

## Establishing Flow Cytometry-Based RNA Detection in *Corynebacterium glutamicum*

### About Us:

The BIOSCALE group is situated within the Chemical Engineering (CIW) Faculty of the KIT. Our goal is to tackle challenges in bioprocess development with a novel and interdisciplinary approach involving bioprocess engineering, molecular biotechnology and data science. Our team envisions a biologically driven bioprocess development while applying cutting edge next generation sequencing technology and pioneering a harmonization of the molecular and technical nature of biotechnological processes. Utilizing the acquired knowledge, our aim is to improve bioprocess development and facilitate novel bioprocess innovations. Our group is collaborating with internal and external experts from academia and industry in e.g. bioinformatics, engineering and synthetic biology.

### Background:

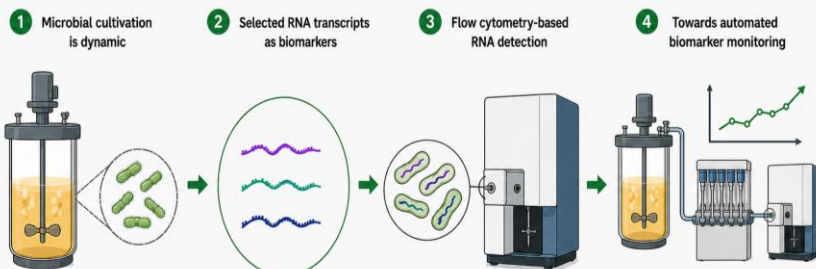
Microbial cultivation processes are highly dynamic, yet many relevant changes in cellular physiology remain hidden when only standard process parameters such as pH, dissolved oxygen or biomass are monitored. Selected RNA transcripts can provide direct and sensitive insights into the cellular state, making them promising biomarkers for understanding and controlling fermentation processes. However, conventional transcriptome analysis based on RNA isolation and sequencing is too time-consuming and labor-intensive for targeted process monitoring. This thesis explores a novel analytical approach that combines the single-cell resolution and high-throughput capability of flow cytometry with the detection of specific RNA targets. By establishing a fluorescence in situ hybridisation- and branched DNA-based RNA detection workflow, the project aims to enable offline monitoring of selected transcripts during microbial cultivation. The work provides an opportunity to contribute to an emerging technology platform with strong potential for future automated biomarker tracking in bioprocesses.

### Your tasks:

- Identify relevant RNA biomarker candidates through literature research
- Design RNA probes for selected target transcripts
- Cultivate *Corynebacterium glutamicum* in shake flasks and stirred-tank bioreactors
- Establish and optimize a flow cytometry-based RNA detection workflow
- Analyze and interpret experimental data in the context of microbial cultivation
- Scientific discussion with the project team on a weekly basis
- Reporting of experiments and results

### Your qualification:

- Background in biotechnology, bioengineering or similar
- Knowledge and interest in bioengineering and microbial process monitoring
- Good communication and team member skills
- High motivation to explore the details and principles of bioprocesses



### Contact:

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