

Biochemical and Molecular Engineering XIX

July 12 – 16, 2015

Hyatt Ziva
Puerto Vallarta, Mexico

Conference Co-Chairs

Theresa Good
National Science Foundation
USA

Gargi Seth
Intas Pharmaceuticals Ltd.
India



Engineering Conferences International

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Engineering Conferences International (ECI) is a not-for-profit global engineering conferences program, originally established in 1962, that provides opportunities for the exploration of problems and issues of concern to engineers and scientists from many disciplines.

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Welcome from the Chairs

July 2015

Dear Participants, Colleagues and Friends,

It is our great pleasure to welcome you all to Puerto Vallarta, Mexico for Biochemical and Molecular Engineering XIX. This premier international conference – the nineteenth in this ECI series–continues our long tradition of bringing together established researchers and young investigators from academia and the private sector around the world to discuss the present and chart out the future of biochemical and molecular engineering.

Biochemical engineers have always embraced new challenges and modern biology with high energy and enthusiasm. The focus of this year's meeting is to highlight and formulate **Next Generation Solutions** by showcasing innovative solutions emerging in response to new discoveries in the area of genome editing (such as CRISPR/Cas9), the rapidly changing energy and chemical production landscape, and evolution of new therapeutic modalities addressing human health. As the tools of the discipline advance, so do the technologies employed for the manufacture of recombinant therapeutics and the approaches used to understand and control genome instability or cell fate. It is our hope that this blend of traditional biochemical engineering and emerging areas will challenge the participants to think of new ways to address problems, cross-pollinate best practices and ideas, and promote in-depth discussions with colleagues from across the Americas and around the globe.

BME XIX will also continue the tradition of bringing in eminent scientists and engineers from within and outside of our community as keynote speakers. This year we are fortunate to have Jennifer Doudna from HHMI/ UC Berkeley and James Roberts from Matrix Genetics joining us, along with Jay Keasling from UC Berkeley/LBNL and Pam Silver from Harvard. In addition, we will celebrate the selection of Wei-Shou Hu as the winner of the prestigious *Amgen Biochemical Engineering Award* for his research excellence, technical leadership and extensive contributions to the community. We will also recognize the immense potential and research excellence of Timothy Lu who will be presented the *Biochemical Engineering Journal Young Investigator Award* at this meeting. Congratulations to Wei-Shou and Tim!

We would like to thank the sponsors listed on the following pages. Without their generous support, BME XIX would not have been possible. We also would like to thank all the board members, session chairs, and dedicated ECI staff for putting together a great program.

Finally, we would like to thank all the speakers, poster authors, and attendees for providing the superb scientific content and interactions that make this meeting so invaluable and productive. With more than 150 participants and 72 posters, we took care to ensure that the meeting covers a broad range of topics. As in the past, we have made an effort to include session chairs and speakers from academia and industry, young and established, domestic and international, with a focus on diversity of participation and ideas. In addition, we have designed a technical program with many opportunities for all participants to interact in both formal and informal settings. We hope you'll take advantage of our lovely location to share some refreshments and conversations while enjoying the views of the Pacific Ocean.

We have thoroughly enjoyed our shared journey preparing for this meeting, and we truly hope you will engage in and enjoy the conference to the fullest extent. Thank you for joining us!

Theresa Good
National Science Foundation

Gargi Seth
Intas Pharmaceuticals

Previous conferences in this series:

Biochemical Engineering

August 20-25, 1978

New England College, Henniker, New Hampshire

Conference Chairs:

W. R. Vieth, Rutgers University

A. Constantinides, Rutgers University

Biochemical Engineering II

July 13-18, 1980

New England College, Henniker, New Hampshire

Conference Chair:

A. Constantinides, Rutgers University

Biochemical Engineering III

Sept. 19-24, 1982

Santa Barbara, California

Conference Chair:

K. Venkatsubramanian, H.J. Heinz Co. and Rutgers University

Biochemical Engineering IV

Sept. 30 - Oct. 5, 1984

Galway, Ireland

Conference Chairs:

H. Lim, Purdue University

Patrick Fottrell, University of Galway

Biochemical Engineering V

July 27-Aug 1, 1986

New England College, Henniker, New Hampshire

Conference Chair:

W.A. Weigand, Illinois Institute Of Technology

Biochemical Engineering VI

October 2-7, 1989

Santa Barbara, California

Conference Chair:

Walter E. Goldstein, ESCA Genetic Corp.

Biochemical Engineering VII

March 3-8, 1991

Santa Barbara, California

Conference Chairs:

H. Pedersen, Rutgers University

D. DiBiasio, Worcester Polytechnic

Biochemical Engineering VIII

July 11-16, 1993

Princeton, New Jersey

Conference Chairs:

Subhash Karkare, Amgen

Robert M. Kelly, North Carolina State University

Previous conferences in this series:

Biochemical Engineering IX

May 21-26, 1995

Davos, Switzerland

Conference Chairs:

J. Bailey, ETH

D. Zabriskie, SmithKline Beecham

Biochemical Engineering X

May 18-23, 1997

Kananaskis, Alberta, Canada

Conference Chairs:

W-S. Hu, University of Minnesota

J. Swartz, Genentech

Biochemical Engineering XI

July 25-30, 1999

Salt Lake City, Utah

Conference Chairs:

George Georgiou, University of Texas

Steven Lee, Merck & Co., Inc.

Biochemical Engineering XII

June 10-15, 2001

Rohnert Park, California

Conference Chairs:

Doug Clark, University of California-Berkeley

Jay Keasling, University of California-Berkeley

David Robinson, Merck

Biochemical Engineering XIII

July 19-23, 2003

Boulder, Colorado

Conference Chairs:

Eleftherios Terry Papoutsakis, Northwestern University

Dr Weichang Zhou, Protein Design Labs

Biochemical Engineering XIV

July 10-14, 2005

Harrison Hot Springs, B.C., Canada

Conference Chairs:

William Bentley, University of Maryland

Hendrik J. Meerman, Genencor International, Inc.

Mike Betenbaugh, Johns Hopkins University

Vijay Yabannavar, Chiron

Biochemical Engineering XV

July 15-19, 2007

Quebec City, Quebec, Canada

Conference Chairs:

M. Betenbaugh, Johns Hopkins University

V. Yabannavar, Trubion Pharmaceuticals

A. Robinson, University of Delaware

E. Schaefer, BMS

Previous conferences in this series:

Biochemical Engineering XVI

July 5-9, 2009

Burlington, Vermont, USA

Conference Chairs:

A. Robinson, University of Delaware

E. Schaefer, BMS

Biochemical Engineering XVII

June 26-30, 2011

Seattle, Washington, USA

Conference Chairs:

F. Baneyz, University of Washington

C. Maranas, Penn State University

B. Junker, Merck Research

Biochemical Engineering XVIII

June 16-20, 2013

Beijing, China

Conference Chairs:

David Robinson, Merck

Tianwei Tan, Beijing University of Chemical Technology

Huimin Zhao, University of Illinois at Urbana-Champaign

2015 Amgen Biochemical Engineering Award to Dr. Wei-Shou Hu

The Amgen Award (supported by Amgen, Inc., Thousand Oaks, California, USA), is given in memory of James E. Bailey to recognize research excellence and leadership in Biochemical Engineering. The Amgen Award Committee (Chair: Sang Yup Lee) is proud to announce that the 2015 Amgen Biochemical Engineering Award has been given to **Professor Wei-Shou Hu** for his extensive contributions to the field of biochemical engineering.



Wei-Shou Hu, Distinguished McKnight University Professor in the Department of Chemical Engineering and Materials Science, University of Minnesota, received his B.S. from National Taiwan University and Ph.D. from Massachusetts Institute of Technology. Dr. Hu has long impacted the field of cell culture bioprocessing since its infancy by steadfastly introducing quantitative and systematic analysis into this field. His insightful work spanning from modeling and controlling cell metabolism, modulating glycosylation, to process data mining, has helped shape the advances of biopharmaceutical process technology. He recently led an industrial consortium to embark on genomic research on Chinese hamster ovary cells, the main workhorse of biomanufacturing, and to promote post-genomic research in cell bioprocessing. His biochemical engineering research also led to clinical development of a bioartificial liver for treating liver failure patients that has inspired much process engineering research in cell therapy. His fondness of applying classical biochemical reaction engineering to study biological regulations led to an early illustration of pathway analysis in secondary metabolism and recent revelation of the first dual-signaling control in microbial communal sensing. He co-authored the textbook *Bioseparations*, authored a cell culture bioprocessing book and co-edited several monographs. His educational effort includes a widely known intensive course on cell technology that has trained thousands of bioprocess professionals in biotech industry around the world. He initiated the Engineering Foundation conference on cell culture engineering nearly three decades ago as the technology was emerging. This has become a key forum for the biochemical engineering profession and continues to thrive to this day under ECI.

He received the inaugural Merck Award on cell culture engineering and the Lifetime Achievement award from the Society of In Vitro Biology. He was also recognized for his contribution in biochemical engineering by the Marvin Johnson Award from the Biochemical Technology Division of the American Chemical Society, the distinguished service award of Society of Biological Engineers, a special award from Asia Pacific Biochemical Engineering Conference (2009), as well as both the distinguished service award and the Division award from Food, Pharmaceuticals and Bioengineering Division of the American Institute of Chemical Engineers.

Previous Winners

1993 - James E. Bailey; 1995 - Daniel I. C. Wang; 1997 - Michael Shuler; 1999 - Douglas Lauffenburger; 2001 - Harvey Blanch; 2003 - Douglas Clark; 2005 - Eleftherios (Terry) Papoutsakis; 2007 - George Georgiou; 2009 – Gregory Stephanopoulos; 2011 – Jens Nielsen; 2013 – Sang Yup Lee

2015 Young Investigator Award Winner: Timothy K. Lu

The Editors of *Biochemical Engineering Journal*, in cooperation with ECI's Biochemical and Molecular Engineering XIX conference, are delighted to announce the selection of **Dr. Timothy K. Lu** as the recipient of the **2015 Biochemical Engineering Journal Young Investigator Award**.

Launched in 2009, this now annual award recognizes outstanding excellence in research and practice contributed to the field of biochemical engineering by a young community member.

The 2015 award consists of a cash prize of \$2,500 and a plaque presented at the ECI's Biochemical and Molecular Engineering XIX conference, held from July 12-16, 2015 at the Hyatt Ziva in Puerto Vallarta, Mexico. Dr. Timothy K. Lu will present the Award Lecture on Tuesday, July 14 at 6:30 pm.

Award recipients are also invited to compose a review article for the *Biochemical Engineering Journal*, based on the topic of their lecture.

Timothy Lu, M.D., Ph.D. is an Associate Professor leading the Synthetic Biology Group in the Department of Electrical Engineering and Computer Science and Department of Biological Engineering at MIT. Tim received his S.B. and M.Eng. in Electrical Engineering and Computer Science at MIT and completed his M.D./Ph.D. in the Harvard-MIT Health Sciences and Technology Program. He is a core member of the Synthetic Biology Center at MIT, Associate Member at the Broad Institute of MIT and Harvard, and co-founder of multiple start-up companies, including Sample6, Eligo Biosciences, and Synlogic. He is also affiliated with the MIT CSBi Program, the MIT Microbiology Program, and the Harvard Biophysics Program.

Tim is a recipient of the Presidential Early Career Award for Scientists and Engineers (the highest honor given by the US government to early career investigators), the NSF CAREER Award, Young Investigator Prizes from the Army Research Office and the Office of Naval Research, the Lemelson-MIT Student Prize, Grand Prize in the National Inventor Hall of Fame's Collegiate Inventors Competition, and the Leon Reznick Memorial Prize for "outstanding performance in research" from Harvard Medical School. He was also selected as a Kavli Fellow by the National Academy of Sciences, a Siebel Scholar, and one of Technology Review's top 35 innovators under the age of 35.

The Lu lab's current research is focused on establishing foundational platforms to enable the engineering of robust, scalable, and sophisticated biological networks in living cells. These platforms are being applied to tackle a wide range of industrial and biomedical challenges, including scalable materials assembly, on-demand biomanufacturing, antibiotic resistance, microbiome engineering, cancer, and neurodegenerative diseases.



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MedImmune

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Sunday, July 12, 2015

13:00 – 15:30	Conference Check-in (Foyer Breakouts)
15:30 – 16:00	Welcome from Conference Chairs and ECI Liaison Theresa Good, Gargi Seth and Beth Junker
16:00 – 18:30	<u>Session I: Genome Instability and Evolution</u> Session Chairs: Katy Kao, Texas A&M University, USA Lisa Laffend, DuPont, USA
16:00 – 16:25	Long- and short-term genomic and epigenetic changes in CHO cell lines Nicole Borth, University of Natural Resources and Life Sciences, Austria
16:25 – 16:50	Genome evolution and engineering for elucidating and improving isobutanol tolerance in <i>Escherichia Coli</i> Xiaoxia (Nina) Lin, University of Michigan, USA
16:50 – 17:15	Stable long-term bioreactor production of anabolic products: Process and genetic solutions Kirsten R. Benjamin, Amyris Biotechnologies, USA
17:15 – 17:40	Reinforcing synthetic biology against evolutionary failure Jeff Barrick, University of Texas, USA
17:40 – 18:10	How to cope with unwanted evolutions of industrial production strains Wanda Dischert, METabolic Explorer, France
18:30 – 19:30	Keynote: Re-writing genomes: Discoveries to applications Jennifer Doudna, HHMI & University of California Berkeley, USA
19:30 – 20:30	Opening Reception (Pureza Beach)
20:30 - 22:00	Dinner (Pureza Beach)

NOTES

- Technical sessions will be held in the Pitillal & Cuale Rooms.
- Coffee breaks will be in the Foyer Rios Ballroom.
- Poster Sessions will be in the Foyer Breakouts. Although there are two poster sessions, all posters will remain mounted for the entire conference. Authors of odd-numbered posters are asked to stay with their presentations on Monday evening, and authors of even-numbered posters are asked to stay with their presentations on Tuesday evening.
- Breakfasts will be in the Vivaz and Blaze Restaurants.
- Lunches will be in the Vivaz, Blaze and Melanzane Restaurants.
- Dinners on Monday and Tuesday will be in the Vivaz, Blaze, Casa Grande and Melanzane Restaurants. The conference banquet on Wednesday will be on Pureza Beach.
- Audiotaping, videotaping and photography of presentations are strictly prohibited.
- Speakers – Please leave at least 5 minutes for questions and discussion.
- Please do not smoke at any conference functions.
- The ECI office is in the Ibiza Room.
- Turn your cellular telephones to vibrate or off during technical sessions.
- Be sure to check the Master Participant List to confirm that your listing is correct. If there are changes or updates, please login to the ECI website and update your listing so that the list that ECI will send to all participants after the conference will be correct.

Monday, July 13, 2015

- 06:30 – 08:00 Breakfast Buffet
- 08:00 – 10:00 **Session II: Next Generation Biologics**
Session Chairs: Jennifer Maynard, University of Texas, USA
Pranhitha Reddy, Seattle Genetics, USA
- 08:00 – 08:30 **High-throughput conformational epitope mapping to guide design of structure-based vaccines**
Timothy A. Whitehead, Michigan State University, USA
- 08:30 – 09:00 **SYN-004, a novel, clinical-stage oral beta-lactamase therapy to protect the microbiome from antibiotic-mediated damage**
Michael Kaleko, Synthetic Biologics, Inc., USA
- 09:00 – 09:30 **Translating the human microbiome to novel products**
John Aunins, Seres, USA
- 09:30 – 10:00 **E. coli and CHO protein expression technology to advance new therapeutics at Genentech**
Dorothea Reilly, Genentech, USA
- 10:00 – 10:20 Coffee Break
- 10:20 – 12:30 **Session III: Metabolic Engineering & Synthetic Biology**
Session Chairs: Wilfred Chen, University of Delaware, USA
Ramon Gonzalez, Rice University/DOE, USA
Darlene Solomon, Agilent, USA
- 10:20 – 10:45 **Xylodextrin conversion to biofuels: A new pathway with new challenges**
Jamie H. D. Cate, University of California, Berkeley, USA
- 10:45 – 11:10 **Understanding and exploiting enzyme promiscuity for metabolic engineering**
Keith Tyo, Northwestern University, USA
- 11:10– 11:35 **High-efficiency multiplexed integration of synergistic alleles and metabolic pathways in yeasts using CRISPR-Cas9**
Jessica M. Walter, Amyris Biotechnologies, USA
- 11:35 – 12:00 **Development of genome-scale kinetic models and their use for metabolic engineering and synthetic biology**
Vassily Hatzimanikatis, Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland
- 12:00 – 12:30 **Metabolite valves: Dynamic control of metabolic flux for pathway engineering**
Kristala L. J. Prather, Massachusetts Institute of Technology, USA
- 12:30 – 13:45 Lunch
- 13:45 – 14:30 **Engineered polyketide synthases for production of commodity and specialty chemicals**
Jay Keasling, University of California, Berkeley, USA
- 14:30 – 16:20 **Session IV: Biorenewable Chemicals**
Session Chairs: Brian Pfleger, University of Wisconsin, USA
Keith Tyo, Northwestern University, USA

Monday, July 13, 2015 (continued)

- 14:30 – 15:00 **Rethinking the logic of biological activation of short-chain hydrocarbons and their conversion to liquid fuels**
Ramon Gonzalez, Rice University, USA
- 15:00 – 15:30 **Commercial-scale production of fuels and commodities from waste and low cost resources via gas fermentation**
Michael Koepke, Lanza Tech Inc., USA
- 15:30 – 15:55 **Fuels from the wind or rocks: Engineering the iron-oxidizing chemolithoautotroph *Acidithiobacillus ferrooxidans* for biochemical production**
Scott Banta, Columbia University, USA
- 15:55 – 16:20 **Biobased production of mechanically tunable polyesters**
Kechun Zhang, University of Minnesota, USA
- 16:20 – 16:40 Coffee Break
- 16:40 – 18:40 **Session V: Protein Aggregation, Engineering and Design**
Session Chairs: Jeff Gray, Johns Hopkins University, USA
Michelle O'Malley, University of California, Santa Barbara, USA
Dana Andersen, Genentech, Inc., USA
- 16:40 – 17:10 **CORNET: Combining correlated mutation data, structural data and literature data to guide protein engineering experiments**
Henk-Jan Joosten, Bio-Product, The Netherlands
- 17:10 – 17:40 **Computational tools for enzyme and antibody design**
Costas Maranas, Pennsylvania State University, USA
- 17:40 – 18:10 **In silico predictive tools to aid in development of therapeutic antibodies**
Vikas Sharma, Genentech, USA
- 18:10 – 18:40 **A transcription activator-like effector repressor-induction system mediated by proteolytic degradation**
Brian Pfleger, University of Wisconsin, USA
- 19:00 – 20:00 Dinner
- 20:00 – 22:30 **Poster Session / Social Hour**
Sponsored by Genentech
Session Chairs: Joon Chong Yee, Bristol Myers Squibb, USA
Howard Salis, Pennsylvania State University, USA
(Authors of odd-numbered posters are asked to stay with their presentations)

Tuesday, July 14, 2015

- 07:00 – 08:00 Breakfast
- 08:00 – 10:30 **Session VI: Engineering at the Micro- and Nanoscale**
Session Chairs: William Bentley, University of Maryland, USA
Laura Palomares, IBT/UNAM, Mexico
Chong Yung, Agilent, USA
- 08:00 – 08:25 **Switchable protein sensors and therapeutics based on dynamic DNA assembly**
Wilfred Chen, University of Delaware, USA
- 08:25 – 08:50 **Engineering protein nanocontainers: Altering permeability and size of MS2 viral capsids**
Danielle Tullman-Ercek, University of California Berkeley, USA
- 08:50 – 09:15 **Microparticles (MPs) as cellular communicators to control cell fate and empower therapies: The case of megakaryocytic MPs**
Eleftherios (Terry) Papoutsakis, University of Delaware, USA
- 09:15 – 09:45 **Biomimetic protein nanoparticles for modulation of immune response towards cancer**
Szu-Wen Wang, University of California, Irvine, USA
- 09:45 – 10:10 **Efficient nuclear and cytoplasmic proteins delivery using HIV-1-based-virus-like particles**
Marc-Andre Robert, Universite Laval, Canada
- 10:10 – 10:30 Coffee Break
- 10:30 – 13:00 **Session VII: Advances in BioProcessing**
Sponsored by Pfizer
Session Chairs: Alois Jungbauer, BOKU, Austria
Irina Ramos, MedImmune, USA
Anita Shaw, Merck, USA
- 10:30 – 11:00 **Integrated bioprocess development for an agronomically relevant secondary metabolite natural product**
Mark Mikola, Dow AgroSciences LLC, USA
- 11:00 – 11:30 **Emerging technologies for the development and operation of continuous processing of viral vaccines and vectors**
Jose P. B. Mota, FCT-UNL & IBET-ITQB, Portugal
- 11:30 – 12:00 **Point of care bioprocessing**
Govind Rao, University of Maryland Baltimore County, USA
- 12:00 – 12:30 **Advances in understanding protein unfolding and aggregation in ion exchange chromatography columns**
Giorgio Carta, University of Virginia, USA
- 12:30 – 13:00 **A comparison of multimodal chromatographic resins: Protein binding and selectivity**
Carnley L. Norman, KBI Biopharma, USA
- 13:00 – 14:15 Lunch
- 14:15 – 16:00 Free Time

Tuesday, July 14, 2015 (continued)

- 16:00 – 17:30 **Session VIII: Metabolic Engineering & Synthetic Biology**
Session Chairs: Wilfred Chen, University of Delaware, USA
Ramon Gonzalez, Rice University/DOE, USA
Darlene Solomon, Agilent, USA
- 16:00 – 16:20 **Designing synthetic anaerobic communities based on syntrophy**
Michelle A. O'Malley, University of California, Santa Barbara, USA
- 16:20 – 16:40 **Transforming synthetic biology with designer translation systems**
Michael C. Jewett, Northwestern University, USA
- 16:40 – 17:00 **Finding a needle in a haystack: Parsing large-scale data to define regulatory networks for strain engineering**
Lydia Contreras, University of Texas, Austin, USA
- 17:00 – 17:30 **Measuring metabolism of individual cell populations in mixed microbial cultures: A novel approach**
Maciek R. Antoniewicz, University of Delaware, USA
- 17:45 – 18:30 **Designing biology for a healthy world**
Pamela Silver, Harvard University, USA
- 18:30 – 19:15 **BEJ Young Investigator Award**
Tim Lu, Massachusetts Institute of Technology, USA
- 19:15 – 20:30 Dinner
- 20:30 – 22:30 **Poster Session / Social Hour**
Session Chairs: Joon Chong Yee, Bristol Myers Squibb, USA
Howard Salis, Pennsylvania State University, USA
(Authors of even-numbered posters are asked to stay with their presentations)

Wednesday, July 15, 2015

- 07:00 – 08:00 Breakfast Buffet
- 08:00 – 10:00 **Session IX: Advances in Rapid BioManufacturing**
Michael Lynch, Duke University, USA
Raghavan Venkat, Medimmune, USA
- 08:00 – 08:30 **Rapid production of a biodefense agent by transient agroinfiltration in nicotiana benthamiana**
Karen A. McDonald, University of California, Davis, USA
- 08:30 – 09:00 **Technologies to enable the genome design-build-test cycle**
Ryan T. Gill, University of Colorado, USA
- 09:00 – 09:30 **Rapid production of recombinant proteins via scalable transient gene expression and stable cell line by MaxCyte flow transfection technology**
Weili Wang, MaxCyte, Inc., USA
- 09:30 – 10:00 **High throughput engineering of mammalian cell factories for biopharmaceuticals and biomedicine**
Michael Betenbaugh, Johns Hopkins University, USA
Joseph Shiloach, National Institutes of Health, USA
- 10:00 – 10:20 Coffee Break
- 10:20 – 12:20 **Session X: Controlling Cell Fate**
Session Chairs: Chris Rao, University of Illinois, Urbana Champaign, USA
Todd McDevitt, Gladstone, USA
Rashim Kshirsagar, Biogen Idec, USA
- 10:20 – 10:50 **Dynamic metabolic control using synthetic metabolic valves in two-stage fermentations**
Michael Lynch, Duke University, USA
- 10:50 – 11:20 **Recellularization of bioengineered kidney scaffolds in perfused bioreactors using ΔP and metabolic profiles as surrogate markers for tissue and scaffold integrity**
William M. Miller, Northwestern University, USA
- 11:20 – 11:50 **Directed differentiation of human pluripotent stem cells to cardiovascular lineages via stage-specific modulation of canonical Wnt signaling**
Sean P. Palecek, University of Wisconsin - Madison, USA
- 11:50 – 12:20 **Neural differentiation of MSCs is dependent on downregulation of Nr5f**
Christina Chan, Michigan State University, USA
- 12:20 – 13:30 Lunch
- 13:30 – 16:30 **Session XI: Biosimilars**
Session Chairs: Sergio Valentionotti, Liomont, Mexico
David Robinson, Merck, USA
- 13:30 – 14:00 **TBD**
Angeles Martinez, IMS-Health
- 14:00 – 14:30 **Challenges and achievements in the scale-up of trastuzumab - Integrating protein quality into early development**
Claudia Berdugo-Davis, Cook Pharmica LLC, USA

Wednesday, July 15, 2015 (continued)

- 14:30 – 15:00 **Development and business fundamentals of biosimilar CMC**
Martin Mueller, MSD Merck, Switzerland
- 15:00 – 15:30 **Key aspects for the development and commercialization of biosimilar products**
Laura Palomares, Universidad Nacional Autonoma De Mexico, Mexico
- 16:00 – 19:00 **Concurrent Workshops**
1. **Emerging Trends in Biomanufacturing**
Chairs: Ekta Mahajan, Genentech Inc., USA and Kumar Dhanasekharan, Cook
 Pharmica, USA
- Case study for multi-site manufacturing: Use of clinical and commercial
 manufacturing facilities to ensure delivery of breakthrough therapies to
 patients**
 David Robinson, Merck & Company, USA
- Managing quality and securing performance of single-use technology across
 an extended network**
 Duncan Low, Amgen, Inc., USA
- Integrated single-use flow through technologies for the economic and robust
 purification of monoclonal antibodies**
 Michael Phillips, EMD Millipore, USA
- The criticality of early strategic sourcing of manufacturing in a global supply
 chain model**
 Kathy Gannon, Janssen R&D, USA
2. **Rapid Response to Global Health Crisis – (Mixture of Presentations and Panel)**
Chair: Karen McDonald, University of California, Davis, USA
- Rapid manufacture to counter an infectious disease outbreak**
 Richard Welch, Emergent BioSolutions, USA
- Rapid response to biothreats: A case study in rapid production of antiviral
 antibodies produced in plants**
 R. Barry Holtz, Holtz Biopharma Consulting, USA
3. **Biochemical and Molecular Engineering Education**
Chair: Claire Komives, San Jose State University, USA
- Panel discussion with participants from industry, academia and funding agencies
 including: Bill Miller, Bill Bentley, Jeff Gray, Theresa Good, Beth Junker and others
- 19:30 – 22:00 Dinner and Amgen Award

Thursday, July 16, 2015

- 07:00 – 08:00 Breakfast Buffet
- 08:00 – 10:00 **Session XII: Disease Models**
Session Chairs: Jamey Young, Vanderbilt University, USA
Elebeoba (Chi Chi) May, University of Houston, USA
- 08:00 – 08:30 **Integrative physiological analysis of adipose tissue metabolism in the context of obesity**
Christian Metallo, University of California, San Diego, USA
- 08:30 – 09:00 **Oxidative stress and adenosine receptors: A cytoprotective role in neurodegeneration?**
Anne S. Robinson, Tulane University, USA
- 09:00 – 09:30 **Identifying altered intercellular signaling networks associated with local immunosuppression in cancer: A quantitative and systems pharmacology approach**
David J. Klinke, West Virginia University, USA
- 09:30 – 10:00 **An engineering approach to discover antivirulence strategies**
Mark P. Brynildsen, Princeton University, USA
- 10:00 – 10:30 Coffee Break
- 10:30 – 11:30 Panel Discussion / Wrap Up
- 11:30 Lunch and Departures

Biochemical and Molecular Engineering XIX

Poster List

July 12-16, 2015
Hyatt Ziva
Puerto Vallarta, Mexico

1. **An engineered secretion system for recovery of folded heterologous proteins in the extracellular space**
Kevin J. Metcalf, University of California, Berkeley, USA
2. **Development of new-integrated bacterial secretion process platforms**
Lourdes Velez-Suberbie, University College London, United Kingdom
3. **Case studies for domestic and international cell culture process transfers**
Christina Petraglia, Genentech, USA
4. **High performance antibody fragment secretion system in Escherichia coli**
Chih-Chin Chen, Development Center for Biotechnology, Taiwan
5. **A high throughput metabolic screening assay for media development**
Joon Chong Yee, Bristol Myers Squibb, USA
6. **Creating an integrated scale-down platform process for the extraction and recovery of periplasmically expressed fab from E.coli**
Asma Ahmad, University College London, United Kingdom
7. **Malic acid production from glycerol with Ustilago trichophora**
Thiemo Zambanini, RWTH, Germany
8. **Role of Cd36 and free fatty acid uptake in Epithelial-mesenchymal transition of hepatocellular carcinoma cells**
Christina Chan, Michigan State University, USA
9. **Revisiting cancer energetics: Establishing a link between altered fatty-acid metabolism and metastasis**
Christina Chan, Michigan State University, USA
10. **3D in vitro disease model of human adipose tissue using silk biomaterials**
Kelly A. Burke, University of Connecticut, USA
11. **Pathogen adaptation to host-induced environmental stress**
Komal Rasaputra, University of Houston, USA
12. **Sputtering deposition of magnetic Ni nanoparticles directly onto an enzyme surface**
Roberta Bussamara, Estadual University of Rio Grande do Sul, Brazil
13. **Heterogeneous systems biocatalysis: A valuable tool to optimize multi-enzyme cascades**
Fernando López-Gallego, CIC biomaGUNE, Spain
14. **Dielectrophoretic behavior of PEGylated Ribonuclease A in a microdevice with diamond-shaped insulating posts**
Marco Rito-Palomares, Tec de Monterrey, Mexico

15. **Genetic changes during an adaptive laboratory evolution process allowed fast growth in glucose to an E. coli strain lacking the major glucose transport system**
César Aguilar, IBT/UNAM, Mexico
16. **Adaptive laboratory evolution of the Escherichia coli PB11 strain for recovery the growth capability on glucose**
Susy Beatriz Carmona, IBT/UNAM, Mexico
17. **A scalable, GMP-compliant transfection technology for rapid production of viral vector and VLPs in mammalian and insect cells**
Weili Wang, MaxCyte Inc., USA
18. **Rapid manufacturing of diverse biological molecules by MaxCyte flow electroporation technology**
Weili Wang, MaxCyte Inc., USA
19. **A study on fatty acid ethyl ester production in a Saccharomyces cerevisiae cell factory; Metabolic engineering practice towards a sustainable transportation fuel.**
Bouke Wim de Jong, Chalmers Technical University, Sweden
20. **Genome-wide RNAi screen for improved functional expression of recombinant proteins from HEK 293 cells**
Su Xiao, Johns Hopkins University, USA
21. **Characterization of physiological conditions in the origin of the metabolic reprogramming of cancer cells**
Joana Pinto Vieira, Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland
22. **In Silico atom labeling for the reconstruction of atom-mapped metabolic networks**
Noushin Hadadi, Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland
23. **Developing a reconciled genome-scale model of the malaria parasite plasmodium falciparum and its thermodynamics-based flux balance analysis**
Anush Chiappino Pepe, Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland
24. **Systematic, unbiased reduction of genome scale metabolic reconstruction networks: Redgem**
Meric Ataman, Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland
25. **Characterization of uncertainty in parameters of kinetic models of large-scale and genome-scale metabolic networks**
Ljubisa Miskovic, Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland
26. **Yeast cell factories for production of high-value isoprenoids**
Anastasia Krivoruchko, Chalmers University, Sweden
27. **Enhancing the quality of glycoproteins produced in mammalian cell culture through PYC expression**
Eric Karengera, École Polytechnique de Montréal, Canada
28. **Hug1p's role as a negative regulator of the MEC1 pathway**
Michael G. Benton, Louisiana State University, USA
29. **Facilitating unconventional yeast engineering for biorenewables production**
Zengyi Shao, Iowa State University, USA

30. **Phosphoproteomic analysis using DiART mass tags.**
Mark Marten, UMBC, USA
31. **Heterologous sigma factors expression for functional screening of metagenomic libraries**
Nicholas R. Sandoval, University of Delaware, USA
32. **Engineering CHO cell metabolism for culture in galactose**
Ziomara P. Gerdtzen, University of Chile, Chile
33. **Generation and use of a Cho genome-scale model to describe metabolic shift**
Ziomara P. Gerdtzen, University of Chile, Chile
34. **Interleukin-2 antibody-driven modulation of immune cell homeostasis**
Jamie B. Spangler, Stanford University School of Medicine, USA
35. **Metabolic engineering of new streptomyces sp. from extreme environments for novel antibiotics and anticancer drugs**
Vida Rodriguez, University of Chile, Chile
36. **High throughput analysis of paired heavy and light chain antibody repertoires for systems immunology and human antibody discovery**
Brandon J. DeKosky, The University of Texas at Austin, USA
37. **Engineering high-titer heterologous protein secretion in salmonella enterica**
Anum Azam, UC Berkeley, USA
38. **Toward structure prediction and design of protein glycosylation**
Jeffrey J. Gray, Johns Hopkins University, USA
39. **The external pH affects the recombinant protein aggregation and inclusion body quality**
Saumel Perez-Rodriguez, Universidad Nacional Autonoma de Mexico, Mexico
40. **Low-cost healthcare diagnostics by directed evolution of peptide receptors in yeast**
Keith EJ Tyo, Northwestern University, USA
41. **Recombinant synthesis of therapeutic peptides**
Vida Rodríguez, University of Chile, Chile
42. **Quantitative subcellular fractionation of CHO cells**
Saumel Perez-Rodriguez, Universidad Nacional Autonoma de Mexico, Mexico
43. **Contionuous precipitation of antibodies**
Alois Jungbauer, BOKU, Austria
44. **A unified time scale for comparing stem cell differentiation and liver development through transcriptome meta-analysis**
David Chau, University of Minnesota, USA
45. **Modeling the movement of DMT1 transporters in Caco2 cells after iron exposure**
Ziomara P. Gerdtzen, University of Chile, Chile
46. **Experimental determination and mathematical modeling of iron fluxes in Caco2 cells**
Andrea Colins, University of Chile, Chile

47. **Interruption of epigenetic regulators with bacterial delivered macromolecules**
Neil Forbes, UMass Amherst, USA
48. **Towards microbiome engineering: A machine learning approach to infer intra-community interactions**
Ranjan Srivastava, University of Connecticut, USA
49. **Simultaneous glucose/xylose co-utilization by an evolved *Thermus thermophilus* strain elucidated by genome sequencing and ¹³C metabolic flux analysis**
Maciek R. Antoniewicz, University of Delaware, USA
50. **A Chinese hamster ovary cell host cell protein that impacts genome instability contaminants**
Kelvin Lee, University of Delaware, USA
51. **Evolution of metabolic networks**
John Barrett, University of Minnesota, USA
52. **Integrated analysis of anaerobic gut fungi reveals new tools for lignocellulose breakdown**
Kevin V. Solomon, University of California, Santa Barbara, USA
53. **A systems analysis of dual signaling control of conjugative drug resistance transfer in *Enterococcus faecalis***
Arpan Bandyopadhyay, University of Minnesota, USA
54. **A genome-scale approach to modeling and engineering the mammalian secretory pathway**
Nathan Lewis, University of California, San Diego, USA
55. **Building pathways around alcohol-o-acetyltransferase for the biosynthesis of short chain volatile esters**
Ian Wheeldon, UC Riverside, USA
56. **Modelling of metabolic networks with gene regulation and in vivo determination of rate parameters**
Vida Rodríguez, University of Chile, Chile
57. **Opening Pandora's Box**
Esteban Marcellin, The University of Queensland, Australia
58. **A genome-scale metabolic network reconstruction for chinese hamster ovary cells identifies the biochemical capacity of protein production**
Michael Hanscho, Austrian Centre Of Industrial Biotechnology, Austria
59. **Development and analysis of precursor production strains**
Jennifer Reed, UW Madison, USA
60. **Sustainable production of cyclic triterpenoids in *saccharomyces cerevisiae***
Eik Czarnotta, RWTH Aachen University, Germany
61. **Engineering and preclinical development of a novel class of immune checkpoint Inhibitors for cancer therapy**
John Blazeck, University of Texas at Austin, USA

62. **Opossum peptide highly active against rattlesnake envenomation in mice**
Claire Komives, San Jose State University, USA
63. **Industrial IgG-expressing CHO cells exhibit high-productivity metabolic phenotypes identified by 13C flux analysis**
Allison G. McAtee, Vanderbilt University, USA
64. **Discovery of novel neutralizing antibodies against Bordetella adenylate cyclase toxin and the implication for vaccine design**
Xianzhe wang, The University of Texas at Austin, USA
65. **Antibody cocktails to treat disease caused by Bordetellae**
Jennifer Maynard, The University of Texas at Austin, USA
66. **Engineering the type III secretion system for high-titer bacterial protein production**
Danielle Tullman-Ercek, University of California Berkeley, USA
67. **High-throughput scanning mutagenesis of a polymerase active site using array synthesized oligos**
Benjamin Borgo, Agilent Technologies, USA
68. **MOSST Suit: A computational tool able to guide rational mutation strategies to design protein properties and functions**
Alvaro Olivera-Nappa, University of Chile, Chile
69. **Detection and structural characterization of misfolded tau protein in neurodegenerative disease**
Olga A. Morozova, University of Delaware, USA
70. **Integration of genome-wide kinetic information into computational strain design protocols**
Costas Maranas, The Pennsylvania State University, USA
71. **Teaching biomolecular structure prediction and design with PyRosetta**
Jeffrey J. Gray, Johns Hopkins University, USA
72. **Integrating team building and collaboration in a MS in biotechnology program**
William M. Miller, Northwestern University, USA
73. **Massively parallel flow cytometry and cell sorting using fluorescent barcodes**
David Colby, University of Delaware, USA