University of Stuttgart

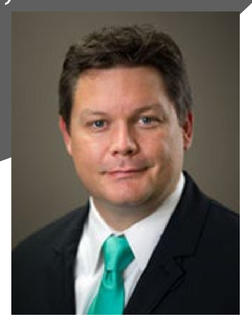
Stuttgart Research Center Systems Biology (SRCSB)

Systems Biology Seminar Talk

„Metabolic Engineering Strategies for Sustainably Producing Oleochemicals in Microbes “

Prof. Dr. Brian Pfleger
(As visiting Professor at IBVT, University of Stuttgart)

University of Wisconsin-Madison, Chemical and Biological Engineering, Madison



Monday
November 7, 2022
2 p.m. – 3 p.m.

Lecture Hall 0.106
Allmandring 31
Stuttgart

Abstract:

Finding a sustainable alternative for today’s petrochemical industry is a major challenge facing chemical engineers and society at large. To be sustainable, routes for converting carbon dioxide and light into organic compounds for use as both fuels and chemical building blocks must be identified, understood, and engineered. Advances in metabolic engineering, synthetic biology, and other bioengineering disciplines have expanded the scope of what can be produced in a living organism. As in other engineering disciplines, synthetic biologists want to apply a general understanding of science (e.g. microbiology, biochemistry) to construct complex systems from well-characterized parts (e.g. DNA, protein). Once novel synthetic biological systems (e.g. enzymes for biofuel synthesis) are constructed, they must be engineered to function inside evolving cells without negatively impacting the host’s physiology.

In this talk, I will describe pathways for producing chemicals derived from fatty-acids and how my group and others have improved oleochemical production in microbes. The talk will describe the critical regulatory points in native fatty acid metabolism, strategies for deregulating flux, and alternatives that by-pass it altogether. I will highlight the use of heterologous plant enzymes to alter the chain length distribution of products from common long-chain molecules to higher-value medium-chain analogs. I will also highlight strategies that we have used to produce medium-chain fatty alcohols, the highest value compounds in the class, through engineering of thioesterase and thiolase driven pathways. I will conclude with commentary on the remaining barriers to commercializing these technologies and areas where further research investment could prove fruitful.

CV:

Brian received his bachelor’s degree in Chemical Engineering from Cornell University in 2000 and earned his PhD in Chemical Engineering in 2005 from the University of California-Berkeley. Brian was a postdoctoral fellow at the University of Michigan from 2005-2007. Brian is the Jay and Cynthia Ihlenfeld Professor of Chemical and Biological Engineering at UW-Madison with an appointment in the Microbiology Doctoral Training Program. Brian’s research group uses systems and synthetic biology approaches to develop biocatalysts for production of small molecules.

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