

# Micro Structures and Resist Opening Maskless Lithography with LPKF ProtoLaser LDI





# Smaller Structures, More Functions

Very fine structures required – growing markets for microfluidic applications and research in chemistry, biology, life-sciences, medicine, physics and photonics require flexible and fast in-house prototyping possibilities.

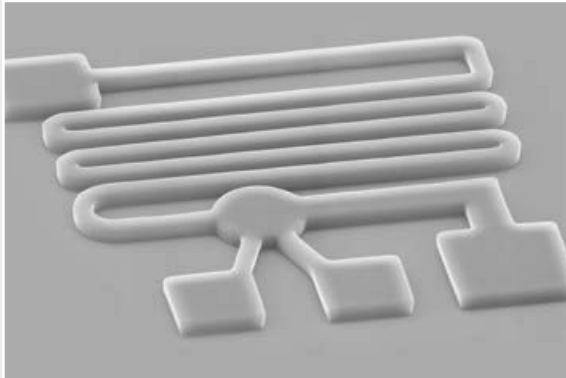
The LPKF ProtoLaser LDI is an universal, high-resolution, table-top Laser Direct Imaging (LDI) system for prototyping on resist-covered substrates. A transferred image has even better defined edges compared to conventional lithography. With a working area of up to 100 x 100 mm and structures down to 1  $\mu\text{m}$  it is an ideal tool for microfluidic designs.

The UV laser-based LPKF ProtoLaser LDI structures on UV standard inline resists – directly from CAD. There is no need for expensive mask alignment equipment nor to wait for costly masks.

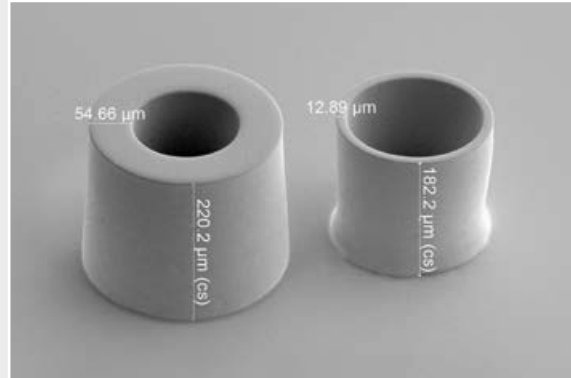
The process can be utilized on different flat substrates without any special environment conditions (yellow light recommended). The substrate is just inserted using a standard or custom designed cartridge, which is simply pushed into the ProtoLaser LDI slot. The LPKF ProtoLaser LDI can be operated in a clear room environment.

As the process is contact-less, there is no tool wear-out. No maintenance is necessary for years. This makes the system just a perfect and very affordable tool to produce and test the most daring designs. The LPKF ProtoLaser LDI drastically increases possibilities for innovations.

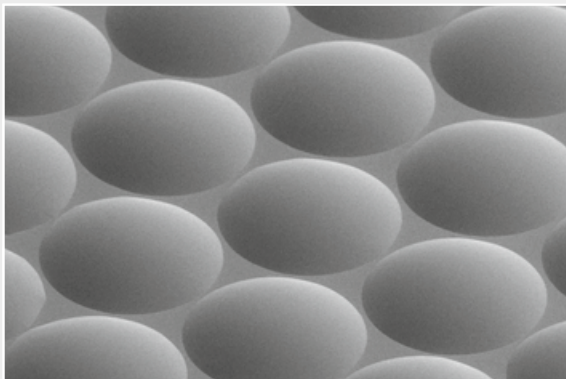
- Structures down to 1  $\mu\text{m}$
- Works with various substrates
- Processing straight from CAD
- Fast positioning
- Stand-alone operation



A microfluidic circuit – smooth and crisp edges



Various cylinders exposed in SU8. Accurate geometry at extreme aspect ratio



Array of micro-lenses in AZ



The ProtoLaser LDI is fed with a microfluidic cartridge

### Built-in Know-how

Using 100 kHz beam positioning by acousto-optic deflectors, extremely fast writing is possible. Illumination of a typical microfluidic circuit only takes a short time. Automated measurements may compensate for unevenness of the substrate and applied resists: Best conditions for excellent results.

The LPKF ProtoLaser LDI dedicated user interface supports DXF files and also enables CAD design. A variety of built-in functions makes designing of a microfluidic circuit very easy and efficient. Different laser tools and algorithms can be selected to optimize the process for speed and the finest structures. All job preparation steps are controlled via very intuitive software controls.

## PCB Prototyping with Worldwide Support

Users of LPKF prototyping laser systems can rely on global application centers in Germany, the USA, Japan, Korea and China for assistance. Application centers provide access to LPKF's many years of experience in laser material processing and offer expert counsel on technical questions, new processes and applications.

Technical Data: LPKF ProtoLaser LDI	
<b>Substrate size</b>	Up to 100 mm x 100 mm (4" x 4")
<b>Laser wavelength</b>	375 nm
<b>Laser spot size (TEM<sub>00</sub>)</b>	1 µm (0.04 Mil) and/or 3 µm (0.12 Mil), software selectable
<b>Laser spot positioning resolution</b>	< 1 nm
<b>Writing speed</b>	Up to 100 000 spots per second
<b>Structure size</b>	Down to 1 µm (0.04 Mil)
<b>Data input formats</b>	DXF, Gerber, BMP
<b>Power supply</b>	230 V / 50 Hz, 100 VA
<b>Dimensions (W x H x D)</b>	650 mm x 522 mm x 626 mm (25.6" x 20.6" x 24.6")
<b>Weight</b>	80 kg (176.4 lbs)
<b>Camera</b>	Integrated camera for sample alignment and inspection
<b>Hardware and software requirements</b>	Windows 7, 32 bit or Windows XP, 32 bit with service pack 3, 1.3 GHz processor or higher, 2 GB RAM (4 GB recommended), 160 MB of available hard-disk space for installation, screen resolution min. 1 024 x 768 pixels (1 600 x 1 050 recommended). In general higher computer performance results in shorter illumination process.

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