DNA-based, Read-Only Memory (ROM) for Data Storage Applications

Tech ID: 32410 / UC Case 2018-772-0

ABSTRACT

Researchers at the University of California, Davis have collaborated with colleagues at the University of Washington and Emory University to develop a DNA-based, memory and data storage technology that integrates seamlessly with semiconductor-based technologies and conventional electronic devices.

FULL DESCRIPTION

Continuous advances in technologies – driven by Moore's Law - have allowed electronic devices and their associated memory systems to become both smaller and more powerful for decades. However, current data storage and other memory technologies consume significant amounts of power. In addition, internal heat dissipation and other constraints may limit further advances in memory storage – while demands for increased data storage and retrieval capabilities continue to explode globally.

Approaches for developing "next-generation" data storage and memory options have included analyzing biological systems – both at the cellular level and by studying complex biological systems. The goal is to develop memory technologies that are low-cost, reliable, high-density, stable and consume less energy. Ideally, this technology could also be quickly written to, read from or erased - and not degrade over time.

Researchers at UC Davis, the University of Washington and Emory University have developed a memory technology that applies DNA bases to encode information directly. The researchers have demonstrated the capability to create DNA-based, read-only memory (ROM) that is programmable and can interface seamlessly with current electronic devices. The technology applies the self-assembly and electrical conductance properties of DNA to create crosswire (X-wire) nanostructures that simulate the "ones and zeroes" that currently form the basis for electronic storage of digital information. The resulting memory system is extremely stable over time, offers high-density storage capabilities and has the potential for extremely low-cost fabrication.

APPLICATIONS

- Data storage and memory technology

FEATURES/BENEFITS

- Higher memory density
- Long-life storage
- Seamless integration with conventional electronic devices
- Low-cost fabrication

PATENT STATUS

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OTHER INFORMATION

KEYWORDS

Data Storage, DNA-Based Information Storage, Read-only Memory (ROM), Synthetic Biology, DNA-based Applications

CATEGORIZED AS

- **Biotechnology**
  - Other
- **Computer**
  - Other
- **Engineering**
  - Engineering
- **Materials & Chemicals**
  - Biological
  - Nanomaterials
- **Nanotechnology**
  - Electronics
  - NanoBio

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,943,940	03/26/2024	2018-772

RELATED CASES

2018-772-0

RELATED MATERIALS

- Nucleic acid-based electrically readable, read-only memory Patent Application

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- On-Chip Platform for Single-Molecule Electrical Conductance Measurements
- A Combined Raman/Single-Molecule Junction System For Chemical/Biological Analysis
- Rapid and Sensitive Detection of Microbial RNA directly from Blood Samples by Electrical Biosensors
- Broadband Light Emission with Hyperbolic Material
- Hybrid Electromechanical Metamaterials for Optical and Electrical Devices
- RNA-based, Amplification-free, Microbial Identification using Nano-Enabled Electronic Detection

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