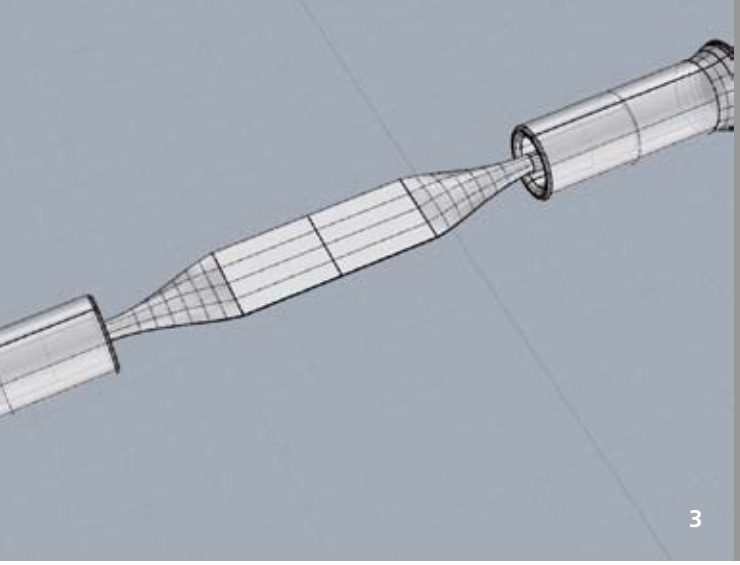

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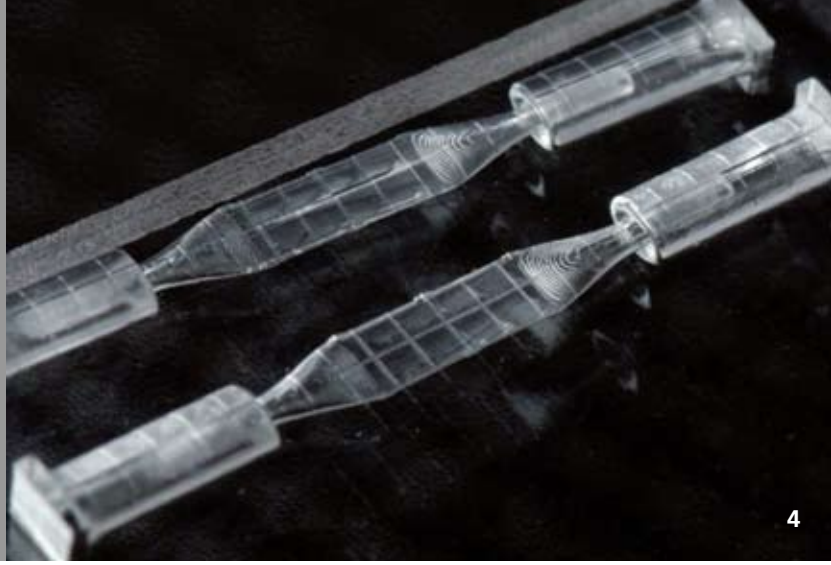

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INDIVIDUALIZED PRODUCTION THROUGH SELECTIVE LASER-INDUCED ETCHING

Task

To produce component parts for microsystems technology, masks, molding tools or injection molds first have to be manufactured. Therefore, it is costly to produce micro component parts as prototypes or in small series. The aim in this project is, thus, to individualize photonic production: laser-based manufacture directly from digital data (CAD). Selective laser-induced etching (SLE) is an appropriate tool to implement digital photonic production for transparent working materials.

Method

SLE is a two-step process: first, the transparent material is exposed to ultra-short pulsed laser radiation in the interior of the workpiece with a three-dimensional movement of the focus and, second, the structure is developed by removing the exposed material through wet-chemical etching.

By means of a CAD model of the structure to be produced, the track data for the movement of the laser focus is automatically derived. These track data are then transferred to CAM software, which synchronizes the controls of a microscanner system and guides automatic illumination of the desired structure.

Result

A microscanner system and a CAD/CAM software were developed and adapted to the process-based requirements of SLE, making the individualized photonic production possible, in this case, of a flow-through cell for medical diagnostics for automated cell count.

Applications

The system technology developed here finds applications in prototype and small-series production using SLE for microsystems technology, bio- and medical engineering as well as chemical analytics and process engineering. Further applications for systems technology are 2-photon polymerization and microablation with laser radiation.

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3 CAD model of a microfluidic system.
4 Microfluidic system producing by means of CAD model.