

Master's Thesis: Investigating cellular ATP dynamics during lycopene production in *Pseudomonas putida*

Are you interested in synthetic biology, metabolic engineering, and systems microbiology? Join the professorship of systems biotechnology for an exciting master's thesis project where you will explore the cellular energy balance during heterologous production of valuable compounds!

Project Background:

Pseudomonas putida is a highly versatile microbial host that is increasingly used in biotechnology for the sustainable production of chemicals. In this project, we aim to better understand how the production of a heterologous pathway, specifically for lycopene, a commercially valuable carotenoid, impacts the cellular ATP pool. For this purpose, a *Pseudomonas putida* strain has already been engineered with a genomically integrated ATP sensor, enabling real-time monitoring of intracellular ATP levels.

Project Description:

As part of the master's thesis, you will introduce a synthetic lycopene biosynthesis pathway into the ATP sensor strain and systematically study the impact of lycopene production on cellular ATP levels. Depending on your interests, there is the possibility of incorporating a modeling component, where you will develop or refine a computational model to predict energy dynamics during lycopene production.

Your tasks will include:

- Cloning and genetic engineering of *P. putida* strains
- Cultivation experiments to characterize growth, lycopene production, and ATP levels
- Data analysis and interpretation
- (Optional) Development of a simple computational model of ATP dynamics

Requirements:

- Background in biotechnology, molecular biology, microbiology, bioengineering, or a related field
- Interest in synthetic biology and metabolic engineering
- Basic laboratory skills; experience with microbial genetic engineering is a plus
- (Optional) Interest or basic experience in computational modeling

Start: From now

Language: German/ English

If you are motivated to work on a cutting-edge research project and expand your skills in both experimental and (optional) computational biology, don't hesitate to contact Carina Meiners (c.meiners@tum.de) with your CV and your transcript of records.

28.04.2025