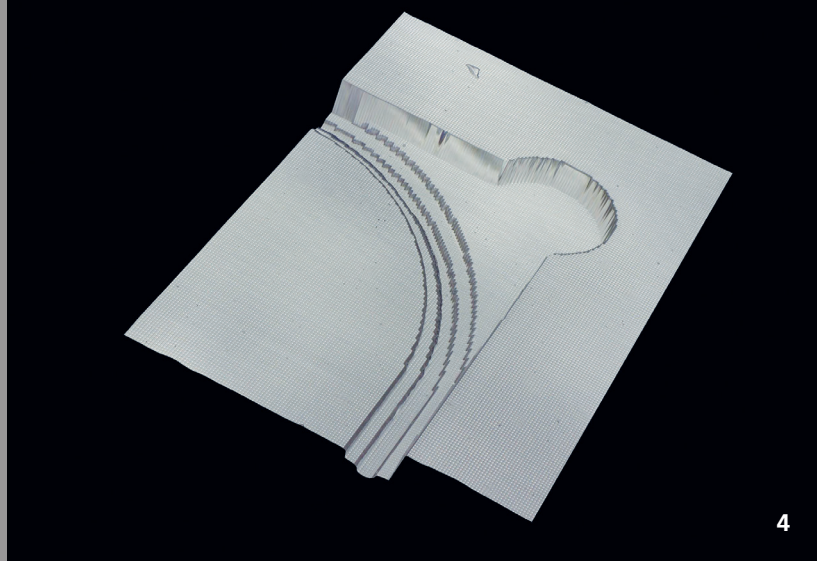


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HIGH-RESOLUTION 3D-PRINTING BY PHOTO-CROSSLINKING WITH SCROLLING DIGITAL LIGHT PROCESSING

Task

Injection molding is commonly used to produce microfluidic chips for diagnostic procedures, a process that makes developing new chips lengthy and expensive. Until now, sufficiently high resolution could not be achieved under economic conditions using 3D printing methods.

Method

In electronics manufacturing, the scrolling DLP (Digital Light Processing) process is already used to expose ultra-fine conductor tracks at a resolution of a few micrometers. Here, a photoresist is irradiated in a layer thickness of a few micrometers. Fraunhofer ILT has adapted the scrolling DLP process to the requirements of 3D printing and tested a machine-based solution with which components up to several centimeters high can be produced.

Results

The image field of the DLP projector is about 10 x 20 mm² with a pixel size of 10 µm. When the projector is moved (scrolled) during exposure, a large area of, for example, 40 x 100 mm² can be exposed at high resolution. The image information is scrolled line by line and synchronized with the movement so that the entire area can be exposed seamlessly and homogeneously.

Applications

The process is particularly suitable for quickly developing diagnostic chips and processes for the rapid diagnosis of pathogens and environmentally harmful substances. It can be used to produce inexpensive initial test samples for testing both the design of the chips and the functionality of the approach.

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3 Side view of a microfluidic chip fabricated with DLP.

4 Microfluidic channel structure fabricated with a pixel size of 10 µm.