The advantages of using nano-enabled microsystems for bio analysis

Product Watch: Nano-enabled microsystems for bio analysis

The miniaturisation of microfluidic systems to scale down the volumes of sampled and reagents, effectively cutting down on the time, costs and efforts in sample preparation and analyses, is an important technological trend. It contributed to improvements in the integration of laboratory systems onto one single chip. A range of analytical procedures that used to be manually handled in laboratories can now be substituted by integrated technologies, commonly termed as lab-on-a-chip (LOC).

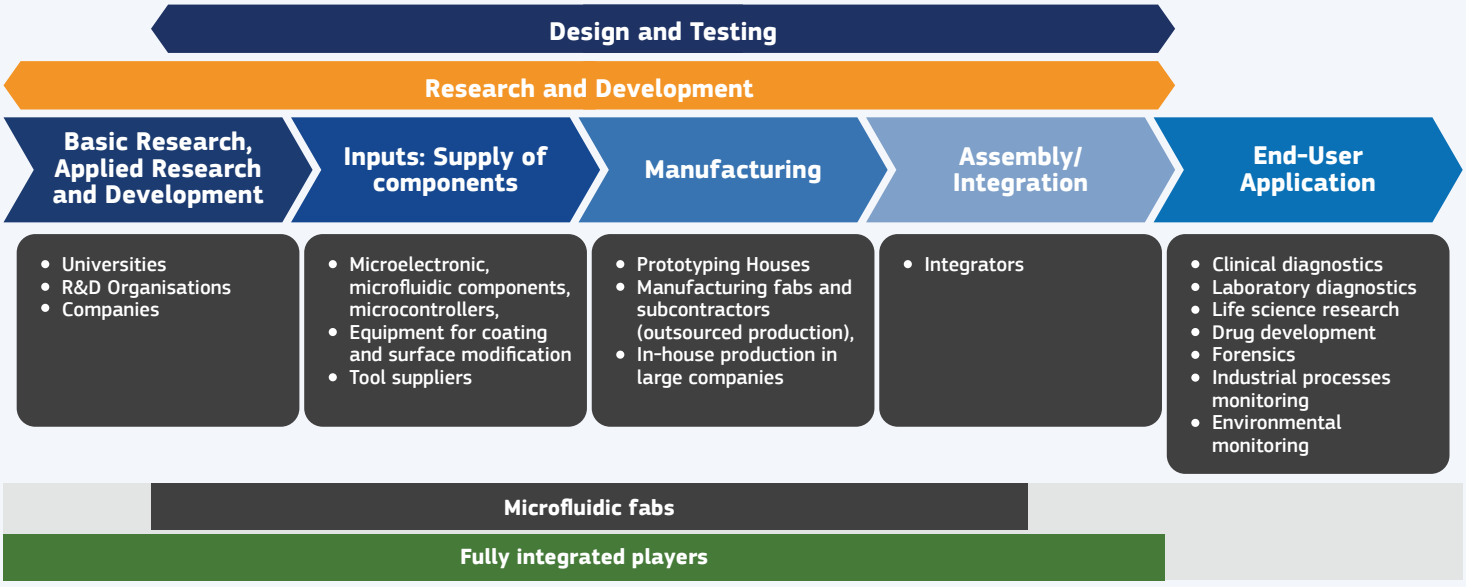
The most significant current and potential advantages of the LOC-based technologies are:

- **High parallelisation**- a large number of analyses on one chip
- **Diagnostic speed**- LOC speeds up doing analyses and related operations
- **Cost efficiency**- reduces the cost of analysis, diagnostic costs and cost of diagnostic infrastructure
- **Real time control and monitoring, improved sensitivity**- LOC leads to more controlled results
- **Ease of use and compactness**- LOC devices are extra small and require less handling and complex operations
- **Improvement of diagnostics in developing countries**- LOC can enable rapid and cost-effective diagnosis of large groups in remote locations

All stages of the value chain are Research & Development (R&D) intensive and need continuous testing and simulation activities

The microfluidics industry is complex. The complexity of this industry is linked to its interdisciplinary and cross-functional character on the interface between microelectronics, microfluidics and life sciences.

Lab-on-a-Chip technologies value chain



For more information, read the full Product Watch report on Nano-enabled microsystems for bio analysis here:
https://ati.ec.europa.eu/reports/product-watch/nano-enabled-microsystems-bio-analysis

EU competitive positioning for nano-enabled microsystems for bio analysis

Strengths

- Strong scientific and technological basis
- Large market size and favourable framework conditions
- Increasing demand on point-of-care diagnostics
- Wide range of applications in different sectors

Opportunities

- Favourable prospects for the future development of microfluidics
- Benefits for a wide range of application
- Advanced opportunities from combination of LOCs with Artificial Intelligence
- Stringent regulatory provisions for toxicity testing

Challenges

- Lack of standardisation and of compatible integration
- Lack of testing and certification for integrated technologies
- Strict regulation of medical products
- Slow adaptation of norms and standards
- Availability of funds for startups

Risks

- Rising complexity, accelerated pace of innovation
- High development costs and reimbursement concerns
- Management of genetic and other medical data
- Ethics and human behaviour
- Lack of visibility and user awareness in new application fields

LOC technology has great potential to provide a shift in paradigm for bio analysis

Conclusions

LOC-based technology holds the potential to dramatically improve speed, efficiency and cost of bio-chemical diagnostics procedures providing a paradigm shift for bio analyses.

Outlook

The EU has strengths and capabilities contributing significantly to the advancement of the microfluidics technology. It is perfectly positioned to excel in solutions to increase resource efficiency and circularity across the value chain.

Impact of COVID-19

The COVID-19 pandemic highlighted the need for accurate and rapid diagnostic tools to effectively manage the infectious disease.

About the Advanced Technologies for Industry (ATI) project

The ATI project – funded by the European Commission – supports the **implementation** of Europe's new growth strategy with a systematic monitoring of **technological trends** and reliable, **up-to-date data** on advanced technologies.

The **Product Watch** analyses novel products that are based on advanced technologies for the development of goods and services - enhancing their overall commercial and social value. It supports cluster organisations and S3 partnerships, providing intelligence on innovation areas where European regions could team up and invest together.

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