P23 – Convenient Light Microscopy Adapters for Optical Trapping, Cutting, and Excitation in Biological Experiments

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Fast development of new laser-based microscopy and micromanipulation techniques increases demands for easy-to-handle and easy-to-replace tools appropriate for routine operations. Implementing microscopy methods such as optical trapping, cutting, fluorescence excitation, photopolymerization, and most spectroscopic techniques is expensive and time consuming, because in most cases, microscope parts and frames must be adapted to insert additional lasers, detectors etc. Our idea overcomes these difficulties by inserting the source of radiation (CW or pulsed laser light of various wavelengths) directly between the microscope body and microscope objective via specially designed adapters. Laser diode source is incorporated inside one type of the adapter and it substantially increases compactness of the adapter. The second type of the adapter uses optical fiber to deliver the light from various sources of radiation into the microscope. Mechanical and optical construction of light microscopy adapters (LMA) address spatial constrains of commercially available microscopes, mainly the fact that the optical parts of microscopes are optimized for visible spectrum of light. Thus both types of LMA can be easily integrated with most types of microscopes including confocal microscope.

We prove the ability of LMA to trap optically the particles in the range of hundreds of nanometers to tens of micrometers. We have determined the stiffness of the optical trap for various microscope objectives. Using LMA we have also bleached fluorescently labeled samples (FRAP, FLIP methods) and performed microdissection experiments. Our solution preserves all microscope properties unaffected and therefore it paves the way for easy and fast utilization of the modern microscopy techniques in various types of microscopes.

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