

Lab-on-a-Chip Foundry Service – enabling the miniaturization of in vitro diagnostics

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Background. A number of Lab-on-a-Chip systems have been developed during the last decade. They enable the miniaturization, integration and automation of in vitro diagnostics for mobile systems and point of care diagnostics. Yet, only a small number of such systems have been established in the market. The successful development of integrated Lab-on-a-Chip systems relies on a robust microfluidic platform concept combined with comprehensive knowledge in process technology, liquid handling, biochemistry, and system integration.

Method. The Lab-on-a-Chip Foundry Service of the HSG-IMIT offers the efficient development of custom designed Lab-on-a-Chip systems which are based on well defined microfluidic platforms. Assays are implemented in a systematic workflow, which is based on a library of design rules. The assay is subdivided into laboratory unit operations, which are then compiled into a layout of validated and scalable microfluidic structures. A new layout is therefore built up by the concatenation of well known structures. A functional prototype is realized by validated manufacturing technologies. It is then tested for fluidic and biochemical performance.

Results. A number of assays comprising clinical chemistry, immunoassays and DNA analytics have been realized successfully on our centrifugal and pressure driven microfluidic platforms. Validated microfluidic structures cover unit operations for valving, metering, mixing and separation of samples.

Conclusions. The Lab-on-a-Chip Foundry Service offers the integration, miniaturization and automation of in vitro diagnostic assays based on a standardized workflow and access to a broad range of state of the art technologies in the field of microfluidics, prototyping biochemistry.

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