Medical Technology | Physical sciences | Optics | Technology Offer

Device for rotation of 3D samples in microscopy or for CAD-modeling & 3D printing

Field of Application

Microscopy is a well-established and frequently used technology in research, diagnostics and industrial quality control. The present invention offers a simple and inexpensive option to investigate three-dimensional samples without changing the position of the sample vis-à-vis the microscope. The technique is equally suitable for object acquisition for CAD processing, such as for 3D printing.

State of the Art

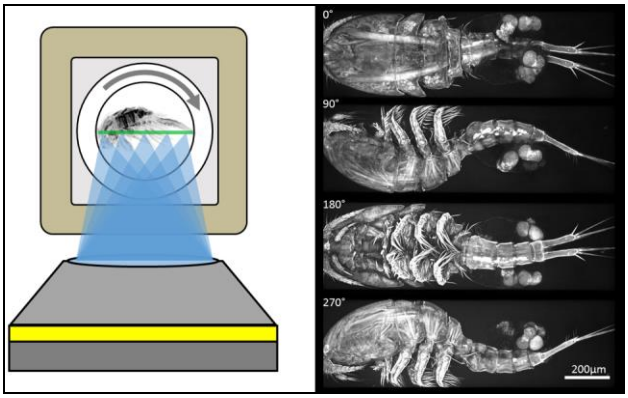
In classic microscopy imaging, the sample is placed on a glass slide and can only be observed from one side. To observe a sample from a range of perspectives, it is necessary to rotate the sample before replacing it under the microscope. This procedure often results in changes to the sample; furthermore authentic reconstruction of how the various pictures relate to each other is almost impossible.
Although there is a need to investigate three-dimensional samples using laser scanning microscopy, there are no viable approaches to sample rotation in this field. Approaches developed for single-plane illumination microscopy (SPIM) require complex and very expensive devices which cannot be used with standard microscopes.

Innovation

Scientists at Aalen University have now developed a device which allows the rotation of samples and can be used in conjunction with a range of microscopy methods, including single-plane illumination microscopy (SPIM) and laser scanning microscopy. The device allows the microscopic investigation from all sides using conventional instruments.
The three-dimensional sample is fastened in a glass capillary with a circular cross section. This capillary is then placed in a further capillary with a rectangular cross section and is optically coupled with this outer capillary. The rectangular capillary is then positioned so that the plane section is at right angle to the optical axes of illumination and detection, while a computer controlled motor is rotating the inner capillary.
This set-up prevents imaging errors and ensures that all images are taken at right angle to the longitudinal axis of the sample and in a precisely defined position. Because the sample does not change position relative to the microscope, stacks of images from different perspectives can be produced by single plane imaging, thus significantly reducing the information loss during 3D reconstruction.
The device incorporating the invention can be easily connected to a micro-fluid system and is therefore suitable for long term in vivo observations.

Advantages

- ✓ Investigation of 3D samples using conventional microscopy / scanning systems
- ✓ Can easily be integrated into conventional microscopes from a range of manufacturers
- ✓ Requires only low light intensities, thus suitable for in vivo investigations
- ✓ Minimizes information loss in 3D reconstructions
- ✓ Modular design with easy access from the outside
- ✓ Coupling with micro-fluid system or special detection systems possible



l.h.s.: schematic view of set-up
r.h.s: four rotational views of a copepod

Technology Transfer

Technologie-Lizenz-Büro GmbH is in charge of the exploitation of this technology and assists companies in obtaining licences.

Patent Portfolio

EP application is pending.

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