

1 Hot embossed endless foil comprising micro structures.

2 Part of the endless foil.

MICROSTRUCTURES BY THE METRE

Fraunhofer Institute for Biomedical Engineering IBMT

Prof. Dr. Günter R. Fuhr
Ensheimer Strasse 48
66386 St. Ingbert
Germany

Contact

Biomedical Microsystems
Dr. Thomas Velten
Telephone +49 6894 980-301
Fax +49 6894 980-152
thomas.velten@ibmt.fraunhofer.de

www.ibmt.fraunhofer.de

Description

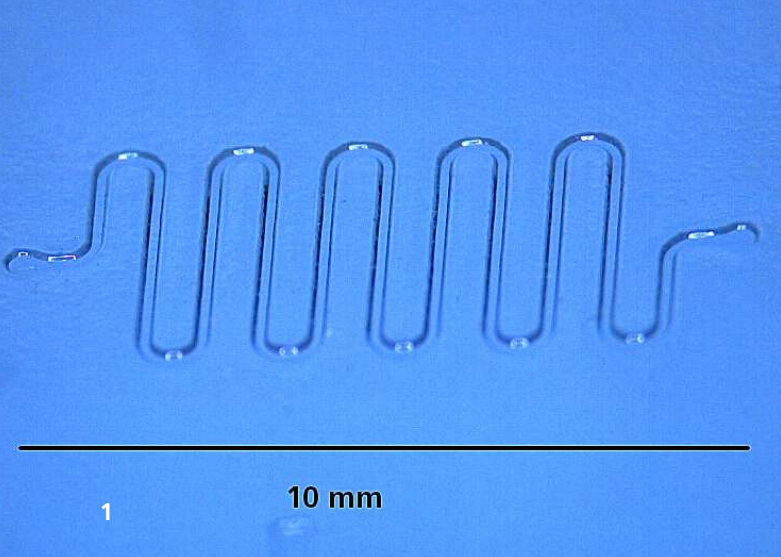
IBMT has developed a method for micro patterning large-area foils by a discontinuous roll-to-roll hot embossing process. The machine employed for discontinuous embossing is much cheaper than typical commercial machines for continuous embossing. Furthermore, the discontinuous process results in hardly any waste. This is especially advantageous as long as the daily production is below one kilometre.

The throughput is very high compared to stamp hot embossing.

The resulting micropatterned areas are much larger than those produced by micro-injection moulding.

Advantages

- low equipment costs
- large-area patterns are possible
- hardly any waste
- high throughput (mass production)
- wide range of micro structures (50 nm – 100 µm)
- defined arrangement of components on a foil
→ further processing in batches



Examples of applications

Microfluidics

Fraunhofer IBMT has many years of experience in fabrication of foil-based microfluidic components comprising channel structures in the range of 10 - 200 μm width and up to 200 μm depth.

These structures can be used for the realisation of labs-on-chip, micro mixers, and similar microfluidic components.

Cell cultures

As an example, Fraunhofer IBMT has manufactured large area micro structures on foil for directed growth of biological cells or for influencing cell adhesion. Foils patterned correspondingly can be applied in cell culture dishes or flasks.

The structures used for influencing cell behaviour have a width of below 10 μm .

Technical data

Typical foil thickness: 150 – 500 μm

Typical foil width: 0.3 m

Embossing depth: 50 nm – 200 μm

Aspect ratio: up to 1:1

Max. throughput: 200 m – 10 km per day
(depending on foil thickness)

Materials:

- Thermoplastics (e.g. COC, PC, PS)
- Thermoplastic elastomers (e.g. PU)

Literature

T. Velten et al,
"Microfluidics on foil",
Proceedings of the Institution of
Mechanical Engineers, Journal of
Engineering Manufacture, Vol. 222 No B1,
January 2008, pp. 107-116.

T. Velten et al,
"Investigations on Reel-to-Reel Hot
Embossing",
The International Journal of Advanced
Manufacturing Technology, Vol. 47, Issue 1
(2010), Page 73.

Our offer

Manufacturing of customised micro structures on foil substrates.

Development of customised embossing processes suited for mass production.

- 1 Hot embossed microfluidic channel (channel height: 100 μm).
- 2 Directed growth of cells on hot embossed micro structures.