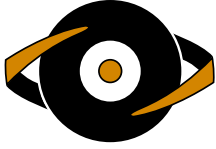


# Micromanufacturing Technologies

IRIS  
CREATIVITY INNOVATION ENTREPRENEURSHIP



INDUSTRIAL RESEARCH INSTITUTE SWINBURNE

## a Technology Revolution

This is not just one Technology; it is many Technologies and many different combinations of technology linked to provide unique functionality. The revolutionary aspect of Microtechnology is that it now becomes cheaper to build highly integrated systems with enhanced performance in comparison to more-traditionally machined and integrated devices.

## Laser-LIGA

**LIGA is a German Acronym:**  
*Lithography (Patterning)*  
*Galvanoformung (Electroplating)*  
*Abformung (Injection Moulding)*

is a process in which the laser is used to cut a plastic mould which is filled with metal by electroplating. In this way small parts for micromotors can be made.

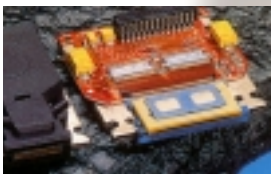


A state-of-the-art excimer laser micromachining system, one of only 6 of its kind in the world, has recently been installed at the Industrial Research Institute of Swinburne University of Technology (IRIS).

### How does it work?

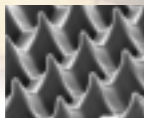
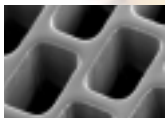
- The excimer laser uses **mask projection** to cut shapes.
- A metal mask is used like a stencil.
- The high power laser beam is used to illuminate the mask.
- A projection lens produces a 10x reduced image of the mask on the workpiece.
- Image reduction concentrates the laser energy.
- The laser energy removes material by ablation to form the shape.

Wavelength:	248 nm (KrF) 193 nm (ArF)
Lens emagnification	4x
10x	
Lens NA	0.2NA
0.NA	
esouction / field	1µm / 1.5mm
0.8µm / 1mm	
Workpiece size	400 x 400 mm
Stitching resolution	0.1 µm



### Ink-Jet printer

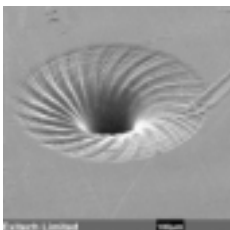
systems are examples of mass-produced microfluidic devices. Other applications include drug delivery systems, microchemistry and bio-factory chips.



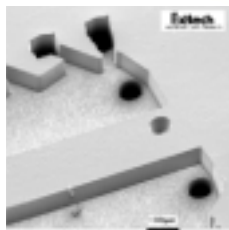
"Human Hair"

"3D Cutting"

"Shark skin"



A nozzle of the future? The riffling on this nozzle helps direct the jet.



Researchers at Swinburne are developing new micromanufacturing processes in microfluidics, biotechnology and bio-factory chips.

### Example Products from this Technology:

- Nebulizers
- Microrelays
- Micromotors
- Flow Sensors
- Level Sensors
- Geophones
- Gyrometers
- Gyroscopes
- Hearing Aids
- Medical Implants
- Pressure Sensors
- Flat Panel Displays
- Ink Jet Printer Heads
- Temperature Sensors
- Microspectrometers
- Microwave Detectors
- Microfilters (for liquids)
- Micropumps, Microvalves
- Chemical Sensors - Liquids
- Chemical Sensors - Gases
- Position Measuring Devices
- Optical Network Components
- Read / Write heads for hard disks
- Tips (for force microscopes)
- Drug Delivery Systems
- Acceleration Sensors