

Yeast synthetic biology for oleochemical and speciality lipid production

Summary

*This project aims to further develop a synthetic biology toolbox for non-conventional yeast *Rhodotorula toruloides*, and engineer these yeasts to accumulate and secrete high levels of oleochemicals and speciality lipids.*

Research field:	Chemistry and Biotechnology
Supervisors:	Petri-Jaan Lahtvee Nemailla Bonturi
Availability:	This position is available.
Offered by:	School of Science Department of Chemistry and Biotechnology
Application deadline:	Applications are accepted between September 01, 2021 00:00 and September 30, 2021 23:59 (Europe/Zurich)

Description

The transition towards a bioeconomy requires novel processes that use sustainable substrates, have improved life cycle assessments and, hence, require less energy to produce. Oleochemicals are a wide range of molecules that can be used as biofuels, cosmetics, plastics, surface coatings, among others. Microbial lipids (ML) are a potential feedstock for oleochemical production. MLs are mostly triacylglycerides (TAGs) produced by oleaginous microorganisms. Production of MLs does not require land, compete with food production, and is not affected by the weather. The yeast *Rhodotorula toruloides* has recently been defined as a high-potential workhorse for biotechnological applications. This yeast grows on various substrates, including lignocellulosic hydrolysates, accumulates over 70% of lipids (g/gdw), and grows to high cell densities. *R. toruloides* is also a natural producer of high-value compounds, such as carotenoids and enzymes.

In the project, we aim to further develop metabolic engineering tools for a more efficient modification of the yeast and develop it into a well-characterized synthetic biology toolbox. These tools will be used for the engineering of *R. toruloides* to accumulate and secrete high levels of various specific lipids and oleochemicals. The candidate will acquire skills for the metabolic engineering of non-conventional yeasts, proficiency in bioprocess optimization and a strong background in the quantification of small molecules.

The applicants should fulfil the following requirements:

- MSc degree in synthetic biology, biotechnology, microbiology, or similar field
- Previous experience in working with microbes
- Previous experience in metabolic engineering
- Previous experience with yeast is a plus
- Previous experience handling bioreactors is a plus
- Good English language skills (oral and written)
- Fluency in Estonian is a plus



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