

## SACCA

### System for Automated Cell Cultivation and Analysis

**Project Provider:**  
Carl Zeiss Stiftung

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**Project Partners:**

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**Coordinator of the Scientific Group:**

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**Duration:** 2014–2017

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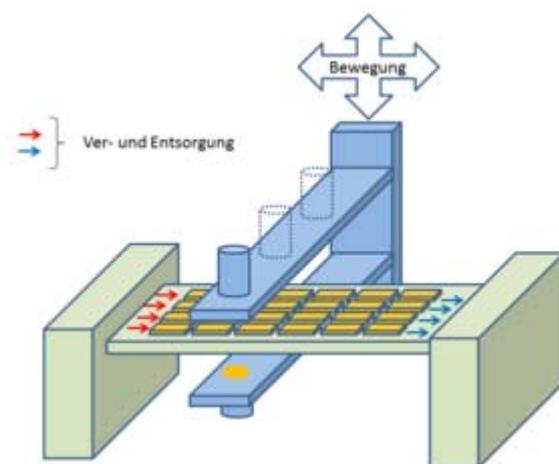
## Project Description:

The state-of-the-art handling processes of cell cultures are very outdated and mainly executed manually. While automation of processes and robotising of equipment may provide a great advantage in terms of speed, precision and quantity, somehow, cell cultivation systems did not evolve with time and research, and the economic market is largely dominated by manufacturers.

In order to change current standards and make cell-handling processes more autonomous, the TU Ilmenau is working to implement automation technology of the 21<sup>st</sup> century into cell cultivation and is supported by the Carl-Zeiss-Stiftung. The project SACCA (System for Automated Cell Cultivation and Analysis) comprises four groups of the IMN MacroNano<sup>®</sup> (Institute for micro- und nanotechnologies) and the iba (Institute for Bioprocessing and Analytical Measurement Technologies), which use methods found in the fields of mechatronics and microsystem technologies to develop an automated lab machine for cell cultivation. This allows the integration of previous achievements by Federal Government and State projects as well as the DFG collaborative research centre 662. With the Biomechatronics Group leading the project management, significant scientific contributions can be achieved, which may lead to the awarding of new collaborate research centre through the IMN MacroNano<sup>®</sup>.



State-of-the-Art



Project Goal

Current experimental setup for cell cultivation in single micro-systems

Schematic drawing of the planned SACCA machine workbench: the optical analysis devices operate relative to the fixed cell cultivation matrix in a micro-system

The structured development of cell analysis devices is largely based on government regulations in the field of biomedical engineering. More specifically, it is highly influenced by the law for medical products, which deploys strict provisions for development documentation. SACCA is able to implement its structuring beyond the initial stage of development and immediately into research itself: the consistent application of the VDI-directive 2206 defined in cooperation with the local scientific community will streamline and facilitate the transfer of research results into product-oriented development.

This leads to great advances in application ranges since it is a biologically-oriented concept for the system rather than technical one. So far, cells to be analysed are transported from the incubator to the scientific analysis station, which may tamper with the cell cultures, especially for cells of the locomotor system (bones, cartilage, tendons, and muscles). The forces encountered by the cells during transport may alter and bias test results since those types of cells are very receptive to forces thanks to their functional specification (differentiation). Hence, SACCA provides a system where cell locations are fixed and the technology is moved instead to reach the analysis station.