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Microfluidic Plastic Devices for Single-use Applications in High-Throughput Screening and DNA-Analysis

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Poster

Microfluidic devices fabricated by mass production offer an immense potential of applications such as high-throughput drug screening, clinical diagnostics and gene analysis [1]. The low unit production costs of plastic substrates make it possible to produce single-use devices, eliminating the need for cleaning and reuse [2]. Fabrication of microfluidic devices can be applied by microtechnical fabrication processes in combination with plastic molding techniques [3].

Basically, replication in plastics requires a hot embossing or injection molding tool. Various microfabrication technologies for the masterfabrication are established, such as the LIGA technique, mechanical micromachining and the micro electrical discharge machining technique (µEDM). Depending on the specific requirements, the most suitable process can be selected. The availability of these technologies allows to generate robust metal molding tools which exhibit the inverse shapes of the intended microstructures.

In close collaboration, Greiner Labortechnik and Forschungszentrum Karlsruhe have fabricated prototype single-use plastic microfluidic devices in a standard microplate format by hot embossing with a mechanical micromachined molding tool and subsequent sealing of the microchannels. The microfluidic lab-on-chip structures are compatible with existing plate and liquid handling robotics. Sub-microliter sample volumes can be applied in the 96-channel multiplexed microstructures. Additionally, the combination of small assay volumes and the possibilities of integrated capillary electrophoretic separation provide a powerful tool for rapid assay development.

This presentation will show a low cost production of 96-channel plastic microfluidic devices including various microfabrication technologies to demonstrate the application of microtechnical fabrication processes for high-throughput screening and DNA analysis.

Literatur

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