Scientific Tracks & Sessions
August 16, 2018

Industrial Biotechnology 2018




International Conference on

Industrial Biotechnology and Bioprocessing

August 16-17, 2018 | Copenhagen, Denmark

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Fermented insect pheromones for environmentally friendly pest control

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Sex pheromones, which are produced naturally by insects for mating communication, present an environmentally safe alternative to insecticides for pest control. Whereas insecticides have severe negative effects on public health and the environment, pheromones are biodegradable species-specific compounds that neither affect beneficial species in the ecosystem, nor exert adverse effects on human health. Pheromones are currently produced by chemical synthesis, which requires expensive and often hazardous specialty chemicals as starting materials and usually results in toxic waste as by-products.

We developed a biotechnology-based solution to enable cheaper and environmentally friendly production of pheromone components from renewable feedstocks using yeast cell factories. This required reconstruction of synthetic biochemical pathways towards pheromones in yeast, extensive engineering of the yeast host to improve the flux towards the products, and optimization of fermentation processes. This technology paves the way for safer pest control in agriculture.

Speaker Biography

Irina Borodina is senior scientist and group leader at the Novo Nordisk Foundation Center for Biosustainability, Technical University of Denmark (DTU). She is also co-founder and CEO of BioPhero ApS. Her research focuses on advancing the methodologies for metabolic engineering of cell factories for the sustainable production of bulk and high-value chemicals. She received PhD degree in Biotechnology from DTU. She has authored 37 peer-reviewed articles, which have been cited over 1,600 times, and she is co-inventor of 9 patent applications.

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Investigations of enzymatic transesterification of castor oil for biodiesel production

Christensen K V, Andrade T A and **Errico M**
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The search for renewable biofuels to replace fossil fuels makes biodiesel production a fairly strait forward choice, both from a production and application point of view, in as much as the processing technology is readily available and only minor changes to the existing fuel distribution network and diesel engines are needed. Unfortunately, at present most biodiesel is produced by transesterification of edible vegetable oils produced on lands useful for producing crops for feed and fodder. This makes biodiesel production less attractive from a resource and sustainability point of view. There are crops available that do grow in arid soils not normally attractive for production of food or fodder. One such crop is castor beans. The oil produced from castor beans, castor oil, is not suitable for human consumption but can be used as a starting point for polymer production, as lubricant, and, if mixed with other fatty methyl or ethyl esters, after transesterification for biodiesel.The work presented gives an overview of the results obtained from transesterification of castor oils using the non-immobilized enzymes Eversa Transform and Resinase HT, the immobilized enzyme Novozyme 435, combining kinetic studies and enzyme reuse with process simulation.

Speaker Biography

Christensen K V holds a PhD from Technical University of Denmark, Denmark. He is an associate professor at University of Southern Denmark and is the head of section of Chemical Engineering. He has over 30 publications with a total number of citations above 1000, and a publication H-index of 12 (SCOPUS). During his academic career at Odense University College (Denmark), American University of Sharjah (AUE) and University of Southern Denmark, he has supervised and co-supervised several PhD-students, over 90 master and bachelor students in their thesis work and has further partaken in over 10 externally funded projects within biofuel and value-added production from biomass and bio-waste.

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Glycolipid production in yeast and enzyme catalysed processes

Lars Haastrup Pedersen and **César Simões da Fonseca**
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Only about 25% of the total surfactant production is biobased and can be classified according to the method of production: 1) Synthetic biobased surfactants synthesised from sugars and fatty acids or their corresponding alcohols by conventional organic chemistry at elevated temperature and reduced pressure using chemical catalysts, 2) Enzymatic biosurfactants also synthesised from sugars and fatty acids but at relatively lower temperatures and atmospheric pressure in cell free processes utilizing the substrate specificity and regio-selectivity of enzymes, 3) Microbial biosurfactants are glycolipids incorporated into cell membranes or secreted extracellularly by microorganisms. Microbial biosurfactants are still in their commercial infancy with only very few products on the market. The most promising biosurfactants known today are produced in bioreactors on lipid and sugar-containing growth media and include sophoro, rhamno, trehalose and mannosylerythritol lipids. The presentation will discuss resent results on production of glycolipids in yeast and enzyme catalysed processes.

Speaker Biography

Lars Haastrup Pedersen did his industrial PhD in a collaboration between Carlsberg Research Center and Copenhagen University, Denmark. He has been working 25 years at Aalborg University where he is associate professor in the Bioprocess Technology Group. Current publication record shows a total of 56 including 25 scientific articles with over 400 citations, H-index Web of Science Thomas Reuters: 12.

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Functional metagenomic mining and comprehensive pathway optimization using synthetic selections

Hans J Genee[1,2], Adam J Riesselman[3], Søren D Petersen[1], Sangeeta Nath[4,5],Luisa S Gronenberg[2], Bo Salomonsen[2], Leanne Jade G Chan[5,6], Melissa Nhan[5,6], Edward E K Baidoo[5,6], George Wang[5,6], Ernst Oberortner[4,5],Nathan J Hillson[5,6], Jay D Keasling[1,5,6,7], Debora S Marks[3], Christopher J Petzold[5,6], Samuel Deutsch[4,5] and Morten O A Sommer[1]

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[6] Joint BioEnergy Institute, USA
[7] University of California, USA

By solving complex metabolic engineering challenges, Biosyntia, a Copenhagen-based biotech company, delivers biological manufacturing of ingredients and high value chemicals. In this talk, co-founder and CSO, Hans Genee, explains how the company with co-workers deploy synthetic selection systems to enable high-throughput mining and functional validation of biological functions. We present a synthetic selection system for thiamine, a vitamin of crucial interest for industrial biotechnology and human health. Using this system we mined soil and gut metagenomes for thiamine transporters and identified several members of a novel transporter class. Additionally, to probe the sequence-function landscape of the complex and tightly regulated thiamine biosynthesis pathway of Escherichia coli, and to speed up the engineering of optimized strains, we applied the synthetic selection to interrogate 16,384 refactored pathway variants that sample the synthetic design space. This approach enabled rapid identification of new and non-intuitive pathway configurations leading to high thiamine production levels. Combined, our results demonstrate how synthetic biology approaches can effectively be deployed to functionally mine metagenomes and elucidate sequence-function relationships of complex transport and biosynthesis systems in bacteria

Speaker Biography

Hans J Genee is the founder of Biosyntia ApS. He founded the biotech academy camp, and his activities in synthetic biology has led to peer reviewed publications, the McKinsey Award for exceptional achievements, the SBR-DTU prize for most innovative project, and the Novo Scholarship. He is a Ph.Dc in Biotechnology at the NNF Center for Biosustainability and holds an M.Sc.Eng. degree with honors in systems biology from the Technical University of Denmark, Delft University of Technology, and Harvard University.

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Estalishment of the Marine Bioproducts and Biotechnology Cooperative Research Centre – an Australian contribution to building a global blue bioeconomy

Heimann K, Zhang W, Puri M and **Franco C**
Flinders University, Australia

Demand and improved availability of sustainably sourced natural bio-products has driven rapid expansion of a global marine biotechnology industry over the last decade. In 2014, it was worth US$176 billion. Australia's emerging marine biotechnology sector is small but seeks to become a major global player over the coming decade.

The Marine Bioproducts and Biotechnology Cooperative Research Centre (MBB-CRC) is a dynamic partnership between industry, R&D, marketing and investment sectors, designed to underpin a step-change in the national marine biotechnology industry and push revenue growth over $1 billion p.a. by 2030.

The CRC will focus on industry priorities for marine bioproduct development, innovative processing technologies and sustainable production of marine bioresources. The CRC will provide an active network of industry partners across the biotechnology value chain, and a pathway to connect industry to investors and e-Commerce collaborates in Australia and internationally.

An expertise-based and independent Board will govern the CRC and oversee investment in and delivery by Australia's leading universities and research agencies. Three programs will work closely with industry to optimise bio-product development, via innovative processing technologies and establishment of sustainable use of marine resources.

The CRC will also invest into a CET (Commercialisation, Education and Training) platform, designed to underpin the MBB-CRC programs. I will provide targeted pathways for commercialisation (C) through development of techno-economic models and setting up incubators and clusters to link individual sectors with e-commerce and venture capital. The education (E) & training (T) component will identify and develop the next generation of industry leaders to provide Australia with a unique competitive advantage in a growth industry.

This presentation is given to inform international research providers and industry of this emerging opportunity for this sector in Australia, to start to lay the foundation for an internationalised approach to realise a blue bioeconomy through building relevant networks.

Speaker Biography

Heimann K is a recognised leader in designing, enabling, implementing and advancing industry-driven research on closed system approaches using high-yield microbes in environmental, aqua- and agricultural and commercial applications for developing renewable products and sustainable industries. She has extensively in peer-reviewed scientific journals, including Nature, 91 journal articles (citations >2,500), 5 books and 11 book chapters, leading to a H-index of 27. Her research has won many awards, the NQ Corporate Business Women Award 2011 and the JCU Advisor of the Year Award 2016, being the latest. She is the president of ASPAB, associate editor of Botanica Marina, and has served on the science and education committee of the Advanced Manufacturing Cooperative Research Centre (AMCRC) and the tarong science steering committee for microalgae GHG emission abatement at coal-fired power stations.

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