COMPACT OPTICAL TWEEZERS

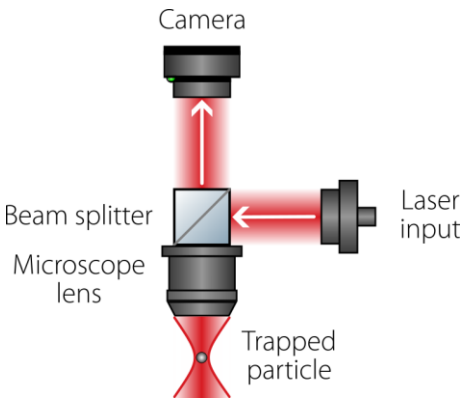
Applied and Integrated Photonics Group

Institute of Scientific Instruments
The Czech Academy of Sciences

Application Note

A unique scientific instrument, awarded a Physics Nobel prize in 2018, can be used to manipulate microscopic and sub-microscopic objects, such as particles, droplets, or even living cells in their natural environment. The typical dimensions of the objects studied range from 0.1 µm to 30 µm. Our compact optical tweezers use a highly focused laser beam to create an optical trap.

How does it work?



The image shows an optical tweezers setup, used to trap and manipulate microscopic particles using a focused laser beam. The basic principle involves the use of laser beam that is focused onto a small area, creating an intense electromagnetic field that can exert forces on particles in the area of the focused laser light. In our setup a dichroic beam splitter is used to separate the trapping laser light from the light used for imaging, allowing them to operate simultaneously.

Our solution of compact optical tweezers module, that can be attached to any kind of optical microscope.

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Want to know more? Contact us!

Czech Academy of Sciences

Applications and Features

Application area

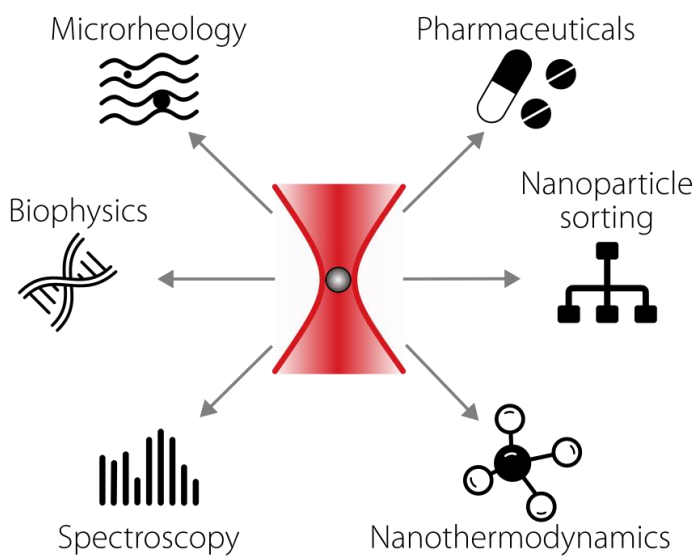
- Microbiology, biophysics
- Pharmaceuticals
- Physical chemistry
- Micro-rheology
- Single-molecule research
- Nanothermodynamics
- Nanoparticle sorting and analysis

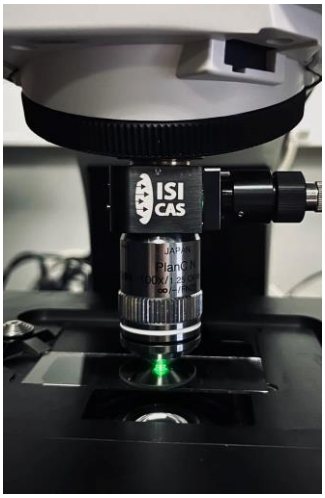
Key features

- Precise sample manipulation
- Unique design solution with small footprint (60 × 30 × 20 mm)
- Compatible with most optical microscopes
- Easy mounting and installation
- Optional compact optical tweezers with wavelengths of 355 nm, 405 nm, 532 nm, 785 nm, 808 nm, 980 nm and 1064 nm

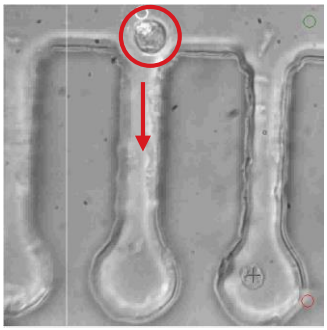
Improve your optical microscope with one of the following laser-based techniques:

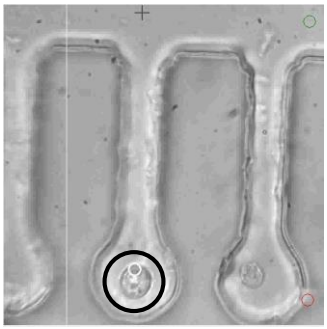
- Optical micromanipulation of micro-objects or living cells (optical tweezers)
- Micro-cutting (laser scalpel or laser scissors)
- Polymer microstructure formation using focused beam induced photopolymerization
- Advanced fluorescence microscopy techniques (e.g. FRAP – fluorescence recovery after photobleaching, FLIP - fluorescence loss in photobleaching)

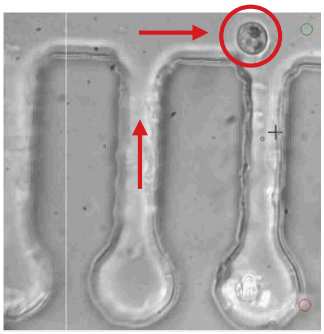




Compact optical tweezers module attached to Renishaw inVia Raman microscopy system.







Optical micromanipulation of algae cells inside of incubation microfluidic channel by developed compact optical tweezers module.