

# Master thesis or student project

in Biotechnology, Bioengineering, Nanotechnology, Chemistry, or related

## Microbial cells and their resistance to drugs studied using microfluidic tools

### The group

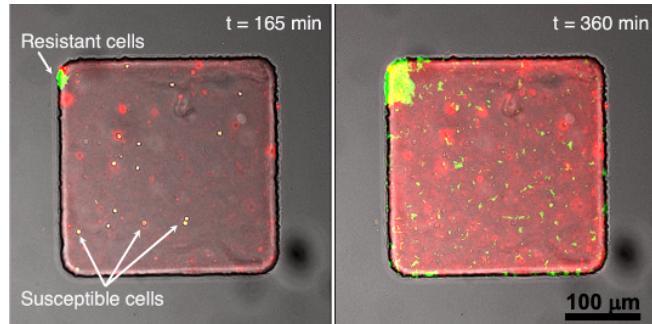
The Bioanalytics Group focuses on developing miniaturised devices (so-called lab-on-chip technology or microfluidics) for applications in the life sciences. We employ an interdisciplinary approach to address questions in the fields of analytics and artificial cell systems.

### The project

The goal of the project is to develop a platform to study microbial cells with a particular focus on antibiotic resistance detection. Due to miniaturization approach, we can sub-divide bacterial samples into hundreds of small cultivation areas, which facilitate faster resistance detection and provides a platform to further explore growth behavior on the level of individual cells. The viability of cells and growth dynamics are evaluated via oxygen changes and fluorescence measurements.

Specifically, in the ongoing projects we investigate antibiotic resistance in mixed bacterial populations containing cells with different resistance profiles, development of a platform for antibiotic susceptibility testing of tuberculosis (using *Mycobacterium smegmatis* as a model pathogen) and alternative techniques to determine viability of bacterial cells in biofilms.

*Microscopy images from a selected cultivation chamber with a resistant bacterium (green) and susceptible bacteria (orange) exposed to an amoxicillin concentration of 16 µg/mL. The images show two timepoints within the cultivation.*



### The tasks

- Batch cultivation and analysis of the microbial cells
- Monitoring of the microbial cells via bright field and fluorescence microscopy
- Image analysis and data interpretation
- Optional: fabrication and operation of microfluidic devices