Fabrication of optofluidic and microfluidic devices

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Organisation

Name of the organisation Vrije Universiteit Brussel (VUB)
Department Faculty of Engineering
Country Belgium
Geographical Area Brussels Region

SCOPE OF THE METHOD

The Method relates to	Animal health, Environment, Human health
The Method is situated in	Basic Research, Translational - Applied Research
Type of method	In silico

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

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