

## 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<sup>2</sup> and can achieve subcellular resolution over a large FOV of 24 mm<sup>2</sup>. 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. Khademhosseini, 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.

### CONTACT

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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
- ▶ Holographic Opto-Fluidic Microscopy
- ▶ Design Of Task-Specific Optical Systems Using Broadband Diffractive Neural Networks
- ▶ Tunable Vapor-Condensed Nano-Lenses

## Gateway to Innovation, Research and Entrepreneurship

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