

## Tunable Vapor-Condensed Nano-Lenses

Tech ID: 24964 / UC Case 2014-784-0

### SUMMARY

UCLA researchers in the Department of Electrical Engineering have developed an improved and cost-efficient nanolens to visualize nanoparticles and viral particles with 50 fold greater detection and more than 10 fold field-of-view compared to other imaging modalities.

### BACKGROUND

Various methods exist to fabricate micro-scale lenses to image very small particles. Current forms of nanolenses, however, have limited resolution and sensitivity. Furthermore, imaging particles of a particular shape (i.e rod-shaped particles) may be problematic. The problem is further amplified when the particles are at a low concentration, making the capture of "rare events" unlikely.

### INNOVATION

Dr. Ozcan's Lab in the Department of Electrical Engineering has showed that by exposing nanoparticles attached on a coverslip to polyethylene glycol (PEG) vapors, a thin film of PEG condenses over the particle samples, generating a meniscus and thus forming a nanolens. This nanolens is then placed in a lens-free holographic on-chip microscope for image generation. The method applied by Dr. Ozcan's Lab allows for greater control of parameters (i.e. temperature) during lens fabrication.

### APPLICATIONS

- ▶ This invention can be used as an imaging technique/tool to visualize both nanoparticles as well as viral particles, and can also be used as a viral load measurement tool
- ▶ The technique is particularly useful in imaging low concentration particles and viruses

### ADVANTAGES

- ▶ Higher signal-to-noise ratio and increase field-of-view compared to other lenses
- ▶ Imaging modality (a lens-free holographic on-chip microscope) is more cost-effective than conventional microscopy
- ▶ A wide range of nanoparticles (various materials and shape) as well as modifications can be used

### STATE OF DEVELOPMENT

The newly fabricated nanolenses has been successfully used to image both spherical and rod-shaped nanoparticles with greater sensitivity (~50 folds) and greater field-of-view (~10 folds) compared to standard methods. Furthermore, the lens is compatible with various nanomaterials and chemical modifications.

### PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,088,663	10/02/2018	2014-784

### RELATED MATERIALS

### CONTACT

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### INVENTORS

- ▶ Ozcan, Aydogan

### OTHER INFORMATION

#### KEYWORDS

nanoparticles, viruses, viral load measurements, nano imaging, visualization, improved resolution, lenses, microscope, nanolenses, nanoimaging, lens-free microscopy, on-chip imaging, self-assembly, wide-field microscopy

#### CATEGORIZED AS

- ▶ **Biotechnology**
  - ▶ Industrial/ Energy
- ▶ **Imaging**
  - ▶ Molecular
- ▶ **Materials & Chemicals**
  - ▶ Thin Films
- ▶ **Nanotechnology**
  - ▶ Other
  - ▶ Tools and Devices

#### RELATED CASES

2014-784-0

▶ Euan McLeod, Chau Nguyen, Patrick Huang, Wei Luo, Muhammed Veli, and Aydogan Ozcan. Tunable Vapor-Condensed Nanolenses.

ACS Nano. 2014

#### 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
- ▶ Ultra-Large Field-of-View Fluorescent Imaging Using a Flatbed Scanner
- ▶ Revolutionizing Micro-Array Technologies: A Microscopy Method and System Incorporating Nanofeatures

## Gateway to Innovation, Research and Entrepreneurship

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