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Flux Controls Flux – a Key Challenge for Metabolic Engineering

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filamentous fungi, first digests and then ingests its food, it has astounding capabilities in secreting enzymes hydrolyzing biopolymers. This feature is exploited by many biotech companies to manufacture enzymes for use in different industries including food & feed, textile, and biofuel.

In addition, *A. niger* has been used as a platform organism for the manufacture of the primary metabolite citric acid for almost hundred years.

Can the current product portfolio of *A. niger* be enlarged? Yes! In the talk, the recent synthetic biology approaches

aiming to establish *A. niger* as secondary metabolite producer will be presented. It will be demonstrated that *A. niger* can indeed be genetically trimmed to become an expression host for the synthesis of nonribosomal peptides with product yields high enough for commercial exploitation.

V18.07

Filamentous Organisms Catching up: Parallelized, Miniaturized, and Automated Characterization Methods for *Streptomyces lividans*

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Bacteria of the genus *Streptomyces* are industrially relevant candidates for the production of pharmaceutical active compounds. However, so far, only very few approaches focused on sophisticated growth and production characterization methods. By applying techniques from automated and parallelized mL-scale cultivation while paying attention to the special needs of filamentous organisms, the strain characteriza-

tion process is accelerated also for this industrially relevant class of organisms.

An automated 48-well microtiter plate (MTP)-based cultivation approach with robot-assisted sampling techniques allows to access important information online for pH, dissolved oxygen, fluorescence and backscatter and offline for bio dry mass, substrate, product, and morphology. The usability of this novel workflow was dem-

onstrated in comprehensive comparison studies with a 1-L lab-scale cultivation system. The workflow was applied to screen a set of 58 genome-reduced *Streptomyces lividans* strains, where only a small number of strains showed significant growth deficiencies or morphological effects. With the large set of parameters available from the MTP cultivation, many questions can now be addressed in small-scale directly.

Ü18.02

Flux Controls Flux – a Key Challenge for Metabolic Engineering

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V18.08

Construction of a *Corynebacterium glutamicum* Platform Strain for the Production of High-Value Plant Secondary Metabolites

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Corynebacterium glutamicum is an important organism in industrial biotechnology for the microbial production of bulk chemicals, in particular amino acids. However, until now, activity of a complex catabolic network for the degradation of aromatic compounds averted application of

C. glutamicum as production host for aromatic compounds of pharmaceutical or biotechnological interest. In the course of the construction of a suitable *C. glutamicum* platform strain for plant polyphenol production, four gene clusters comprising 21 genes involved in the cat-

abolism of aromatic compounds were deleted.

Expression of plant-derived and codon-optimized genes coding for a chalcone synthase and a chalcone isomerase in this strain background enabled formation of 35 mg L⁻¹ naringenin and 37 mg L⁻¹ erio-