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 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

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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

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