Ultra-Large Field-of-View Fluorescent Imaging Using a Flatbed Scanner

Tech ID: 24140 / UC Case 2014-055-0

SUMMARY

UCLA researchers in the Department of Electrical Engineering have developed a flatbed scanner based high-throughput fluorescent imaging system for detecting fluorescent micro-objects in optically dense media.

BACKGROUND

Fluorescence imaging is a widely used technique in life sciences and medicine with both *in vitro* and *in vivo* applications. Imaging through fluorescence typically requires a fluorescent dye that is specific to a subset of micro-objects and an imager to detect fluorescence. Fluorescent probes, tags and labeling have allowed for increased sensitivity and specificity, however, detection of these fluorescent particles have been cumbersome for analysis of micro-objects in bodily fluids. The samples often require special preparation steps in optically dense fluids such as blood, and the excitation or emission of the fluorescent particles is difficult to detect. To circumvent some of these problems, using a shallow field of view of 1 micrometer or less in combination with a fluorescent microscope has been used in the literature. However, these previous techniques are still limited in performance and costly if one were to scan volumes over 1 milliliter.

INNOVATION

Researchers at UCLA have developed a high-throughput ultra-large field-of-view fluorescent imaging system that is based on modifying a flatbed scanner to detect fluorescent micro-objects in optically dense media. This technology uses customized microfluidic channels on modified scanner design to increase the area for detection as well as to improve the speed and reduce the cost for imaging ultra-wide fields of view such as >500 cm^2.

APPLICATIONS

- Microfluidics, cytometry: rare cell research, fluorescent sample detection in optically dense fluids

ADVANTAGES

- High-throughput and wide field of view
- Fast imaging times
- Cost-effective
- Portable

STATE OF DEVELOPMENT

The fluorescent imaging system was able to detect sub-10-micrometer fluorescent particles in 2.2 milliliters of undiluted whole blood in less than 5 minutes.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9683938	06/20/2017	2014-055

CONTACT

UCLA Technology Development Group
ncd@tdg.ucla.edu
tel: 310.794.0558.

INVENTORS

- Ozcan, Aydogan

OTHER INFORMATION

KEYWORDS

fluorescent imaging, large fields-of-view fluorescent imaging, imaging in optically dense fluids, fluorescent sample detection, cytometry, microfluidics, diagnostics, microscopy

CATEGORIZED AS

- **Medical**
  - Devices
  - Research Tools

RELATED CASES

2014-055-0

RELATED MATERIALS

- Z. Gorocs, Y. Ling, M. Dai Yu, D. Karahalios, K. Mogharabi, K. Lu, Q. Wei, and A. Ozcan, "Giga-pixel fluorescent imaging over an ultra-large field-of-view using a flatbed scanner," Lab on a Chip (2013) DOI:10.1039/C3LC51005K - 09/10/2013

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Automated Semen Analysis Using Holographic Imaging
- Low-Cost And Portable Uv Holographic Microscope For High-Contrast Protein Crystal Imaging
- Extended Depth-Of-Field In Holographic Image Reconstruction Using Deep Learning-Based Auto-Focusing And Phase-Recovery
- Detection and Spatial Mapping of Mercury Contamination in Water Samples Using a Smart-Phone
- Computational Cytometer Based On Magnetically-Modulated Coherent Imaging And Deep Learning
- Lensfree Tomographic Imaging
- Single Molecule Imaging and Sizing of DNA on a Cell Phone
- Cross-Modality Deep Learning Brings Bright-Field Microscopy Contrast To Holography
- Microscopic Color Imaging And Calibration
- Quantification Of Plant Chlorophyll Content Using Google Glass
- Rapid, Portable And Cost-Effective Yeast Cell Viability And Concentration Analysis Using Lensfree On-Chip Microscopy And Machine Learning
- Holographic Opto-Fluidic Microscopy
- Design Of Task-Specific Optical Systems Using Broadband Diffractive Neural Networks
- Revolutionizing Micro-Array Technologies: A Microscopy Method and System Incorporating Nanofeatures
- Tunable Vapor-Condensed Nano-Lenses

UCLA Technology Development Group
10889 Wilshire Blvd., Suite 920,Los Angeles,CA 90095
tdg.ucla.edu
Tel: 310.794.0558 | Fax: 310.794.0638 | ncd@tdg.ucla.edu