Revolutionizing Micro-Array Technologies: A Microscopy Method and System Incorporating Nanofeatures

Tech ID: 27531 / UC Case 2009-454-0

SUMMARY

UCLA researchers in the Department of Electrical Engineering have developed a novel lensfree incoherent holographic microscope using a plasmonic aperture.

BACKGROUND

Lensfree imaging has gained interest due to the potential to eliminate bulky optical components and to develop on-chip microscope systems, which would be beneficial for microfluidic systems used in medical diagnostics and cytometry applications. A lightweight and compact, lensfree-imaging modality would also be a cheaper alternative to conventional lens-based microscopy, especially for telemedicine applications. Current imaging modalities that are compact, cost-effective, and easy to use either have poor performance or low resolution, limiting their practical use.

INNOVATION

Researchers led by Professor Aydogan Ozcan have invented a novel lensless incoherent holographic microscope with a resolution of ~500 nm over a field of view (FOV) of ~5 mm^2 and can achieve subcellular resolution over a large FOV of 24 mm^2. This compact and lightweight microscope does not require any lenses, lasers, or other bulky optical and mechanical components and instead, utilizes a simple light emitting diode and a compact optoelectronic sensor-array.

APPLICATIONS

- On-chip microscopy
- Medical diagnostics
- Cytometry
- Telemedicine applications involving global health problems (i.e. malaria, TB, and HIV)

ADVANTAGES

- Minimally trained personnel to operate
- Subcellular resolution with large FOV
- Compact, cheap, and lightweight
- Lensfree holographic imaging
- Does not need lenses, lasers, or bulky components

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,202,835	12/01/2015	2009-454

RELATED MATERIALS

- B. Khademhosseinieh, I. Sencan, G. Biener, T. W. Su, A. F. Coskun, D. Tseng, and A. Ozcan. Lensfree On-Chip Imaging using Nanostructured Surfaces. Appl. Phys. Lett. 2010.
- O. Mudanyali, D. Tseng, C. Oh, S. O. Isikman, I. Sencan, W. Bishara, C. Oztoprak, S. Seo, B. Khademhosseini, and A. Ozcan. Compact, Light-Weight and Cost-Effective Microscope based on Lensless Incoherent Holography for Telemedicine Applications. Lab Chip. 2010.

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INVENTORS

- Ozcan, Aydogan

OTHER INFORMATION

KEYWORDS

Lensfree, incoherent, holographic, lensless microscope, holographic microscope, nanosurface, plasmonics, medical diagnostics, cytometry, on-chip microscope

CATEGORIZED AS

- **Optics and Photonics**
  - All Optics and Photonics
- **Engineering**
  - Engineering
  - Other
- **Imaging**
  - Medical
  - Other
- **Materials & Chemicals**
  - Nanomaterials
- **Medical**
  - Imaging
- **Nanotechnology**
  - Tools and Devices

RELATED CASES

2009-454-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Automated Semen Analysis Using Holographic 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
- Ultra-Large Field-of-View Fluorescent Imaging Using a Flatbed Scanner
- Tunable Vapor-Condensed Nano-Lenses

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