic models of metabolism using multiple fluxomic datasets**
Costa Maranas, Penn State University, USA

11:15 – 12:00 **The statistics of directed evolution: From library generation to high throughput screens**
Keith Tyo, Northwestern University, USA

12:00 – 13:00 **Keynote 4**
Establishing a Novel Cell Therapy Platform: Synthetic Biology and Bioprocess Considerations for Rational Therapeutic Development
Spencer Fisk, Senior Vice President of Manufacturing, Rubius Therapeutics, USA

13:00 – 14:30 Lunch

Wednesday, July 17, 2019 (continued)

Workshop on Entrepreneurship and Commercialization

Chairs: Matthew DeLisa, Cornell University, USA
James Swartz, Stanford University, USA

14:30 – 14:50

Personal reflections on an entrepreneurial path

Jonathan Dordick, Rensselaer Polytechnic Institute, USA

14:50 – 15:10

Adventures and lessons in start-up land

Kenneth Reardon, Colorado State University, USA

15:10 – 15:30

A tale of three companies

James Swartz, Stanford University, USA

15:30 – 16:30

Discussion and Q&A

16:30 – 17:00

Coffee Break

17:00 – 18:30

Panel discussion

Chairs: Mike Betenbaugh, Johns Hopkins University, USA
Kristala Jones Prather, Massachusetts Institute of Technology, USA

18:30 – 19:30

Reception

19:30 – 22:00

Amgen Award Lecture/Dinner/Roast/Poster Awards/Next Conference
Announcements

Amgen Award lecture

**Biochemical engineering under stress: from plants to people to
products**

Jonathan Dordick, Rensselaer Polytechnic Institute, USA

Thursday, July 18, 2019

06:30 – 08:00 Breakfast

Session IX: Current Technology Challenges and Opportunities: Microbial Production of Bio-Based Chemicals, Fuels and Building Blocks

Chairs: Ching Leang, LanzaTech, USA
Andreas Liese, Hamburg University of Technology, Germany

08:00 – 08:05 Introduction by Session Chairs

08:05 – 08:30 **CO₂ as carbon source for microbial production of bio-based chemicals (Invited)**

Dirk Weuster-Botz, Technical University of Munich, Germany

08:30 – 08:50 **Increased yield and productivity for the conversion of algal biomass carbohydrates**

Kenneth F. Reardon, Colorado State University, USA

08:50 – 09:10 **Bioswitches and robotics for systems metabolic engineering and synthetic biology of hyper microbial production strain**

An-Ping Zeng, Institute of Bioprocess and Biosystems Engineering, Germany

09:10 – 09:30 **Scaling up *E. coli* from the lab to industrial conditions: Lessons learned to engineer robust processes and production hosts**

Ralf Takors, University of Stuttgart, Germany

09:30 – 09:55 **Challenges and successes in technology scale up (Invited)**

Jason Bromley, LanzaTech, USA

09:55 – 10:00 Remarks by Session Chairs

10:00 – 10:30 Coffee Break

Session X: Discovery, Development and Production of Emerging and Current Products: Microbial Production of Bio-Based Chemicals, Fuels and Building Blocks

Sponsored by Evonik Creavis GmbH

Chairs: Jan Marienhagen, Forschungszentrum Jülich, Germany
Itzel Ramos, REG Life Sciences, USA

10:30 – 10:35 Introduction by Session Chairs

10:35 – 11:00 **Engineering yeast for the high-level synthesis of polyketide biobased chemicals (Invited)**

Nancy DaSilva, University of California, Irvine, USA

11:00 – 11:25 **Engineering of an environmental isolate of *bacillus megaterium* for biochemical production under supercritical CO₂ (Invited)**

Kristala Jones Prather, Massachusetts Institute of Technology, USA

11:25 – 11:50 **Optogenetics as a new paradigm for dynamic control in metabolic engineering (Invited)**

Jose Avalos, Princeton University, USA

Thursday, July 18, 2019 (continued)

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| 11:50 – 12:10 | Microbial synthetic biology
Sang Woo Seo, Seoul National University, South Korea |
| 12:10 – 12:30 | Bioconversion of levulinic acid to methyl-ethyl ketone via a novel catabolic pathway
Brian Pfleger, University of Wisconsin-Madison, USA |
| 12:30 – 12:35 | Remarks by Session Chairs |
| 12:35 – 13:00 | Closing remarks by Conference Chairs / Lunch to go |