ROWIAK

Laser microtome LMT F14

Precise, non-contact cutting

Using the femtosecond laser technology, the LMT F14 is designed to slice biological tissue and other material with high precision. It is suited for applications in life science such as biology, pathology or medicine and also in micro technology. The LMT F14 offers a wide range of advantages:

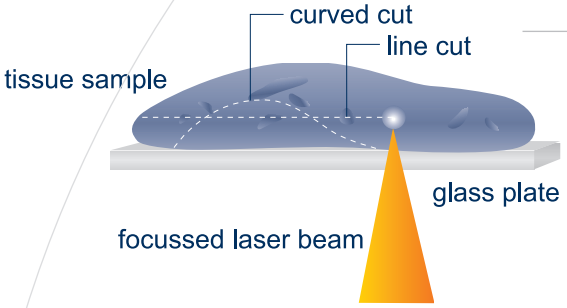
- non-contact processing
- submicrometer precision
- cutting of tissue in native state
- no time-consuming tissue preparation
- less artefacts

photons at work

The principle of the laser microtomy

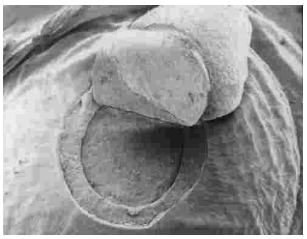
The cutting process is performed by a femtosecond laser, emitting radiation in the near-infrared range. By strong focussing the laser radiation, intensities over 10 GW/cm² arise inside the laser focus. These extreme intensities ionize the illuminated material and lead to the formation of a plasma. Accompanied by a shock wave this causes the disruption of the material. This effect is called optical breakdown or photodisruption. Due to the ultra short laser pulse duration of only a few femtoseconds (1 fs = 10^{-15} s), there is only very low energy of some nano joule (1 nJ = 10^{-9} J) per laser pulse deposited into the tissue. This limits the interaction radius to diameters below one micrometer. As this effect is based on nonlinear absorption, the optical breakdown is not necessarily limited to the surface of the specimen. Cutting can be realized even inside the tissue or other material by focussing the laser beam into deeper regions. In conjunction with a fast scanning unit an effective and non-contact sectioning method is available.

Principle of the laser microtome:
The focussed laser beam writes a cutting plane into the sample.The laser microtome offers cutting of flat lines and also of any other shape.



No time-consuming tissue preparation

In contrast to conventional, mechanically working microtomes the LMT F14 does not require a time-consuming tissue preparation such as freeze, dehydration, embedding in resin or paraffin or related to hard tissue decalcification.
It is the first microtome, that has the ability to slice every tissue in native state.
Thus the processing of a sample is possible within a short time.
Further advantages are the significant reduction of artefacts and contamination-free specimens as a positive consequence of the non-contact cutting method.
Depending on the material being processed, slice thicknesses of 5 to 100 µm are viable.



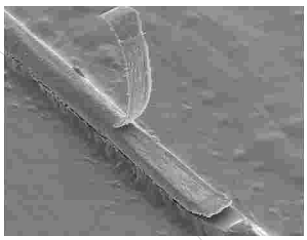
lamellar structures
in corneal tissue

Configuration

Laser	Average output power	< 3 W
	Wavelength	1050 nm
	Pulse width	< 300 fs
	Pulse repitition rate	20 MHz
Camera	Sensor type	1/2" CCD, B/W
	Videorate	
	Field of view	ca. 0,9 x 0,9 mm
Software	Labview based	

Technical parameters

Section thickness	Minimum 5 to 10 µm, Maximum depends on the material
Process duration	ca. 1mm² / s
Working area	14 x 14 mm (larger areas on request)
Dimensions	500 x 1200 x 600 mm (H/W/D)
Weight	ca. 80 kg



human hair, sliced by
the laser microtome

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