

Laser microscope adapter - LMA



Meopta optika, s.r.o is pleased to report about successful cooperation with **Institute of Scientific Instruments, Academy of Sciences of the Czech Republic** and present a result of the joint project which is the **Laser Microscope Adapters (LMA)**.

This adapter allows optical micromanipulations on traditional light microscopes. The LMA is inserted between the body of the microscope and the microscope objective to accurately guide the beam of the laser for extremely precise observation and control.

Optical trap technology to confine micro- and sub-micro objects within the focus of a laser beam. This allows for the three dimensional capture and precise manipulation of micro particles in a controlled environment.

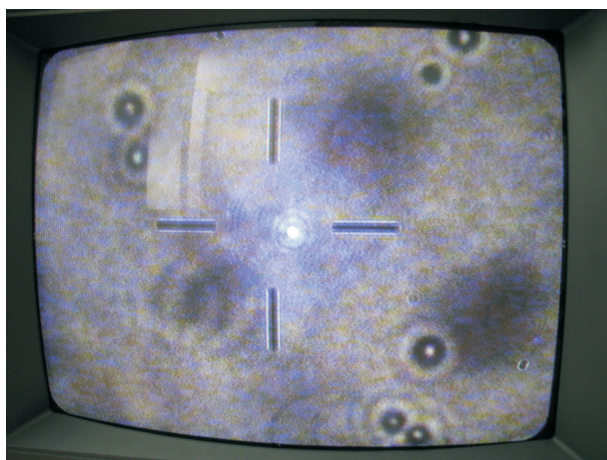
LMAs direct visible, UV or IR laser radiation through the optical path of the microscope, which allows for non-contact manipulation of micro-objects with dimensions ranging from 0.1-30 μm . The Meopta LMA is a versatile device capable employing the following techniques for use in many diverse applications.



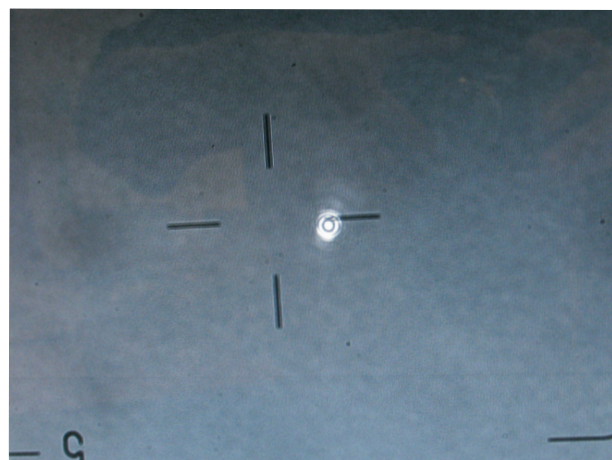
Laser microscope adapter (LMA 3) is placed into objective turret, into a space for e.g. Nomarski DIC slider

The LMA supports the following laser based techniques to significantly expand the capabilities of traditional optical microscopes:

- Optical micromanipulation with micro-objects or living cells (optical tweezers)
- Micro-cutting (laser scalpel or laser scissors)
- Creation of polymer micro-structures by focused-beam-induced photopolymerization and some of the advanced fluorescence microscopy techniques (e.g. FRAP - Fluorescence Recovery After Photobleaching, FLIP Fluorescence Loss In Photobleaching)



A



B

Pictures A and B show different side aberration of laser beam track on a monitor (which is not necessarily a fault) that comes from tolerations for fixing adapter objective on different microscopes (with different levels of defocusing)



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Laser microscope adapter - LMA



LMA 1

LMA 1 is laser microscope adapter, which allows implementation of laser radiation beam by the optical fiber to optical microscope assembly.

Micro-object is space-caught by a focused laser beam near its focal point. The micro-object remains fixed in the visual field of the microscope and can be moved by adjusting the microscope stage. The microscope's objective is used for viewing the micro-objects as well as to focus the laser beam.

The unimodal optical fiber is connected to the adapter through a FC/PC connector while the optical fiber supplies laser radiation at the desired wavelength.

We have currently manufactured and tested the following wavelength variants:

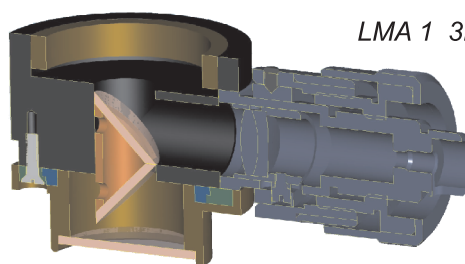
337 nm, 405 nm, 808 nm, 1064 nm, 1500 nm

Focusing mechanism

The focusing mechanism employs scale units consisting of single turns of the mechanism. Each turn shifts the lens focus by 0.25 mm the scale has a range of ± 6 turns. The total range of a 100x objective is ± 0.012 mm in the focal plane. These numbers are only for general reference and will vary for different objectives and wavelengths. This focusing mechanism allows greater flexibility and versatility for use with a variety of objects and variables.



LMA 1



LMA 1 3D model cut - view

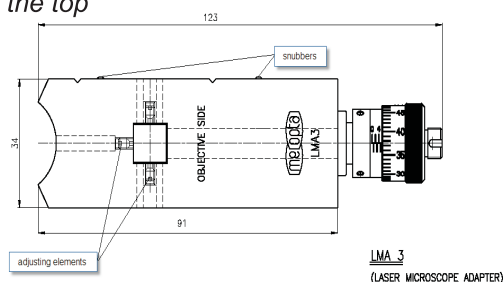
LMA 3

The LMA 3 employs its optical trap technology to capture micro-objects at a fixed point where it can be adjusted on the stage for clear viewing through the microscope objective.

It is easily installed by attaching the optical fiber, which generates the desired laser wavelength, to the adapter with the aid of a FC/PC connector. The focusing mechanism employs scale units consisting of single turns of the mechanism; Each turn shifts the lens' focus by 0.25 mm the scale has a range of ± 6 turns. The total range of a 100x objective is ± 0.012 mm in the focal plane.

These numbers are only for general reference and will vary for different objectives and wavelengths. This focusing mechanism allows greater flexibility and versatility for use a variety of objects and variables. LMA 3 is constructed primarily for use in Olympus microscope IX71 a BX51. Function and set up of the centricity of laser beam track were thoroughly tested for these models of microscope.

LMA 3 design - Design - view from the top



LMA 3
(LASER MICROSCOPE ADAPTER)



LMA 3



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