- ALL IN ONE –

Advanced technologies for complex low cost microfluidic devices in glass, silicon and quartz
MATERIAL REPARTITION (IN VOLUME)

Percentage of microfluidic products integrating each material, per application, in 2016

- Polymer
- Glass
- Silicon
- Other

Clinical & veterinary diagnostics: 91%, 0%, 0%, 1%
Point of care diagnostics: 97%, 0%, 0%, 2%
Industrial and environmental: 43%, 0%, 0%, 5%
Pharmaceutical and life science research: 65%, 0%, 0%, 5
Analytical devices/flow chemistry & micro Reaction Technology: 61%, 0%, 0%, 15%
Drug delivery: 69%, 0%, 0%, 0%
Total: 100%, 0%, 0%, 65%
MATERIALS and MANUFACTURING

Penetration rate by material in 2016

- PDMS: 80%
- Glass: 20%
- Polymer: 20%

11 & 12 DECEMBER
INTERNATIONAL MICRO NANO CONFERENCE 2018
AMSTERDAM
MATERIALS and MANUFACTURING

PDMS “Pros”
- porous to gas
- optical transparency
- rapid prototyping

PDMS “Cons”
- Low chemical resistance
- Adsorption of small hydrophobic molecules
- Adsorption of biomolecules
- Change in concentration
GLASS - REALLY A COST ISSUE?

- Approx. 50% of all micro fluidic applications are made in glass, silicon or glass/silicon
- 3 of the 5 biggest micro fluidic applications are made in glass, silicon or glass/silicon
- Prototyping in glass is cheaper
- Price up to medium quantity is cheaper

No, it isn’t a cost issue
## GLASS FACTS

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Property</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical resistance</td>
<td>UV transmission</td>
</tr>
<tr>
<td>Heat resistance</td>
<td>Low fluorescence</td>
</tr>
<tr>
<td>High pressure</td>
<td>Bio compatible</td>
</tr>
<tr>
<td>Optical transparency</td>
<td>Long term stable</td>
</tr>
</tbody>
</table>

- No hurdles when upscaling
NEXT GENERATION MANUFACTURING

The combination of new developed and existing processing methods at LTF leads to unique results and products which can not be achieved by any other method.
MULTI STEP HEIGHT WITH MIXING STRUCTURE AND HOLES
LASER ETCHING
COMBINATION OF TECHNOLOGIES

Structured glass device

Silicon etched structure
DESIGN RULES LASER PROCESS

- Diameter of a bore is limited to the thickness of the glass plate
- Bore / Channel will be tapered
- Aspect ratio limited to 1:1
- Surface roughness
SURFACE QUALITY

Laser etched „dry“

Laser etched „wet“
SURFACE QUALITY

Bonding an unstructured top layer
OPTICAL ACCESS

Spacer Process

Top
Spacer
Bottom
FLOW FOCUSING CHIP
FLOW FOCUSING CHIP
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Water : Toluene = 4:1 / 4:2 / 4:3
APPLICATION
## LTF OFFERS THE WHOLE PROCESS CHAIN

<table>
<thead>
<tr>
<th>Grinding and polishing</th>
<th>Water jet cutting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diamond milling</td>
<td>3D Printing</td>
</tr>
<tr>
<td>Wet etching – HF, KOH</td>
<td>Molding</td>
</tr>
<tr>
<td>DRIE</td>
<td>Metal coatings</td>
</tr>
<tr>
<td>TGV process</td>
<td>Dicing</td>
</tr>
<tr>
<td>Micro powder blasting</td>
<td>Packaging</td>
</tr>
<tr>
<td>Laser patterning</td>
<td>Clean room class 100</td>
</tr>
</tbody>
</table>
Thank you for your attention!

Visit us at our booth