Application Report:

Excimer Lasers for Microsystems Technology

Micromachining with UV-Light:

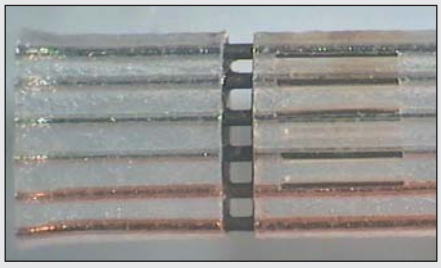
A Fast and Precise Industrial Tool

Microstructures play an important role in many applications such as analytical devices for biotechnology, products for telecommunication or medical industry. Excimer lasers are the industrial tool for the fast and precise micromachining of micro components. Excimer lasers achieve high precision in the submicron range and, in addition, work forceless and without mechanical stress for the substrate. The fast repetition rate (1 kHz) permits a serial mass production. Often excimer lasers are used for rapid prototyping and small series. Excimer lasers can easily handle common plastics such as PEEK, PC, POM, polyimide or PMMA. With a few restrictions, even metals, glass or ceramics can be microstructured with excimer lasers.

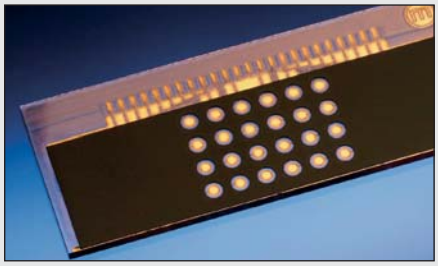
Bartels Mikrotechnik (Dortmund, Germany), a leading company in microsystems technology, use the ExciStar™S from TuiLaser AG. Some product applications of the excimer laser by Bartels Mikrotechnik are presented here.

Micromachining in Electronics:

Micro Wire Stripping



The accurate stripping of micro wires is achieved with the excimer laser. A major advantage is the non-thermal ablation of the isolating material, since the plastic material does not melt. Materials used for isolation: polyurethane (picture), polyimide and others
Wire diameters from 25 μm up to 100 μm



Nano Well Plate with 24 individual contact wells. The excimer laser ablates the electrodes from a gold layer as well as the holes in the foil. The wells have a diameter of 2,5 mm and a depth of 150 μm (intervals 3,8 mm)

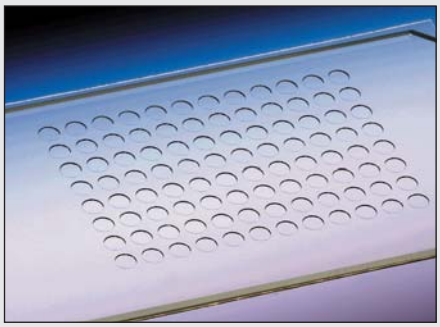
Micromachining in Medical Device Technology:

CryoPen® with Micro Nozzle in PEEK

The CryoPen® freezes tissue in the cryo therapy without destroying the fibre structure. The decisive part of the CryoPen® is a micro nozzle made of PEEK. The excimer laser drills a hole of 30 μm in diameter into the tip. Compressed laughing gas (N2O) cools down to -89°C (Joule-Thompson-effect). The CryoPen® is manufactured by Bartels Mikrotechnik for H&O Equipments.

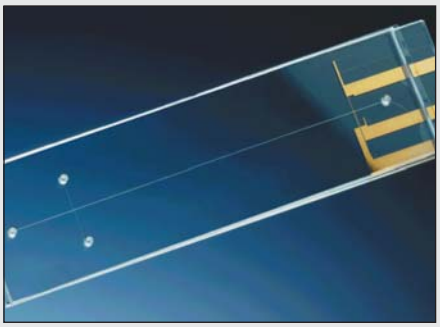
Micromachining in Biotechnology:

Micro Titer Plates

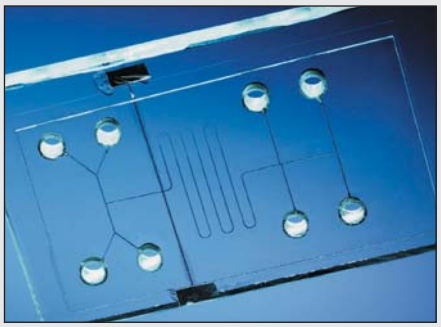


Micro titer plates are a growing market in biotechnology. The parallel investigation of small volumes speeds up the analysis. This micro titer plate is made of a polcarbonate sheet on glass. The wells have a diameter of 1,2 mm and a depth of 250 μm.

CE-Chips



Capillary electrophoresis is a strong separation tool for biotechnological applications. This "lab-on-a-chip" is made of polycarbonate. The channels of 50 μm width and depths ranging from 20 to 50 μm have been created with an excimer laser.



all pictures: courtesy of Bartels Mikrotechnik

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