

Engineering Conferences International

ECI Digital Archives

Enzyme Engineering XXVII

Proceedings

10-1-2023

Conference program - ENZYME ENGINEERING XXVII

Ang Ee Lui

Yan Feng

Li Zhi

Follow this and additional works at: https://dc.engconfintl.org/enzyme_xxvii

Program

Enzyme Engineering XXVII

**October 1-6, 2023
Singapore**

Conference Chairs:

Ang Ee Lui

Singapore Institute of Food and Biotechnology Innovation, A*STAR, Singapore

Yan Feng

Shanghai Jiao Tong University, China

Li Zhi

National University of Singapore, Singapore



Engineering Conferences International

369 Lexington Avenue, 3rd Floor #389

New York, NY 10017, USA

www.engconfintl.org – info@engconfintl.org

ParkRoyal Hotel Beach Road

7500 Beach Road

Singapore 199591

+65 6505 5666

enquiry.prsin@parkroyalhotels.com

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.

ECI BOARD MEMBERS

Eugene Schaefer, Chairman
Mike Betenbaugh
Joye Bramble
Barry C. Buckland
Nick Clesceri
Chetan Goudar
Peter Gray
Michael King

Chair of ECI Conferences Committee: Nick Clesceri

ECI Technical Liaison for this conference: Jeff Moore

ECI Executive Director: Barbara K. Hickernell

ECI Associate Director: Kevin M. Korpics

ECI Conferences Manager: Tressa D'Ottavio

ECI Registrar: Kathy Chan

Enzyme Engineering Steering Committee

Chair: Jeff Moore, Merck & Co., Inc., USA
Yasuhisa Asano, Toyama Prefectural University, Japan
Yan Feng, Shanghai Jiao Tong University, China
Cheng Jin, Professor, President of Guangxi Academy of Sciences, Nanning, Guangxi, China
Byung-Gee Kim, Seoul National University, Korea
Andy Bommarius, Georgia Institute of Technology, USA
Doug Fuerst, GSK, USA
Vesna Mitchell, Codexis, USA
Pierre Monson, Toulouse White Biotechnology, France
Magali Remaud-Simeon, INSA-University of Toulouse, France
John Wong, Pfizer, retired, USA
Huimin Zhao, University of Illinois, Urbana-Champaign, USA
Stefan Lutz, Codexis, USA
Wen Ping Wu, Senior Director, Novozymes, China
John Woodley, Technical University of Denmark, Denmark
Ditte Hededam Welner, Technical University of Denmark, Denmark
Jens Erik Nielsen, Novozymes A/S, Denmark
Uwe Bornscheuer, University of Greifswald, Germany

Enzyme Engineering Organizing Committee

Andy Bommarius, Georgia Institute of Technology, USA
Vesna Mitchell, Codexis, USA
Doug Fuerst, GSK, USA
Magali Remaud-Simeon, INSA-University of Toulouse, France
Pierre Monson, Toulouse White Biotechnology, France
John Wong, Pfizer, retired, USA
Huimin Zhao, University of Illinois, Urbana-Champaign, USA
Yan Feng, Shanghai Jiao Tong University, China
Wen Ping Wu, Senior Director, Novozymes, China
Cheng Jin, Professor, President of Guangxi Academy of Sciences, Nanning, Guangxi, China

Previous conferences in this series:

Enzyme Engineering

August 9-13, 1971

New England College, Henniker, New Hampshire

Conference Chair:

L.B. Wingard, Jr., SUNY Buffalo

Enzyme Engineering II

August 5-10, 1973

New England College, Henniker, New Hampshire

Conference Chairs:

L. B. Wingard, Jr., University of Pittsburgh

E. K. Pye, University of Pennsylvania

Enzyme Engineering III

August 3-8, 1975

Reed College, Portland, Oregon

Conference Chairs:

E. K. Pye, University of Pennsylvania

Howard H. Weetall, Corning Glass Works

Enzyme Engineering IV

September 25-30, 1977

Bad Neuenahr, W. Germany

Conference Chairs:

G. Manecke, der Freie Universität Berlin

L. B. Wingard, Jr., University of Pittsburgh

Enzyme Engineering V

July 29-August 3, 1979

New England College, Henniker, New Hampshire

Conference Chairs:

Howard H. Weetall, Corning Glass Works

G. P. Royer, University of Delaware

Enzyme Engineering VI

September 20-26, 1981

Kashikojima, Japan

Conference Chairs:

S. Fukui, Kyoto University

I. Chibata, Tanabe Seiyaku Co.

Enzyme Engineering VII

September 25-30, 1983

White Haven, Pennsylvania

Conference Chair:

Allen I. Laskin, Exxon Research & Eng. Co.

Previous conferences in this series:

Enzyme Engineering VIII

September 22-27, 1985

Elsinor, Denmark

Conference Chair:

Klaus Mosbach, University of Lund

Enzyme Engineering IX

October 4-9, 1987

Santa Barbara, California

Conference Chairs:

Harvey W. Blanch, University of California, Berkeley

Alexander M. Klibanov, Massachusetts Institute of Technology

Enzyme Engineering X

September 24-29, 1989

Kashikojima, Japan

Conference Chair:

H. Okada, University of Osaka

Enzyme Engineering XI

September 22-27, 1991

Kona, Hawaii

Conference Chairs:

David A. Estell, Genencor

Douglas S. Clark, University of California, Berkeley

Enzyme Engineering XII

September 19-24, 1993

Deauville, France

Conference Chairs:

Daniel Thomas, University of Technology of Compiègne

Marie Dominique Legoy, University of Technology of Compiègne

Enzyme Engineering XIII

October 15-20, 1995

San Diego, California

Conference Chairs:

Jon Dordick, University of Iowa

Alan Russell, University of Pittsburgh

Enzyme Engineering XIV

October 12-17, 1997

Beijing, China

Conference Chairs:

Yao-Ting Yu, Nankai University

Gao-Xiang Li, Academia Sinica

Previous conferences in this series:

Enzyme Engineering XV

October 10-15, 1999

Kailua-Kona, Hawaii

Conference Chairs:

David Anton, DuPont

Frances H. Arnold, California Institute of Technology

Robert Kelly, North Carolina State University

Enzyme Engineering XVI

October 7-12, 2001

Potsdam, Germany

Conference Chairs:

Frieder W. Scheller, University of Potsdam

Christian Wandrey, Research Center Jülich

Oreste Ghisalba, Novartis Pharma AG

Enzyme Engineering XVII

November 9-14, 2003

Santa Fe, New Mexico

Conference Chairs:

Stephen Benkovic, Pennsylvania State University

Chi-Huey Wong, Scripps Research Institute

Jeffrey Moore, Merck & Co., Inc.

Birgit Kosjek, Merck & Co., Inc.

Enzyme Engineering XVIII

October 9-14, 2005

Gyeong-ju, Korea

Conference Chairs:

Hak-Sung Kim, KAIST, Korea

Ji-Yong Song, LG Life Sciences, Ltd, Korea

Tae-Kwang Oh, Korea Research Inst.of Biosciences & Biotech, Korea

Moon-Hee Sung, Kookmin University, Korea

Enzyme Engineering XIX

September 23-28, 2007

British Columbia, Canada

Conference Chairs:

Romas Kazlauskas, University of Minnesota

Stefan Lutz, Emory University

David Estell, Danisco/Genencor

Enzyme Engineering XX

September 20-24, 2009

Groningen, the Netherlands

Conference Chairs:

Dick Janssen, University of Groningen

Oliver May, DSM Pharmaceutical Products

Andreas Bommarius, Georgia Institute of Technology

Previous conferences in this series:

Enzyme Engineering XXI

September 18-22, 2011

Vail, Colorado

Conference Chairs:

Lori Giver, Codexis

Steve Withers, University of British Columbia

Enzyme Engineering XXII

September 22-26, 2013

Toyama, Japan

Conference Chairs:

Yasuhisa Asano, Toyama Prefectural University

Jun Ogawa, Kyoto University

Yoshihiko Yasohara, Keneka Corp.

Enzyme Engineering XXIII

September 6-11, 2015

St. Petersburg, Florida, USA

Conference Chairs:

Jon Dale Stewart, University of Florida

Robert DiCosimo, DuPont Industrial Biosciences

Enzyme Engineering XXIV

September 24-28, 2017

Toulouse, France

Conference Chairs:

Pierre Monsan, Toulouse White Biotechnology, France

Magali Remaud-Simeon, LISBP-INSA, University of Toulouse, France

Enzyme Engineering XXV

October 15-19, 2019

Whistler, British Columbia, Canada

Conference Chairs:

Huimin Zhao, University of Illinois at Urbana-Champaign, USA

John Wong, Pfizer, USA

Enzyme Engineering XXVI

May 22-27, 2022

Dallas/Fort Worth, Texas

Conference Chairs:

Andy Bommaris, Georgia Institute of Technology, USA

Vesna Mitchell, Codexis, USA

Doug Fuerst, GSK, USA

Hak-Sung Kim – 2023 Enzyme Engineering Awardee



The 2023 Enzyme Engineering Award is given to Professor Hak-Sung Kim of the Korea Advanced Institute of Science and Technology (KAIST). Prof. Kim is honored with this award for his sustained groundbreaking research in the field of enzyme technology with a focus on the design of new biocatalysts, development of tools for advancing enzyme engineering, a role of conformational dynamics of enzyme, and integrating biocatalysis with metabolic engineering. His work has led to commercial processes among a large number of innovations, and he has been a leading figure in Korea, across Asia and in the worldwide enzyme technology/biocatalysis community in driving new discoveries and technologies.

Prof. Kim is a key driver in integrating biocatalysis with a wide range of disciplines, including synthetic and analytical chemistry, molecular biology and biochemistry, and metabolic pathway engineering. His publications are of both substance and impact, leading to revolutionary advances in enzyme engineering. He developed a unique methodology to graft functional elements onto enzymes to alter enzyme function, demonstrating the natural evolution process of enzymes. He also integrated molecular dynamics simulations and directed evolution into rational protein design, greatly enhancing the efficiency and success rate beyond independent rational and molecular evolution techniques. In addition, Prof. Kim has developed a wide array of important tools for the enzyme engineer. To advance molecular evolution and enzyme design, he developed an antisense RNA-based high-throughput screening system for directed evolution of quorum-quenching enzymes. This resulted in a significant reduction in false-positive rates, a critical problem in such screening methodologies. This approach resulted in advancing the integration of enzyme engineering with metabolic engineering, particularly the ability to rationally design a specific enzyme in a metabolic pathway to improve product yield.

He is the discoverer of “repebody”, which is a repeat protein scaffold consisting of varying numbers of consecutive homologous-structural modules of 20–40 amino acid residues with characteristic secondary structures. Armed with this structural knowledge, Prof. Kim developed repebody-drug conjugates with high selectivity and efficacy toward tumor cells, an immensely important field of emerging therapeutics today. Extending this approach, Prof. Kim targeted very specific disease-based proteins, and recently founded a start-up ProEn Therapeutics, which is targeting disease-related enzymes and tumor associated antigens for developing potential therapeutic agents against various diseases and cancers.

Prof. Kim also integrated enzyme design with complex molecular dynamics tools and demonstrated how protein dynamics dictate the binding and dissociation of a ligand through a single-molecule kinetic analysis of specific enzyme engineered mutants. Such a discovery provided direct evidence that protein conformational dynamics plays a crucial role in ligand binding and dissociation. Based on this finding, Prof. Kim engineered the **chorismate-pyruvate lyase** to relieve product inhibition by increasing the intrinsic dynamics of the enzyme. Sever product inhibition of the enzyme has limited its practical applications. The engineered enzyme has been successfully integrated into the shikimate pathway of *Corynebacterium glutamicum* to produce diverse aromatic compounds. Because the role of conformational dynamics in enzyme catalysis is still in early stage of study, those approaches are highly noteworthy in practice. Prof. Kim has been extremely productive, with 235 peer-reviewed publications and an inventor on 45 international patents/patent applications, many of which have been licensed to companies in Korea and elsewhere, and several leading to commercial processes.

He has graduated 62 Ph.D. students, thereby providing a pipeline of researchers in Korea and elsewhere in both academia and industry. Indeed, around 15 of his former Ph.D. students are now faculty members at top universities worldwide, and many former students are CEOs or senior directors at start-up ventures or large corporations. He has also made great contributions to the enzyme engineering profession. He organized the Enzyme Engineering XVIII meeting in 2005, which was the first of such meetings in Korea, and indeed, this meeting resulted in the tremendous growth of biocatalysis in Korea. He has served as president of the Korean Society of Enzyme Engineering. He served as chair of the 13th China-Japan-Korea Joint Symposium on Enzyme Engineering, which promotes collaboration and communication among East Asian enzyme engineering communities and between academia and industry. Finally, closer to home, he has taken on a series of critical leadership roles at KAIST, including serving as Dean of the College of Life Sciences and Bioengineering. Prof. Kim has received a great many awards of recognition from Korean government and KAIST as well as Korea scientific communities.

For these contributions, Engineering Conferences International is proud to award the 2023 Enzyme Engineering Award to Prof. Hak-Sung Kim of KAIST.

Past Enzyme Engineering Awardees

1983—WHITE HAVEN, PA, USA — ICHIRO CHIBATA

1985—HELSINGOR, DENMARK — KLAUS MOSBACH

1987—SANTA BARBARA, CA, USA — EPHRIAM KATCHALSKI-KATZIR

1989—KASHIKOJIMA, JAPAN — SABURO FUKUI

1991—KONA, HAWAII, USA — ALEX KLIBANOV

1993—DEAUVILLE, FRANCE — MALCOLM LILLY

1995—SAN DIEGO, CA, USA — MARIA-REGINA KULA / CHRISTIAN WANDREY

1997—BEIJING, CHINA — HARVEY BLANCH

1999—KONA, HAWAII, USA — CHI HUEY WONG

2001—POTSDAM, GERMANY — HIDEAKI YAMADA

2003—SANTA FE, NM, USA — JON DORDICK / DOUG CLARK

2005—GYEONG-JU, KOREA — DEWEY RYU

2007—HARRISON HOT SPRINGS, BC, CANADA — FRANCES H. ARNOLD

2009 – GRONINGEN, THE NETHERLANDS — SAKAYU SHIMIZU

2011 – VAIL, COLORADO, USA — DAVID ESTELL

2013 – TOYAMA, JAPAN — YASUHISA ASANO

2015 – ST. PETERSBURG, FLORIDA, USA – DAN TAWFIK

2017 – TOULOUSE, FRANCE – PIERRE MONSAN

2019 – WHISTLER, CANADA – HUIMIN ZHAO

2021 – DALLAS, TX, USA - UWE T. BORNSCHEUER

Conference Sponsors

ACS Synthetic Biology

Allozymes

Amano Enzyme Inc.

Aminoverse

Basecamp Research Limited

Biomatter Designs, UAB

Central Glass Co., Ltd.

Codexis, Inc.

Enzymaster (Ningbo) Bio-Engineering Co., Ltd.

Hzymes Biotechnology Co., Ltd

Inscripta

Japanese Society of Enzyme Engineering

Kcat Enzymatic Pvt. Ltd.

MSD

Mojia Biotech

Singapore Consortium for Synthetic Biology (SINERGY)

WuXi STA

Zymvol

Sunday, October 1, 2023

15:00	Conference check-in
18:00 – 21:00	Welcome Reception & Dinner

NOTES

- *Technical Sessions will be held in the Grand Ballroom 2-3.*
- *Poster Sessions will be held in Grand Ballroom 1.*
- *Dinners will be in Sky Ballroom 1-2.*
- *Speakers – Please have your presentation loaded onto the conference computer prior to the session start (preferably the day before).*
- *Speakers – Please leave at least 3-5 minutes for questions and discussion.*
- *Please do not smoke at any conference functions.*
- *Turn your mobile telephones to vibrate or off during technical sessions.*
- *After the conference, ECI will send an updated participant list to all participants. Please check your listing now and if it needs updating, you may correct it at any time by logging into your ECI account.*
- *Audiotaping, videotaping and photography of presentations are prohibited*

Monday, October 2, 2023

- 06:00 – 08:00 Breakfast
- 08:30 – 08:45 Chairs welcome and opening remarks
- 08:45 – 09:30 **Opening Plenary Talk**
Chair: Zhi Li
Bacterial Phosphorothioate DNA Modification: New Defense Systems and Perspective Uses
Zi Xin Deng, Shanghai Jiaotong University, China
- Session 1: Computational Tools for Enzyme Engineering**
Chair: Irmantas Rokaitis
Sponsored by Biomatter Designs, UAB
- 09:30 – 10:10 **Keynote**
Soluble expression of genes for enzymes in Escherichia coli
Yasuhisa Asano, Toyama Prefectural University, Japan
- 10:10 – 10:40 Coffee Break (*Sponsored by Hzymes Biotechnology Co., Ltd*)
- 10:40 – 11:10 **Invited Talk**
CATALYZING GREEN CHEMISTRY: In silico protocols for the efficient discovery and design of industrial enzymes
Marina Canellas, Zymvol Biomodeling, Spain
- 11:10 – 11:40 **Invited Talk**
Expanding the enzymatic toolbox with de novo protein design
Indrek Kalvet, University of Washington, USA
- 11:40 – 12:00 **Computational redesign of functional enzymes**
Bian Wu, Institute of Microbiology, Chinese Academy of Sciences, China
- 12:00 – 12:20 **Machine-learning based prediction of glycosyltransferase substrates**
Ditte Welner, Technical University of Denmark, Denmark
- 12:20 – 13:30 Lunch & Networking
- Session 2: New Technologies for Enzyme Engineering**
Chair: Vesna Mitchell
Sponsored by Codexis
- 13:30 – 14:10 **Keynote**
Enzymatic recycling of plastics
Uwe Bornscheuer, University of Greifswald, Germany
- 14:10 – 14:40 **Invited Talk**
Exploring transaminase stability for biocatalysis
Per Berglund, KTH Royal Institute of Technology, Sweden
- 14:40 – 15:00 **A growth selection system for the directed evolution of amine-forming or converting enzymes**
Shuke Wu, Huazhong Agricultural University, China
- 15:00 – 15:30 Coffee Break

Monday, October 2, 2023 (continued)

- 15:30 – 16:00 **Invited Talk**
The Engineering of Directed Evolution
Jeff Moore, Merck & Co., Inc., USA
- 16:00 – 16:20 **Discovery and engineering of nylon hydrolases for PA66 recycling**
Joshua Michener, Oak Ridge National Laboratory, USA
- 16:20 – 16:40 **Enzyme discovery and specificity fingerprints by analysis of correlated positions in CAZy family GH65**
Emma De Beul, Ghent University, Belgium
- 16:40 – 17:00 **Molecular mechanisms of nucleases: A single-molecule perspective**
Bo Sun, Shanghai University of Science and Technology, China
- 18:00 – 22:00 **Standing Dinner & Poster Session (Odd-numbered posters to be presented)**

Tuesday, October 3, 2023

06:00 – 08:00 Breakfast

Session 3: Novel Enzymes

Chairs: Andy Bommarius & Jun Ogawa

08:30 – 09:10

Keynote

b-NAD as a Building Block in Natural Product Biosynthesis

Ikuro Abe, The University of Tokyo, Japan

09:10 – 09:40

Invited Talk

2-Hydroxyacyl-CoA synthases enable C1-based orthogonal biomanufacturing

Ramon Gonzalez, Mojia Biotech, Singapore

09:40 – 10:10

Invited Talk

Enzyme engineering of glutamate dehydrogenase for production of L-amino acids

Li-Rong Yang, Zhejiang University, China

10:10 – 10:40

Coffee Break (**Sponsored by the Japanese Society of Enzyme Engineering**)

10:40 – 11:10

Invited Talk

Novel enzymes from the biosynthetic pathways of anthraquinone-fused enediynes

Zhaoxun Liang, Nanyang Technological University, Singapore

11:10 – 11:30

Discovery, evolution and synthetic applications of enzymes for chiral oxygen-containing compounds

Yong-Zheng Chen, Zunyi Medical University, China

11:30 – 11:50

Unlocking biocatalytic acylations by enzyme repurposing and engineering for amide synthesis

Christian Schnepel, KTH Royal Institute of Technology, Sweden

11:50 – 12:10

Hydroxynitrile lyase engineering for promiscuous diastereoselective synthesis of β -nitroalcohols

Santosh Kumar Padhi, University of Hyderabad, India

12:10 – 13:30

Lunch & Networking

Session 4: Enzyme Engineering in Synthetic Biology

Chairs: Zhaoxun Liang and Robert Kourist

13:30 – 14:10

Keynote

Enzyme engineering for synthetic biology

Huimin Zhao, University of Illinois at Urbana-Champaign, USA

14:10 – 14:40

Invited Talk

Enzyme Engineering in Synthetic Biology

Pimchai Chaiyen, Vidyasirimedhi Institute of Science and Technology, Thailand

14:40 – 15:00

Immobilized biocatalytic process to prepare enantiopure pregabalin intermediate using engineered hydantoinase

Haibin Chen, Enzymaster (Ningbo) Bio-Engineering Co., Ltd., China

Tuesday, October 3, 2023 (continued)

- 15:00 – 15:30 Coffee Break
- 15:30 – 16:10 **Keynote**
Engineering Hydroxylase and Ketoreductase Activity, Selectivity, and Stability for a Scalable Concise Synthesis of Belzutifan
Stephanie Galanie, Merck & Co., Inc., USA
- 16:10 – 16:40 **Invited Talk**
 α,α -Disubstituted α -amino acid metabolism including a novel three-component non-heme diiron monooxygenase system
Jun Ogawa, Kyoto University, Japan
- 16:40 – 17:00 **Methanol-driven and non-natural redox cofactor mediated biocatalysis**
Zongbao Zhao, Dalian Institute of Chemical Physics, Chinese Academy of Sciences, China
- 18:00 – 22:00 Standing Dinner & **Poster Session (Even-numbered posters to be presented)**

Wednesday, October 4, 2023

- 06:00 – 08:00 Breakfast
- Session 5: Enzyme Engineering for Medical Application**
Chairs: Yongzheng Chen & Bian Wu
- 08:30 – 09:10 **Keynote**
Accelerating Discovery of Substrate Promiscuity in Biocatalyzed Oxidations
Joelle Pelletier, University of Montreal, Canada
- 09:10 – 09:40 **Invited Talk**
Evolution of highly efficient t7 Rna polymerase for Mrna production using aptamer-based fluorescence-activated droplet sorting
Guang-Yu Yang, Shanghai Jiao Tong University, China
- 09:40 – 10:00 **TBA**
Wei Leong Chew, Genome Institute of Singapore, A*STAR, Singapore
- 10:00 – 10:30 Coffee Break
- 10:30 – 11:00 **Invited Talk**
Accessing bacterial dark matter for improved enzyme discovery and engineering
David Ackerley, Victoria University of Wellington, New Zealand
- 11:00 – 11:30 **The use of in silico analysis to engineer the best immunogenic epitope and produce the corresponding prophylactic antigen-based vaccines with C1 production platform in order to rapidly respond to viral pandemics**
Ronen Tchelet, Dyadic International, Inc., USA
- 11:30 – 11:50 **An engineered gastrointestinally stable microbial leucine decarboxylase for potential treatment of maple syrup urine disease**
Chinping Chng, Codexis, Inc., USA
- 11:50 – 13:10 Lunch and Networking
- Session 6: Process Engineering**
Chair: Pimchai Chaiyen
- 13:10 – 13:50 **Keynote**
Studying the effect of industrial operating conditions on enzyme kinetics and stability
John Woodley, Technical University of Denmark, Denmark
- 13:50 – 14:30 **Keynote**
Biocatalyst optimization for process conditions
Andreas Bommarius, Georgia Institute of Technology, USA
- 14:30 – 14:50 **Process enhancement of enzyme-catalyzed reactions based on micro- and nano-reactors**
Yunpeng Bai, East China University of Science and Technology, China
- 14:50 – 15:15 Coffee Break

Wednesday, October 4, 2023 (continued)

Session 7: Industry Session

Chair: Kostas Vavitsas

- 15:15 – 15:35 **Next-Gen Enzyme Engineering – Fusing holistic wet lab data generation with artificial intelligence to identify and recombine key point mutations for superior enzyme performance**
David Schönauer, Aminoverse, the Netherlands
- 15:35 – 15:55 **Transforming protein engineering: advanced integration of deep learning and 3DM technology for superior protein function predictions**
Henk-Jan Joosten, Bio-Product BV, the Netherlands
- 15:55 – 16:15 **ENZYME ENGINEERING AT ALMAC: Case studies of enzyme discovery and engineering**
Alexandra Carvalho, Almac Sciences, UK
- 16:15 – 17:00 **Panel Discussion (Hosted by Allozymes)**
- 17:30 Optional guided excursion to Night Safari with dinner and tour included or a night on your own to explore Singapore.

Thursday, October 5, 2023

- 06:00 – 08:00 Breakfast
- Session 8: Enzyme Engineering for Sustainability**
Chairs: David Ackerley, Per Berglund and Jeff Moore
- 08:30 – 09:10 **Keynote**
Pet recycling: From enzyme and process optimization to an industrial plant
Alain Marty, Carbios, France
- 09:10 – 09:40 **Invited Talk**
Sustainability and oxidase biocatalysis – An overview
Stephanie Burton, University of Pretoria, South Africa
- 09:40 – 10:00 **Engineering an artificial pathway for Cis-alpha-irone biosynthesis**
Xixian Chen, Singapore Institute of Food and Biotechnology Innovation (SIFBI), Singapore
- 10:00 – 10:30 Coffee Break
- 10:30 – 11:10 **Keynote**
Enzyme reactions for biocolors
ByungGee Kim, Seoul National University, South Korea
- 11:10 – 11:40 **Invited Talk**
Repurposing Biology through Synthetic Enzymology – For Human and Planetary Health
Wen Shan Yew, National University of Singapore, Singapore
- 11:40 – 12:10 **Invited Talk**
Enzyme engineering of a membrane-bound monooxygenase as key step of an artificial metabolic pathway towards Tulipalin A
Robert Kourist, Austrian Centre of Industrial Biotechnology, Austria
- 12:10 – 13:30 Lunch & Networking
- 13:30 – 13:50 **Next-generation plastic degrading enzymes**
Sierin Lim, Nanyang Technological University, Singapore
- 13:50 – 14:10 **Efficient synthesis of steroid drugs enabled by engineered P450 monooxygenases**
Aitao Li, Hubei University, China
- 14:10 – 14:30 **Progressive enzyme engineering for rapid discovery of a detergent protease with enhanced sustainability and cleaning performance benefits**
Thomas Graycar, International Flavors & Fragrances, USA
- Poster Talks**
- 14:30 – 14:40 Announcement of Winners of the Poster Competition
- 14:40 – 14:55 Winner 1
- 14:55 – 15:10 Winner 2

Thursday, October 5, 2023 (continued)

15:10 – 15:25 Winner 3

15:25 – 16:00 Coffee Break

Enzyme Engineering Award Presentation and Lecture

16:00 – 16:10 Introduction and Presentation of the Enzyme Engineering Award

16:10 – 17:00 **Enzyme Engineering Award Lecture**
Hak Sung Kim, Korea Advanced Institute of Science and Technology (KAIST),
South Korea

18:00 – 21:00 Reception and Banquet

Friday, October 6, 2023

06:00 – 08:00

Breakfast

Poster Presentations

1. **Engineering bacterial nitroreductases for anticancer gene therapy and targeted cell ablation**
Abigail Sharrock, Victoria University of Wellington, New Zealand
2. **Basecamp Research: Predictive enzyme development through nature and AI**
Ahir Pushpanath, Basecamp Research, United Kingdom
3. **Metagenomic discovery and directed evolution of genes that defend against chemotherapeutics**
Alexandria Linton-de Boer, Victoria University of Wellington, New Zealand
4. **The effect of ionic strength on the kinetic stability of NADH oxidase in a bubble column**
Amalie Vang Høst, Technical University of Denmark, Denmark
5. **Engineering a biocatalytic platform for modified oligonucleotide production**
Anders Knight, Codexis, USA
6. **Improving KMO via enzyme engineering for industrially competitive oxidases**
Ariadna Pié Porta, Technical University of Denmark, Denmark
7. **Flavin-N5OOH: A most powerful nucleophile and base in nature**
Binju Wang, Xiamen University, China
8. **Engineering a hyperactive TcBuster transposase for efficient gene delivery for cell therapy applications**
Bryan Jones, Bio-Techne, USA
9. **Laboratory evolution of a fungal heme-thiolate enzyme promoting peroxidase or peroxygenase activity**
Carsten Pichler, Graz University of Technology, Austria
10. **Post-transcriptional association of proteins to study spatial organisation within multi-enzyme complexes**
Cédric Montanier, TBI, Université de Toulouse, CNRS, INRAE, INSA, France
11. **Nature-inspired engineering of an artificial RNA ligase created by in vitro selection**
Cher Ling Tong, University of Minnesota Twin Cities, USA
12. **Controlling enantioselectivity of limonene synthases by exploring natural diversity combined to molecular engineering**
Clement Pierre Marcel Scipion, CNRS@CREATE, Singapore
13. **Next-gen enzyme engineering – A wet lab data-driven approach to identify and recombine key point mutations with EnzyMAP AI and EnzyREC AI for superior enzyme performance**
David Schoenauer, Aminoverse B.V., Netherlands
14. **Molecular docking and kinetic study of transglycosylation reaction for naringenin using amylosucrase from *Deinococcus wulumuqiensis***
Dong-Ho Seo, Kyung Hee University, South Korea
15. **Synthetic biology for combinatorial biosynthesis of novel alkylating agents**
Edward McGuinniety, Victoria University of Wellington, New Zealand

16. **Understanding the effect of Air-liquid interface on enzyme stability in the presence of hydrophobins**
Elif Erdem, Technical University of Denmark, Denmark
17. **Improved thermostability of a plant sucrose synthase for the sustainable recycling of UDP-glucose**
Felipe Mejia Otalvaro, Technical University of Denmark, Denmark
18. **Precision in medicinal chemistry: Harnessing enzymes for advanced halogenation**
Fong Tian Wong, Institute of Molecular and Cell Biology, Singapore
19. **7d-grid-ai technology: A technology that translates enzymes from a computer to business with limited lab experiments**
Gladstone Sigamani, Kcat Enzymatic Private Limited, India
20. **Putting the spotlight on toluene o-xylene monooxygenase “A good biocatalyst candidate for biotechnological applications”**
Gonul Schara, California State University Stanislaus, USA
21. **A growth selection system for the directed evolution of Sucrose Synthases**
Gonzalo Bidart, DTU Biosustain, Denmark
22. **Assessing the evolutionary potential of novel resistance elements to the candidate antibacterial, niclosamide**
Hannah Lee-Harwood, Victoria University of Wellington, New Zealand
23. **Coupled molecular dynamics mediates interaction between long-range mutations and its application in enzyme engineering**
Haoran Yu, Zhejiang University, China
24. **Molecular basis for a toluene monooxygenase to govern substrate selectivity**
Huili Yu, Hubei University, China
25. **Unlocking the potential of enzyme engineering with Intelligent Architecture platform**
Irmantas Rokaitis, Biomatter Designs, Lithuania
26. **Discovery and evolution of primordial antibiotic resistance genes from soil microbes**
Jennifer Francis, Victoria University of Wellington, New Zealand
27. **The correlation between NAD(P)H oxidase kinetics and its stability exposed to gas-liquid interface**
Jingyu Wang, Technical University of Denmark, Denmark
28. **Structure-based self-supervised learning enables ultrafast prediction of stability changes upon mutation**
Jinyuan Sun, AIM center, Institute of Microbiology, Chinese Academy of Sciences, China
29. **Comparison of Sds-page to automated parallel capillary electrophoresis for enzyme size and purity assessments**
Kyle Luttgaharm, Agilent Technologies, USA
30. **Enzyme engineering for valorization of agrowaste-derived levulinic acid to versatile 4-hydroxyvaleric acid**
Kyoungseon Min, Korea Institute of Energy Research, South Korea

31. **Using Glucan Water Dikinase for in vitro glucan phosphorylation**
Magali Remaud-Simeon, Toulouse Biotechnology Institute, France
32. **Overcoming the risks in synthetic biology product development through rapid, genome scale metabolic engineering**
Matthew Biggs, Inscripta, USA
33. **An in-silico & in-vitro tournament for protein engineering**
Mohamed Hassan Kane, Medium Biosciences, USA
34. **Escaping patents using generative machine learning**
Mohamed Hassan Kane, Medium Biosciences, USA
35. **Non-covalent interactions based machine learning approach to build a second active site on an enzyme for increased K_{cat} and dual function**
Naveen Banchalihundi Krishna, Kcat Enzymatic Private Limited, India
36. **Design of engineered active zymogen of microbial transglutaminase**
Noriho Kamiya, Kyushu University, Japan
37. **Predictive modelling and machine learning-assisted engineering of AvPAL for improved thermal stability**
Pravin Kumar R, Kcat Enzymatic Private Limited, India
38. **Rationally controlling selective steroid hydroxylation via scaffold sampling of a P450 family**
Qian Li, Hubei University, China
39. **The use of in silico analysis to engineer the best immunogenic epitope and produce the corresponding prophylactic antigen-based vaccines with C1 production platform in order to rapidly respond to viral pandemics**
Ronen Tchelet, Dyadic International Inc, USA
40. **Biocatalytic synthesis of indigo and indican for blue denim dyeing**
Ruben Marcel de Boer, Technical University of Denmark, Denmark
41. **The efficient expression of nattokinase in Escherichia coli by sequence optimization**
Ruizhao Jiang, Tsinghua University, China
42. **Construction of artificial biosynthetic pathways for L-theanine production in Escherichia coli**
Ryota Hagihara, Kyowa Hakko Bio Co., Ltd., Japan
43. **Combinatorial engineering of PET and PLA degrading enzymes**
Santana Royan, CSIRO, Australia
44. **Metagenomic domain substitution for the high-throughput creation of non-ribosomal peptide analogues**
Sarah Messenger, Victoria University of Wellington, New Zealand
45. **Next-generation plastic degrading enzymes**
Sierin Lim, Nanyang Technological University, Singapore
46. **Improving thermostability of tryptophan 2-monooxygenase by semi-rational engineering**
Sirus Kongjaroon, Vidyasirimedhi institute of science and technology, Thailand

47. **Harnessing environmental microbiota for the discovery of novel biocatalytic enzymes using microbial single-cell genome sequencing**
Soichiro Tsuda, bitBiome Inc., Japan
48. **Enzymatic properties of a novel CYP152 fatty acid decarboxylase**
Suppalak Phaisan, Vidyasirimedhi Institute of Science and Technology, Thailand
49. **Thermophilic bioremediation of emerging pollutants using a recombinant thermophilic fungal peroxidase**
Syed Salman Ashraf, Khalifa University, United Arab Emirates
50. **The discovery and characterization of tungsten insertase in tungsten cofactor biosynthesis**
Uyen Thu Phan, UNIST, South Korea
51. **Oxidative biocatalysis without oxygen – Applying the less used side of hydrogenases**
Volker Sieber, Technical University of Munich, Germany
52. **Exploring diastereoselectivity mechanism of L-threonine aldolase**
Wenlong Zheng, Zhejiang University, China
53. **Engineering a carbonyl reductase to simultaneously increase activity toward bulky ketone and isopropanol for dynamic kinetic asymmetric reaction**
Xi Chen, Tianjin Institute of Industrial Biotechnology, Chinese Academy of Sciences, China
54. **Biochemical characterization of a SusD-like protein involved in glucooligosaccharide utilization by a cow rumen uncultured Bacteroidales**
Xiaoqian LI, TBI, INSA Toulouse, France
55. **Cannabinoid biosynthesis using non-canonical enzymes**
Yan Ping Lim, NUS SynCTI, Singapore
56. **Directed evolution and predictive modelling of galactose oxidase towards bulky benzylic and unactivated secondary alcohols**
Yee Hwee Lim, A*STAR ISCE2, Singapore
57. **Sugar transporter engineering in yeast to enable simultaneous co-utilization of sugars prevalent in cellulosic hydrolysates**
Yong-Su Jin, University of Illinois, USA
58. **Immobilization of dye-decolorizing peroxidase on magnetic nanoparticles: A dual-functional biocatalyst for mycotoxins degradation and hydrogen peroxide detection**
Yu Xia, Jiangnan University, China
59. **Engineering the substrate specificity of toluene degrading enzyme XylM using biosensor XylS and machine learning**
Yuki Ogawa, RIKEN, Japan
60. **Physical and chemical properties and beta carotene encapsulation of water soluble molecular rearrangement glucans synthesized by amylosucrase**
Yun-Sang So, Jeonbuk National University, South Korea
61. **Rational design of an (R)-selective transaminase improves enzymatic activity and stability using a computational virtual screening workflow**
Yuwen Wei, Tsinghua University, China

62. **Direct arene trifluoromethylation enabled by promiscuous activity of fungal laccase**
Zhennan Liu, Institute of Sustainability for Chemicals, Energy and Environment, Singapore
63. **Discovering and engineering novel prodrug activating and detoxifying enzymes to improve targeted cell ablation**
Thomas W. Skurr, Victoria University of Wellington, New Zealand
64. **Production of biobased ethylbenzene via cascade biocatalysis with an engineered photodecarboxylase**
Shuke Wu, Huazhong Agricultural University, China
65. **Structural understanding of fungal terpene synthases for terpene product cyclization**
Congqiang Zhang, Singapore Institute of Food and Biotechnology Innovation (SIFBI), Singapore
66. **A synthetic biology approach to Vitamin B3 production from coal tar using engineered enzymes**
Pravin Kumar R, Kcat Enzymatic Private Limited, India
67. **Engineering an artificial pathway for Cis-A-irone biosynthesis**
Xixian Chen, Singapore Institute of Food and Biotechnology Innovation (SIFBI), Singapore
68. **Spatial organisation of enzymes in the biosynthetic limonene production pathway in Escherichia coli**
Tiffany Chau, Singapore Institute of Food and Biotechnology Innovation (SIFBI), Agency for Science, Technology and Research (A*STAR), Singapore