Applications for Enzyme Technologies

Utilizing Cutting-Edge Technologies and Approaches to Discover, Develop and Commercialize Novel Enzymes for Emerging Applications

“This year's best opportunity to share perspectives on the latest technical developments, applications and achieving commercial success.”
Anton Glieder, Ph.D., CEO and CSO, Austrian Centre of Industrial Biotechnology, GmbH, Austria

Keynote Presentations:

David Estell, Ph.D.
Research Fellow
DuPont

Design and Evolution: Creating New Enzymes

Frances Arnold, Ph.D.
Dickinson Professor of Chemical Engineering
Bioengineering and Biochemistry
California Institute of Technology

Industrial Enzymes: Perspective, Economics and High Value Applications

Glenn E. Nedwin, Ph.D., MoT
Chief Executive Officer & President
Caisson Biotech, LLC

Create New Enzymes and Applications from Innovations in:

- Protein Engineering
- Directed Evolution
- Cell-Free Enzyme Production
- Functional Transcriptomics
- Synthetic Biology
- Multidimensional Engineering
- Metabolic Engineering
- Library & Diversity Generation
- Computational Enzyme Design
- Shuffling Technologies

Hear Case Studies that Provide Practical Solutions from Discovery to Large Scale Production for:

- Specialty Enzymes
- Agricultural Products
- Pharmaceuticals
- Household Products
- Fine Chemicals
- Environmental Remediation
- Polymers
- Biofuels

Sponsor: DNA 2.0

Premier Publication: BioProcess International

Register Early and Save: www.IBCLifeSciences.com/Enzyme
Dear Colleague,

Welcome Back to Enzyme Technologies!

Rapidly advancing technologies and the use of custom-made biocatalysts are producing exciting opportunities for emerging enzyme applications across several industries. Our intensive research with industry leading companies and experts in the enzyme field indicates a strong need for a focused conference on the development and commercialization of enzymes and enzymatic processes, which is why we are proud to reintroduce IBC’s Enzyme Technologies conference.

A Decade of Progress

IBC’s Enzyme Technologies conferences, held from 1997-2003, provided a unique forum and community for those active in the young and growing field of biocatalyst development. Our exciting new program for 2013 is an applications focused conference which highlights exciting new technical developments and successes in the now-burgeoning enzyme market.

Expanding Industry Applications

Biocatalysis has expanded into all areas of chemical synthesis, from the traditional fine chemical applications in pharmaceutical synthesis and larger scale commodity chemical industry, to the global consumer products and energy industries. This conference covers the breadth of these applications as well as the depth of the underlying science, from the discovery or creative innovation of new catalytic activities, to the economics of efficient enzyme production. Join us to hear the most recent learnings from all stages of research, development and commercialization that provide unique advantages in this ever developing sector.

Your Participation is Requested

Your attendance and enthusiastic participation at this event ensures the level of information exchange and collaboration needed to foster new ideas, practical strategies and solutions that you can take home right away and apply at your organization. We hope you agree that the program is top notch, and that the shared knowledge that comes from your involvement will help propel the field towards further commercial success.

Sincerely,

Jeffrey Moore, Ph.D.
Lori Giver, Ph.D.
Barry Walsh

Merck & Co., Inc.
Codexis Corp.
IBC Life Sciences

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Take an Active Role in the Conference and Present a Poster

Any registered conference attendee may register to present a poster. The deadline to submit an abstract online is June 3, 2013 to have the abstract be included in the conference materials. Full payment of conference registration and poster fees must be received by this date for the abstract to be included in the conference materials and a poster board assignment to be made (see the registration page for details on the poster fee). Posters should be PORTRAIT orientation, with maximum dimensions of 36 inches wide (3 feet) x 48 inches high (4 feet). Please note: Poster presentations may not be used as exhibit displays or for marketing purposes, and all posters are subject to approval by conference organizers. Only one poster presentation is allowed per registered attendee/author.

Drive Your Global Sales and Marketing

IBC’s Applications for Enzyme Technologies event provides a number of sponsorship and exhibiting opportunities you can choose from to meet your goals before, during and after the event. IBC’s sponsorships ensure you the proper balance between attendees and exhibitors so you can spend more time developing your deals and less time searching for possible partners. Sponsorship/Exhibiting opportunities include Technology Workshops (including a thirty minute speaking slot); Session Sponsorships; Reception, Luncheon and Break Sponsorships; Delegate Focus Groups; Imprinted Giveaways; and much more.

To learn more about sponsoring or exhibiting, please contact: Jennifer Thebodo at 508-614-1672 or jthebodo@ibcusa.com

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Monday, June 17, 2013

8:00 Chairwoman’s Opening Remarks
Lori Giver, Ph.D., Vice President, Technology and Innovation, Codexis Corp.

Keynote Presentations

8:15 CASE STUDY Effective Strategies for Protein Engineering and Economical Large Scale Protein Production
Protein engineering and directed evolution have proven effective techniques to produce enzymes with improved properties. In order to fully utilize these products, they must be produced in volumes (metric ton quantities), and at price points that are radically different from current pharmaceutical protein production volumes and economics. This requires a radically different approach to protein production.
David Estell, Ph.D., Research Fellow, DuPont

9:00 UNPUBLISHED DATA Design and Evolution: Creating New Enzymes
Biotechnology offers elegant solutions to problems that range from producing fuels and chemicals from sunlight and carbon dioxide to combating disease. Although biology has a large repertoire of catalytic functions, it does not include many that chemists have invented and developed in other contexts. This presentation describes new efforts to expand the repertoire of genetically encoded catalysts.
Frances Arnold, Ph.D., Dickinson Professor of Chemical Engineering, Bioengineering and Biochemistry, California Institute of Technology

9:45 Networking Refreshment Break and Poster/Exhibit Viewing

Applications from Discovery

10:15 CASE STUDY - UNPUBLISHED DATA The Three Pillars of Evolutionary Enzyme Optimization
The process of directed evolution can be viewed as a canonical optimization task comprised of three fundamental components: 1) Fitness function, 2) Diversity generation, and 3) Search algorithm. The presentation focuses on recent developments in the context of these components, discuss the critical interplay between them, and provide relevant examples that demonstrate the principles behind rapid and efficient enzyme optimization.
Richard Fox, Ph.D., Research Fellow, Pioneer Hi-Bred International

10:45 CASE STUDY Infolog-Based Protein Engineering Allows for Controlled Navigation in Megadimensional Sequence Space
Independently designed synthetic genes where substitutions are systematically incorporated (Infologs) allows for uniform and maximally information rich sampling of megadimensional sequence space. Infologs have been successfully used to engineer genes, proteins and pathways for altered functionality. Several case studies are presented.
Claes Gustafsson, Ph.D., Founder, Chief Commercial Officer, DNA2.0 Inc.

11:15 UNPUBLISHED DATA Exploiting Squalene Hopene Cyclases and Their Catalytic Bronsted Acid for Non-Natural Reactions
Squalene hopene cyclases (SHC) catalyze the Bronsted acid initiated cyclization of squalene to hopene via cationic intermediates in one of the most complex reactions known in biochemistry. By harnessing the catalytic machinery of SHCs we postulate that the pool of biocatalytic reactions for these enzymes can be greatly expanded, bearing in mind the large diversity of reactions catalyzed by Bronsted acid catalysts in synthetic organic chemistry. To test this hypothesis molecules were designed which address not only substrate promiscuity (non-natural substrates) but also catalytic promiscuity (non-natural reactions). Employing this approach we show that SHCs can catalyze Friedel-Crafts alkylation and the synthesis of different heterocyclic compounds. Our results indicate that the catalytic machinery of SHCs can be exploited for general Bronsted acid catalysis in the chiral environment of the active site.
Bernhard Hauer, Ph.D., Professor, Institute Of Technical Biochemistry, University of Stuttgart, Germany

11:45 Technology Workshop
This technology highlight session is available. For more information contact Jennifer Thebodo at 508-614-1672 or jthebodo@ibcusa.com

12:15 Luncheon and Poster/Exhibit Viewing

1:25 Chairman’s Remarks
Anton Glieder, Ph.D., CEO and CSO, Austrian Centre of Industrial Biotechnology GmbH, Austria

Applications from Discovery (continued)

1:30 Novel Enzymes and Synthetic Pathways for Bio-Based Chemicals
The ability to rapidly and reliably design new enzymes is key to designing customized cell factories for the production of novel fuels and chemicals. This presentation illustrates how Arzeda’s computational design technology for new enzyme activities is opening up avenues for the synthesis of truly novel metabolic pathways by designing enabling the full potential of synthetic biology.
Daniela Grabs, Ph.D., Chief Technology Officer, Molecular Screening, Arzeda Corp.

2:00 CASE STUDY - UNPUBLISHED DATA Industrial Enzyme Discovery by Functional Transcripomics
In addition to bacteria, plants, animals and fungi provide a vast and often complementary diversity of enzymes. Transcriptome sequencing, analysis and expression in yeast as well as direct functional screening of normalized cDNA expression libraries now provide a similar simple and quick access to new enzymes from eukaryotes as from the bacterial world.
Anton Glieder, Ph.D., Chief Executive Officer & Chief Scientific Officer, Austrian Centre of Industrial Biotechnology GmbH, Austria

2:30 Developing Enzymes for Environmental Applications – From Fund Research to Product Development
Anthropogenic pollutants are a major concern in both developed and developing countries because of their potential adverse effects on human health and the environment. We have identified a number of enzymes for exploitation as cell-free bioremediants of pesticides and herbicides. We have improved these enzymes in the laboratory to meet their commercial requirements (production qualities, kinetic properties, etc.).
Colin Scott, Ph.D., Stream Leader, Division of Ecosystem Sciences, CSIRO Australia

3:00 Networking Refreshment Break and Poster/Exhibit Viewing

Applications of Enzyme Engineering

3:30 The (Near) Future of Bio catalytic Enzyme Screening: sA Coming Together Of Genomics/ Metagenomics, Advanced High-Throughput Screening Technology and Rapid Structure-Assisted Biocatalyst Optimization
The debate: should you scale your transformation now, keep on screening enzymes, or evolve current hit(s)? It’s situational of course - a complex interplay of fundamental and commercial factors. The current / future impact of expanding sequence databases, HT cloning, advanced cost-effective screening technologies, and optimization of biocatalyst performance by in silico sequence / 3D-structure informed methods are discussed.
Simon J. Charnock, Ph.D., Managing Director, Technical Director, Prozomix Limited, United Kingdom

4:00 CASE STUDY - UNPUBLISHED DATA Enzyme Evolution - Theory and Practice
This presentation describes experimental work aimed at understanding how enzymes evolve. Properties that drive enzyme evolvability are described, including functional promiscuity, structural plasticity, and the role of neutral mutations in promoting new functions. This presentation shows how these fundamental principles apply to specific cases, and how far enzyme engineering can get in terms of both rates and specificity.
Dan Tawfik, Ph.D., Professor, Department of Biological Chemistry, Weizmann Institute of Science, Israel

4:30 CASE STUDY - UNPUBLISHED DATA New Tricks with Old Yellow: Multidimensional Engineering of Enoate Reductases
We have been exploring a combination of protein and cofactor engineering to identify novel enolate reductase variants with enhanced catalytic activity, as well as altered substrate specificity and enantioreselectivity. These studies have been greatly facilitated through the use of fully synthetic gene libraries in combination with cell-free enzyme production, enabling rapid and comprehensive library analysis.
Stefan Lutz, Ph.D., Associate Professor, Department of Chemistry, Emory University

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Applications of Enzyme Engineering (continued)

9:00 CASE STUDY Using Shuffling Technologies to Develop Specific Catalysts for Pharmaceutical Intermediates
Codexis uses a suite of proprietary technologies to develop novel biocatalysts that can lead to commercial scale solutions for manufacturing and production. This presentation draws on several recent examples to illustrate the evolution process and how we work with our partners to enable new manufacturing routes to pharmaceutical intermediates.
Lori Giver, Ph.D., Vice President, Technology and Innovation, Codexis Corp.

9:30 UNPUBLISHED DATA FEEDSTOCK ENGINEERING WITH CONDITIONALLY ACTIVATED ENZYMES
In certain enzyme-dependent processes, premature activation of enzymes can detract from overall process performance. Agniva has pioneered the use of inteins to engineer enzymes that are activated only under predetermined conditions that correspond to critical steps in a process or product application. We have used such intein-modified enzymes to enhance biomass hydrolysis and other applications involving industrial hydrolysases.
Philip A. Lessard, Ph.D., Project Manager and Head of Biochemistry, Agniva, Inc.

10:00 Networking Refreshment Break and Poster/Exhibit Viewing

Specialty & Fine Chemical Enzyme Applications

10:30 CASE STUDY - UNPUBLISHED DATA Enzyme Process Scale-Up Using SelectAZyme
The application of biocatalysis in chemical development continues to grow as it moves from the domain of specialised technology to mainstream methodology, a move that has been facilitated by the increasing commercial "off-the-shelf" availability of enzymes at large scale. This presentation, through actual case studies, illustrates the development and application of selectAZyme™ biocatalysts. Highlights of recent examples of the scale-up of biooxidation processes and application of ultrasound for the rapid synthesis of chiral intermediates is discussed.
Tom Moody, Ph.D., Head of Biocatalysis & Isotope Chemistry, Almac Group, United Kingdom
Applications for Enzyme Technologies

June 17-18, 2013 • Hotel Nikko • San Francisco, CA

Learn from All Stages of Discovery, Research, Development and Commercialization, Including:

- Accelerating Enzyme Discovery Using Transcriptome Library Sequencing and Screening
- Creating New Enzyme Products From Protein Engineering and Directed Evolution
- Combining New Biocatalysts to Synthesize Natural Products and Pharmaceutical Intermediates in Novel Ways
- Increasing Role of Enzymes In Household Products and New Product Segments
- Scaling-Up for Transfer of Bioprocesses from Fermenters to Batch Reactors
- Enabling Commercial Enzyme Applications through High Yielding Production Systems

IBC Life Sciences Presents

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