

# Optimizing industrial organisms for improved functionality and operational efficiency

## Description



Tailoring industrially relevant organisms for bulk production of functional biomolecules and enzymatic catalysts is of high economic and ecological interest. The Synthetic Biology Lab at the University of Potsdam, led by Dr. Lena Hochrein and Prof. Dr. Bernd Mueller-Roeber, develops tools for biotechnological applications in budding yeast and other microbial systems and plant cells. The group

provides cutting-edge expertise in genome engineering and gene regulation for a wide range of applications in industrial settings.

## Details

We offer molecular tools for:

- the rapid construction of genetic pathways (simple and complex)
- multi-parallel and precise gene edits to optimize host organisms for improved protein production and product yield (using newly developed tools)
- light-controlled switches for a time-dependent regulation of genetic activities
- optimized promoters for an independent regulation of multiple genes to control metabolic fluxes through biosynthetic pathways

## Methods

- Genome editing (gene knock-out, gene knock-in, base editing)
- Light-controlled and multi-parallel regulation of protein production
- Construction of complex metabolic pathways

## Scientific literature

- Hochrein L, Mitchell LA, Schulz K, Messerschmidt K, Mueller-Roeber B (2018) L-SCRaMble as a tool for light-controlled Cre-mediated recombination in yeast. *Nat. Commun.* 9: 1931. PMID: 29789561
- Machens F, Balazadeh S, Mueller-Roeber B, Messerschmidt K (2017) Synthetic promoters and transcription factors for heterologous protein expression in *Saccharomyces cerevisiae*. *Front. Bioeng. Biotechnol.* 5: 63. PMID: 29098147
- Hochrein L, Machens F, Messerschmidt K, Mueller-Roeber B (2017) PhiReX – a programmable and red light-regulated protein expression switch for yeast. *Nucl. Acids Res.* 45: 9193-9205. PMID: 28911120
- Hochrein L, Machens F, Gremmels J, Schulz K, Messerschmidt K, Mueller-Roeber B. (2017) AssemblX: a user-friendly toolkit for rapid and reliable multi-gene assemblies. *Nucl. Acids Res.* 6: 1742-1756. PMID: 28130422

## Applications

- Industrial Biotechnology
- Food, Pharmaceutical and Agroindustry
- Environment, Renewable energy, and Biobased industries

## Keywords

- Synthetic biology
- Biotechnology
- Pathway engineering
- Metabolic engineering
- Promoter engineering
- Green Chemistry
- Enzymes
- DNA assembly
- Bio-catalysis
- Bio-based materials
- Bio-based processes
- Biodegradability

## Interest in cooperation

- Research-based collaboration
- Contract research
- Industry-sponsored research

## Contact

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