Fabrication of optofluidic and microfluidic devices

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SCOPE OF THE METHOD

Alternative method relates to	Animal health, Environment, Human health
Alternative method is situated in	Basic Research, Translational - Applied Research
Type of alternative method	In silico
This method makes use of	Animal derived cells / tissues / organs

DESCRIPTION

Method keywords

hot embossing

micro-injection moulding

3D nanoprinting

microscaffolds

Scientific area keywords

lab-on-chip

microfluidics

optofluidics

free-form optics

Method description

Prototyping and replication (small series production) of microfluidic or optofluidic devices, in thermoplastic polymers or in glass. 3D nanoprinting is also available to produce microscaffolds, possibly within microfluidic channels.

Lab equipment

Ultraprecision diamond tooling,
High-precision milling and grinding,
High-precision polishing,
Hot embossing,
(micro-)injection moulding,
Glass press moulding,
Two-photon polymerization-based 3D nanoprinting,
Femtosecond laser glass machining.

Method status

Internally validated
Published in peer reviewed journal

PROS, CONS & FUTURE POTENTIAL

Advantages

Custom-designed labs-on-chips can be fabricated (prototyped, or produced in small series), potentially including photonics structures (e.g. waveguides, lenses, ...) to allow for optical read-out integration. In addition, the produced optofluidic devices can be enhanced with 3D nanoprinting to produce custom scaffolds (e.g. for cell growth). In terms of materials, thermoplastic polymers (PMMA, PC, COC) or glass can be used.

Challenges

Sealing of microfluidic channels is sometimes challenging. Depending on the material used, several approaches are possible (laser welding, thermal bonding, chemical bonding,...).

Modifications

Our fabrication technologies are very flexible and allow a large design freedom.

Future & Other applications

The fabrication technologies are also used in other areas, such as high-end free-form optics for imaging or non-imaging applications.

REFERENCES, ASSOCIATED DOCUMENTS AND OTHER INFORMATION

Associated documents

PARTNERS AND COLLABORATIONS

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Name of the organisation Vrije Universiteit Brussel

Department Applied Physics and Photonics

Country Belgium

Coordinated by

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