



AUTOMATED μ FACS SYSTEMS FOR CLINICAL DIAGNOSTICS

Task

In laboratory diagnostics, FACS devices (Fluorescence Activated Cell Sorters) are used to detect pathogens, tumor cells and marker molecules. Commercial FACS devices, however, are high-priced stand-alone solutions and are not suitable for fully-automated high-throughput laboratory diagnostics.

Method

Fraunhofer ILT has developed an automated and easily integrated diagnostic system solution – based on glass chip technology – for the detection and sorting of specifically stained cells, pathogens and particles. Fluorescence sensors detect the hydrodynamically focused cells by stimulating them with laser light, thereby detecting and analyzing fluorescence. In contrast to conventional FACS devices, glass fibers guide the stimulating laser and fluorescence radiation, which considerably reduces the dimensions of the μ FACS device. The devices are designed as OEM components and can be integrated into an automation platform for handling the samples and assays to be tested.

Results

A great number of fluidic channels for the parallelized sample guide can be arranged on the glass chip. Depending on the task, each of the fluidic channels is equipped with one or more fluorescence sensors, for which up to six different laser wavelengths are available.

The cell detection can be combined with an active sorting process, which selectively directs the cell to a fluidic branch through an optofluidic switch into one of the two channels behind the branch after the detection. During cell sorting, an IR laser beam heats the fluid locally and triggers the fluidic switch by changing the flow conditions at the branch point.

Applications

The μ FACS technology can be used in clinical routine diagnostics as well as in bio- and environmental analytics.

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1 Glass chip for clinical diagnostics.

2 Principle of operation of the optofluidic switch.