

## Technical characterization of novel microfluidic systems for multi-parameter oscillation

**About Us:** The “Microsystems in Bioprocess Engineering” group is situated within the Chemical Engineering (CIW) Faculty of the KIT. Our goal is to bridge the gap between microfluidic technologies and bioprocess development. We develop novel microfluidic tools (e.g., single-cell cultivation systems) and apply them to investigate research questions relevant to bioprocessing. Utilizing the acquired knowledge, our aim is to pioneer the development and establishment of new bioprocesses. Our work is conducted in a highly interdisciplinary manner, involving collaboration with experts in e.g. microbiology, physics, material and data science.

**Background:** In industrial bioprocesses, gradients of multiple process parameters e.g. glucose concentration and pH values arise within a bioreactor due to inadequate mixing. These gradients have the potential to impact the performance of the cultivated microorganisms, leading, for instance, to a reduction in productivity, a decrease in life expectancy, and the promotion of cell heterogeneity. These aspects contribute to poor predictability and reproducibility during scale-up. Consequently, it is imperative to investigate the influence of multiple process relevant parameters on the growth behavior of microorganisms and select the most robust that exhibit reduced susceptibility to environmental heterogeneity.

**Project aim:** This project aims to characterize novel microfluidic systems concerning their ability to establish various distinct environments for the investigation of the impact those parameters on the growth dynamics of microorganisms. Based on the result, initial cultivations of model organisms will be performed using the previously characterized systems.

### Your tasks:

- Fabrication of microfluidic single-cell cultivation devices
- Flow characterization of novel microfluidic systems
- Microfluidic single-cell cultivation experiments
- Analysis, evaluation and interpretation of single-cell imaging data

### Your qualification:

- Background in bioengineering, biotechnology or similar
- Knowledge of microbiological methods
- Interest in multidisciplinary research
- Good written and spoken English skills
- Structured, independent and meticulous working method

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