

## Research Internship / Bachelor Thesis

### Topic: Optimization of the purification of Fe-Fe Hydrogenase from *Escherichia coli* culture

Hydrogen fuels are emerging as a promising alternative to fossil-based fuels, offering a cleaner and more sustainable energy source. However, the current hydrogen supply chain predominantly relies on natural gas or carbon dioxide, both of which still emit high amounts of CO<sub>2</sub>. Water electrolysis stands out as an environmentally friendly method to produce hydrogen. This process, however, requires robust catalysts. Hydrogenases, natural enzymes found in various microorganisms, have shown great potential as electrocatalysts in water electrolysis. Utilizing microorganisms like *Escherichia coli* for hydrogenase production offers an eco-friendly approach, but industrial-scale production requires optimization.

This internship/thesis is part of the CirculH2 project, an innovative initiative dedicated to upscaling Fe-Fe hydrogenase production to meet the growing industrial demand for clean hydrogen.

#### Aim of the project

The project aims to develop robust hydrogenases for the circular use of H<sub>2</sub> and replace conventional chemical production methods. To achieve this, Fe-Fe hydrogenase will be produced through *Escherichia coli* cultivation. The internship/thesis involves optimizing the downstream processing of *Escherichia coli* culture to find the best conditions for maximizing Fe-Fe hydrogenase yield. Key steps include:

- Literature Research: Identify optimal conditions for the best Fe-Fe hydrogenase yield.
- Experimental Evaluation: Test the most promising conditions in a TFF System and analyze them in HPLC.
- Standard Operating Procedure (SOP): Establish the best methods through experimental validation.

#### Requirements

- Independent and proactive working
- Strong organizational and time management skills
- Team player with a friendly attitude
- Basic laboratory skills

#### Why Join Us?

- Work in cutting-edge research to develop technologies that support the hydrogen economy while reducing the carbon footprint
- Gain experience in biotechnology and industrial production processes by operating TFF and HPLC Systems
- Friendly work environment and close support

#### Application

Please send your application documents (including your CV) to the supervisor of this project: M. Sc. Ilgaz Oktay (ilgaz.oktay@tum.de). She will be happy to answer any further questions you may have. Supervision is provided in English. Start of the project: October 2024

#### Privacy policy

As part of your application for a position at the Technical University of Munich (TUM), you submit personal data. Please note our privacy policy pursuant to Art. 13 General Data Protection Regulation (GDPR) for the collection and processing of personal data in the context of your application <http://go.tum.de/554159>. By submitting your application, you confirm that you have taken note of TUM's privacy policy. In the case of a written application, we ask you to only submit copies to us, as we are unfortunately unable to return your application documents after the procedure has been completed.