

Metabolic engineering @ Inbio.be: platform tools and technologies for the production of complex metabolites

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The development of microbial bioprocesses for the production of complex metabolites is one of the major research targets of the Center of Industrial Biotechnology and Biocatalysis (Inbio.be). Currently, many of these complex molecules are obtained via labor-intensive and environmentally unfriendly processes, typically yielding low titers and mixtures. For numerous applications, however, a pure and well defined product is required. Industrial biotechnology provides an economically very interesting alternative. Thus, Inbio.be creates custom optimized microbial production hosts such as *E. coli* and yeasts by merging cutting-edge technologies such as metabolic engineering, synthetic biology and system biology. It focuses on the development of novel tools and methods to fine tune metabolic pathways for the biosynthesis of chemically complex metabolites. These novel tools and technologies include several DNA parts libraries (constitutive and conditional promoter libraries, RBS/Kozak libraries, insulator libraries and terminator libraries) as well as efficient and rapid methods for (combinatorially) constructing synthetic pathways, transferring them into prokaryotic or eukaryotic microbial systems, and screening them in a high-throughput manner, e.g. by developing biosensors. We apply these tools and methods to create custom designed microbes for the production of useful chemicals from renewable resources, in particular for the production of specialty carbohydrates and natural products. These molecules, or their direct precursors, have a myriad of applications in -among others- pharmaceuticals (lycopene, taxol), food additives (chitosan, b-carotene), and cosmetics (chito-oligosaccharides).

With an overview of in-house technologies and recent achievements, we will show how we do our part to smoothen the transition of our fossil-fuel based economy to a more bio-based economy.