

Fully automated relocation of areas of interest on any automated light microscopy system

Field of application

In basic biological and medical research as well as in the pharmaceutical industry, there is a great need to combine the advantages of different microscopy systems.

The method presented here offers the first reliable solution that allows users to automatically retrieve objects when switching between systems.

State of the art

Fluorescence-based microscopy techniques have been used since the 1970s. From wide field microscopy with low resolution and high throughput to super high-resolution microscopy with very low throughput – there is a wide range of systems available on the market. Although the individual microscopy systems have become increasingly automated in recent years, the transfer of samples between the various systems proves to be difficult. This means they can only be transferred in a specific way and usually only manually.

Innovation

Scientists at the University of Heidelberg have now succeeded in developing a fully automated method for the relocation of sample substrates. It is independent of the control software and the microscopy system.

Relocalization requires two process steps, achieving accuracy in the sub- μm range.

In the first step, a high-precision reference matrix of the sample is created with the aid of reference points. This matrix provides absolute coordinates on the sample substrate, which allows the examined structures to be retrieved, independent of the unavoidable twisting of the sample substrates in the image. Accuracy in the range of $5\ \mu\text{m}$ is already achieved in this step.

Fine adjustment is then carried out using pattern recognition methods supported by image processing. The target area is identified by the shape and arrangement of the objects or markers. Correction parameters are then returned to the controller and used to approach the target area. The resolution is only limited by the pixel size of the microscope used. The automatic process can easily be integrated in existing light microscopy systems of different kinds.

Patent portfolio

An EP application is pending.

Your benefits at a glance

- ✓ Significantly simplified correlative microscopy
- ✓ Fully automated localization or relocalization
- ✓ Independent of platforms and reference objects
- ✓ Use of any reference points on any sample substrate
- ✓ Fine adjustment supported by image processing
- ✓ Broadening the range of applications of existing light microscopy systems

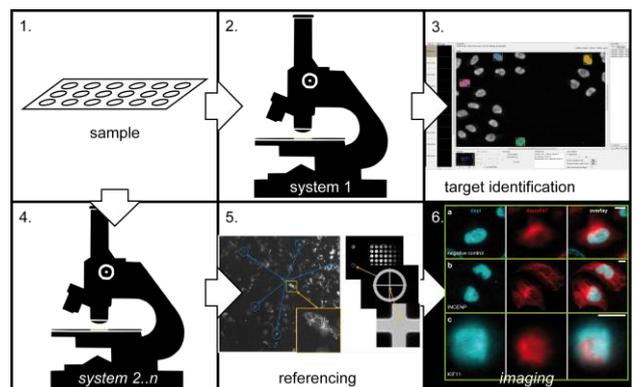


Figure: Exemplary approach: Sample preparation (1.) and imaging using the first system (2.). Identification and marking of interesting areas (3.). Transferring the sample (4.) and referencing it (5.) on another microscope. Automatic relocalization and imaging of the previously identified areas using the second system (6.).

Technology transfer

Technologie-Lizenz-Büro GmbH is responsible for the exploitation of this technology and assists companies in obtaining licenses.

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Reference number: 12/068TLB