

## Next generation single cell RNA sequencing from bioprocesses

**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 biological-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 e.g. for the production of colorants and fragrances. Our group is collaborating with internal and external experts from academia and industry in e.g. bioinformatics, engineering and synthetic biologists.

**Background:** Microbial bioprocesses represent an unimaginably large population with approximately 1 trillion ( $1 \times 10^{18}$ ) cells in 100 qm of industrial production. In pioneering work, the here proposed PhD project will apply modern cutting-edge single cell RNA sequencing (scRNA-Seq) to study the gene expression of individual cells and thus for the first time allows the analysis of the population heterogeneity in a stirred bioreactor over time.

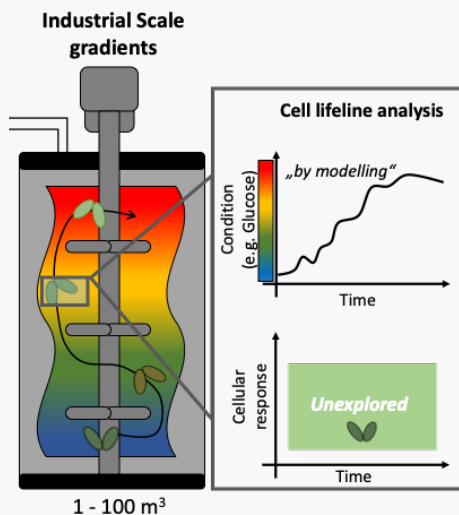
**Project aim:** The goal of the project is to explore the cellular response of the population under the famine-stimulus (glucose shortage) over time in bioreactors at the single cell level (see figure).

### Your tasks:

- Cultivation of microorganisms (e.g. *Escherichia coli*, *Corynebacterium glutamicum*, etc.) in shake flasks and stirred bioreactors
- Preparation of RNA library for single cell transcriptomics
- Extraction and quantitative analysis of pigments with HPLC
- Analysis and comparison of heterogeneity in microbial cultures
- Scientific discussion with the project team on a weekly basis
- Reporting of experiments and results

### Your qualification:

- Background in biotechnology, bioengineering, bioinformatics or similar
- Knowledge and interest in microbiology
- Interest in disruptive approaches and international working atmosphere
- Good communication and team member skills
- High motivation to explore the details and principles of bioprocesses



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