

On-Chip Platform for Single-Molecule Electrical Conductance Measurements

Tech ID: 24934 / UC Case 2015-066-0

ABSTRACT

Researchers at the University of California, Davis have developed a microchip capable of detecting bacteria and viruses that cause plant and human diseases.

FULL DESCRIPTION

Existing methods of detecting and identifying microorganisms such as bacteria, viruses, and fungi rely on data obtained from DNA sequencing. While reliable, these methods are costly and time consuming. Newer techniques, such as the "break-junction" approach, have been developed to extract the same data from RNA as from DNA because RNA is considerably more abundant in cells and many viruses important to human and plant health use RNA to store genetic information. This approach requires large, expensive specialty tools and significant resources, making such instrumentation impractical for general commercial use.

Researchers at the University of California, Davis have developed a micro-electromechanical system (MEMS) that is capable of identifying microbial species. This device functions by detecting specific RNA sequences using electrical conductance measurements. This novel device would provide a quick, easy, and cost-effective method to detect infectious viruses and bacteria in plants and animals.

APPLICATIONS

- ▶ Electrical detection of genetic information (RNA) at the molecular level
- ▶ Detection and identification of bacteria and viruses in agriculture, medicine, epidemiology, biosecurity and public health
- ▶ Integration with electronics for field-deployable and high-throughput devices

FEATURES/BENEFITS

- ▶ Portable
- ▶ Precise and highly sensitive
- ▶ Does not use fluorescent markers
- ▶ Removes the need for enzymatic amplification (PCR)
- ▶ Identification of specific species and strains
- ▶ Amenable to multiplexing and facile integration

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,828,745	11/28/2023	2015-066
United States Of America	Issued Patent	10,989,705	04/27/2021	2015-066

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OTHER INFORMATION

KEYWORDS

microorganisms, qPCR,
 DNA, RNA, sequencing,
 bacteria, viruses, fungi,
 break-junction, micro-
 electromechanical system

CATEGORIZED AS

- ▶ **Biotechnology**
 - ▶ Bioinformatics
 - ▶ Health
 - ▶ Proteomics
- ▶ **Medical**
 - ▶ Devices
 - ▶ Diagnostics
 - ▶ Research Tools
 - ▶ Screening

RELATED CASES

2015-066-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ Portable Heart Motion Monitor
- ▶ Using Contact Doppler Radar to Monitor PA Pressure in Heart Failure Patients
- ▶ A Combined Raman/Single-Molecule Junction System For Chemical/Biological Analysis
- ▶ Absorptive Microwave Bandpass Filters
- ▶ Field Effect Bipolar Transistor
- ▶ Quarter-Rate Serial Link Receiver with Low Aperture Delay Samplers for High Data Rate Applications
- ▶ Rapid and Sensitive Detection of Microbial RNA directly from Blood Samples by Electrical Biosensors
- ▶ A Novel High-Qu Octave-Tunable Resonator And Filter With Lumped Tuning Elements
- ▶ Broadband Light Emission with Hyperbolic Material
- ▶ DNA-based, Read-Only Memory (ROM) for Data Storage Applications
- ▶ Hybrid Electromechanical Metamaterials for Optical and Electrical Devices
- ▶ RNA-based, Amplification-free, Microbial Identification using Nano-Enabled Electronic Detection

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