Ultrasonic Fabrication of Disposable Medical Analysis and Dosing Systems

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Outline

Ultrasonic hot embossing

Ultrasonic welding



Welding in of fluidic and electric connections

Flow sensors

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Detection of a Taylor flow

Micro fluidic chips Conclusions







Ultrasonic hot embossing





Ultrasonic hot embossing





Ultrasonic hot embossing



Ultrasonic hot embossing



Ultrasonic hot embossing of colored polymer layers



The polymer is stirred by the ultrasound.

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Ultrasonic welding with energy director



Ultrasonic welding with metal wire



Ultrasonic hot embossing and welding





Roll-to-roll production





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Welding in of fluidic and electrical connections





Fluidic connections



Hoses



Luer connectors



Screwed connections



Tubes

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Hot Wire Anemometer



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Measurement of flow time



Flow parallel wire (FPW)



Taylor flow





Cell chip





Cell culture chip





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Cells growing in a chip





Calcification risk



Healthy mouse



Calcified mouse



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Analysis chip for calcification risk



Possible Polymers

In principle all thermoplastic polymers can be used. We have tested: PP PE **PVC PMMA** TPU PC PEEK PS LDPE PPSU **PVDF** MABS PA SAN PTFE PLA PET **FEP RWITHAACHEN** UNIVERSITY KE 23 of 24

Conclusions

Ultrasonic processing of analysis and dosing systems is

affordable



even for small-scale production: A welding machine is commercially available for a few 10.000 €.

quick

In one day a new design can be realized.

In a few minutes a tool or the polymer can be exchanged.

In a few seconds a new product is fabricated.

flexible







A lot of micro systems can be fabricated from a variety of polymers.

