

Label-Free Digital Bright Field Analysis of DNA Amplification

Tech ID: 29417 / UC Case 2017-99A-0

SUMMARY

UCLA researchers in the department of Bioengineering have developed a novel method for quantitative analysis of DNA amplification products.

BACKGROUND

The market for DNA-based infectious disease diagnostics is projected to rise to over \$1.5 billion by 2021. While PCR is the industry standard for DNA amplification, novel and simple techniques have been developed such as loop-mediated isothermal amplification (LAMP), among others. Standard technologies then use fluorescent dyes to detect the presence of DNA, but these often suffer from low thermal and light stability, and may interfere with the amplification reaction. Improved DNA detection mechanisms, in combination with these previously-described amplification techniques, would offer significant advances in DNA detection technology.

INNOVATION

UCLA researchers have developed a novel method of analyzing DNA amplification products bright-field microscopy. To analyze, loop-mediated isothermal amplification (LAMP) is carried out within droplets. After amplification, DNA and other salts form a precipitate within the droplet, which can be observed by conventional microscopy or cellphone camera. Images are then processed and the original DNA concentration calculated. No sequence-specific or intercalating probes are required, and no additional processing is required apart from LAMP.

APPLICATIONS

- ▶ Quantification of amplified DNA
- ▶ Disease diagnostics

ADVANTAGES

- ▶ Requires only nanoliters of material
- ▶ Can be imaged using conventional microscope or cell phone camera
- ▶ No fluorescent microscopy required
- ▶ 0.23 fM limit of detection
- ▶ Sensitivity >95% and specificity >98%

STATE OF DEVELOPMENT

The technique has been demonstrated and validated on a set of <17,000 images, with high sensitivity and specificity.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,450,121	09/20/2022	2017-99A

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ Integrated Isolation, Emulsification, And Single-Cell Assay
- ▶ Enhanced Fluorescence Readout And Reduced Inhibition For Nucleic Acid Amplification Tests
- ▶ Robust, Ultra-Flexible, Micro-Encoded Ferromagnetic Tape for Bioseparation and Assembly

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INVENTORS

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OTHER INFORMATION

KEYWORDS

microfluidics, DNA amplification, DNA diagnostics, infectious disease

CATEGORIZED AS

- ▶ **Biotechnology**
 - ▶ Health
- ▶ **Imaging**
 - ▶ Medical
- ▶ **Medical**
 - ▶ Diagnostics
 - ▶ Disease: Infectious Diseases
- ▶ **Nanotechnology**
 - ▶ NanoBio
- ▶ **Sensors & Instrumentation**
 - ▶ Analytical

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