»Microfluidics is the key to make flow cytometry accessible to everyone, anywhere.«

Division Diagnostics at Fraunhofer IMM – your partner for industrial-relevant research

Flow cytometry is a standard tool for quality control in all technical processes involving biological cells, but it is also invaluable for research and development labs due to its ability to reliably gather information about cell populations, down to the single-cell level.

We provide R&D for microfluidic-based analysis systems with applications in life sciences, medical research and diagnostics, food safety or biotechnology.

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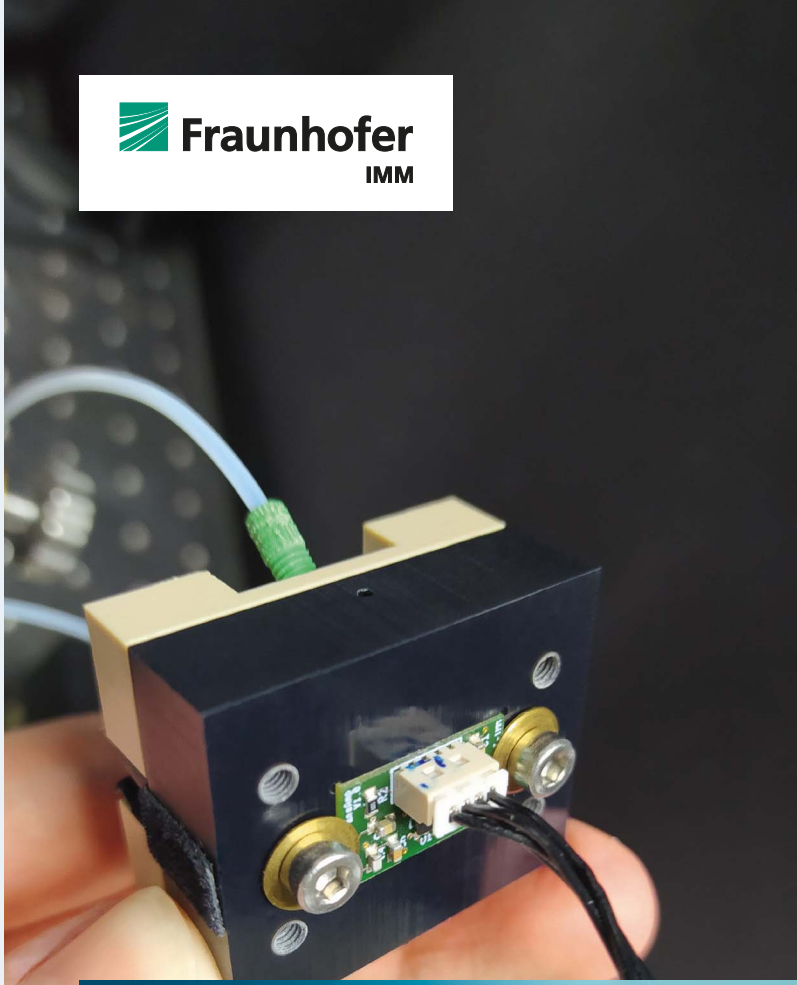
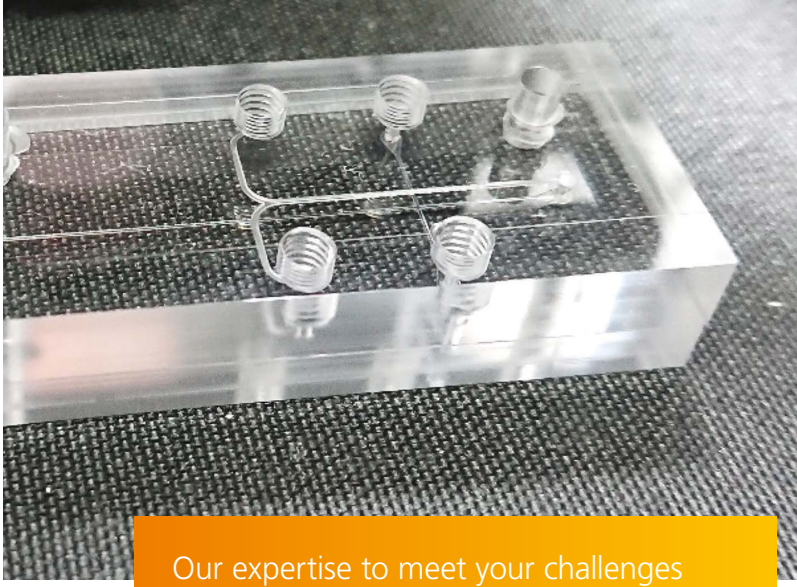


Flow cytometry made simple

Microfluidic tools for the automation and down-sizing of flow cytometry instruments

Flow cytometry – automated and miniaturized



Automation of flow cytometry

Flow cytometry requires many **manual, labor-intensive steps** which so far lack automation: A sample needs to be extracted from the cell suspension, and then the media needs to be removed by centrifugation. Afterwards, the sample needs to be stained with the appropriate dyes. After an incubation period, the unbound dyes need to be removed through a second centrifugation step, before the sample can eventually be measured. These tasks massively increase **costs**, especially for personalized, cell-based therapies.

At the **Fraunhofer IMM**, we are using **microfluidic tools** to realize the automation of the necessary sample preparation steps. The staining and cytometric detection are **automated on-chip** to minimize hands-on time for the researcher. The same chip is used for hydrodynamic focusing and the subsequent detection of the cells. For viability measurements in bacteria populations, this method was shown to be **on par** with standard preparation techniques.

Washing steps can be replaced using microfluidic valves, filtering as well as precise dilution techniques.

Miniaturization of flow cytometry

A **miniaturization** of flow cytometry instruments is necessary to help with automation tasks, as smaller devices can be more readily integrated into fluidic systems. Additionally, down-sizing makes flow cytometry accessible in the field, e.g., for drinking water analysis at the point of need.

We have developed microfluidic chips where the detector optics are integrated into a **very small package**. By making use of confocal detection techniques and a smart tuning of channel dimensions, the need for hydrodynamic focusing can be eliminated.

Further miniaturization can be achieved by employing **fluorescent-lifetime-detection techniques**, which allow for the complete omission of optical filters.

Our expertise to meet your challenges

- fast prototyping techniques (3D printing, milling, hot embossing, injection molding)
- assay development on microfluidic cartridges
- system integration
- highly motivated and interdisciplinary team of scientist and engineers
- broad test infrastructure with the opportunity to cooperate with strong scientific partners
- opportunities for cooperations in publicly funded projects and flexible contract research