



I+D RESULT

Patent

Knowledge area

- Health. Biomedicine
- Biology
- Materials

Collaboration

- Technology available to licensing
- Other collaborations may be considered

Ref. OTRI

201556R-Martínez Corral, M

Integral microscope, uses of it and integral microscopy system

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Background: The problem of obtaining three-dimensional (3D) images of microscopic samples is generally solved by taking numerous images after an axial scanning process, as in the case of Light-Sheet Microscope or of Structured-Illumination Microscope. An alternative to these techniques is the Digital Holographic Microscopy (DHM) which does not require performing the scanning of the sample. However, DHM only applies to the case of transparent samples under coherent illumination. More recently, the implementation of integral microscopy (iMic) (also known as plenoptic microscopy or "Lightfield" microscopy) has been proposed. The main feature of iMic is its ability to record 3D information of thick samples without requiring more than a single shot. The iMic is based on the simultaneous capture of a series of (vertical and horizontal) views of the sample. This is achieved by placing a microlens array in front of the sensor (CCD or CMOS). However, at present the images obtained by this technique show a spatial resolution that is significantly worse than the spatial resolution of standards of microscopes.

The invention: Researchers from the University of Valencia have developed a novel iMic that achieves a spatial resolution better than the one obtained with other integral microscopes. Other advantages of the invention are: a high depth of field and the possibility of implementing the microscope in very small size compared with conventional Integral microscopes. Specifically, the technology allows the manufacture of portable 3D microscopes with size of a camera.

Applications: The invention is applicable mainly in two sectors: (a) Bio-medicine, particularly for obtaining images in which the profile of the sample is of interest, or in which a depth section view is necessary; (B) Profilometry, for quality control of microelectronics and semiconductors, intra-ocular lenses and microlens testing, forensic science, etc.

Advantages: The main advantages provided by the invention are:

- Portability and connectivity, to perform screening of biological samples (potentially linked to a pathogen) or profilometry of opaque microscopic samples in environments away from a laboratory. This can be very useful, for example, for on-site detection of possible infection, or for immediate verification of possible defects in small industrial products.
- Direct and fast capture of the views of the sample. The views of 3D samples are directly obtained, without further calculations.
- Spatial resolution better than the spatial resolution obtained with other integral microscopes. It is due to the fact that the spatial resolution is not limited by the size of the microlenses.
- Applicable to the analysis of transparent samples.



Fig. 1.- Samples for analysis

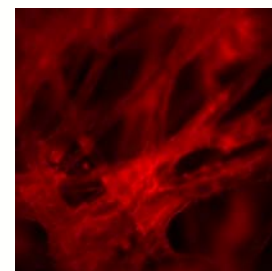


Fig. 2.- Reconstruction of the sample with the device of the invention.

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