Simple All-in-One UV Waveguide Microscope with Illumination Sectioning for Surface Morphology and Fluorescence Imaging

Tech ID: 29012 / UC Case 2017-759-0

ABSTRACT

Researchers at the University of California, Davis have developed an all-in-one microscope combining ultraviolet excitation light with a waveguide directly integrated onto a light microscope stage, capable of providing surface morphology and fluorescence information with minimal sample preparation.

FULL DESCRIPTION

Histology is an important tool in biology for visualization of plant and animal cells and tissues. Cells can be visualized with white light or polarized light to allow for visualization of fluorophores. Although both methods are effective, each mode provides detailed information that the other does not. Traditional microscopes illuminate a sample from either the top or bottom at normal incidence, which greatly limits the amount of information that can be retrieved.

Researchers at the University of California, Davis have combined ultraviolet excitation light with a plastic LED waveguide, doubling the sample mount while successfully integrating it directly onto a light microscope stage. This waveguide can be fitted onto existing microscopes and is configured so that the excitation light is launched in from the side at an oblique angle to allow for the acquisition of images. By allowing the acquisition of images, this new method provides both surface morphology and general fluorescence information without the need for specialized lasers or separate imaging modes.

APPLICATIONS

- High resolution, rapid histology
- Imaging of live plants
- Imaging of live animal cells
- Surface morphology and fluorescence all-in-one

FEATURES/BENEFITS

- Able to retrofit existing regular microscopes
- Easier switch between lenses
- Ability to use with high-NA short-working-distance lenses
- No thin-sectioning required
- Minimal sample preparation
- Tissue can be stained in the cassette and can replaced with a UV transparent window for imaging
- Uses non-total internal reelection conditions for deeper tissue imaging penetration

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INVENTORS

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OTHER INFORMATION

KEYWORDS

surface illumination, tissue, oblique incidence, side launch geometry, surface weighted, UV light imaging, side launched visible light imaging, sharp morphology, sensitive detection

CATEGORIZED AS

- **Imaging**
  - Medical
  - Molecular
  - Other
- **Medical**
  - Imaging

- Can add additional spectral ranges for increased immunofluorescence detections

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,982,622	05/14/2024	2017-759
United States Of America	Issued Patent	11,774,361	10/03/2023	2017-759
Patent Cooperation Treaty	Published Application	2018/204712	11/08/2018	2017-759

- **Research Tools**
  - Other
- **Sensors & Instrumentation**
  - Medical
  - Scientific/Research

RELATED CASES

2017-759-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- White Dwarf: Cross-Polarized White Light Slide-Free Imaging
- Tissue Imaging Technique Using Reflectance Microscopy

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