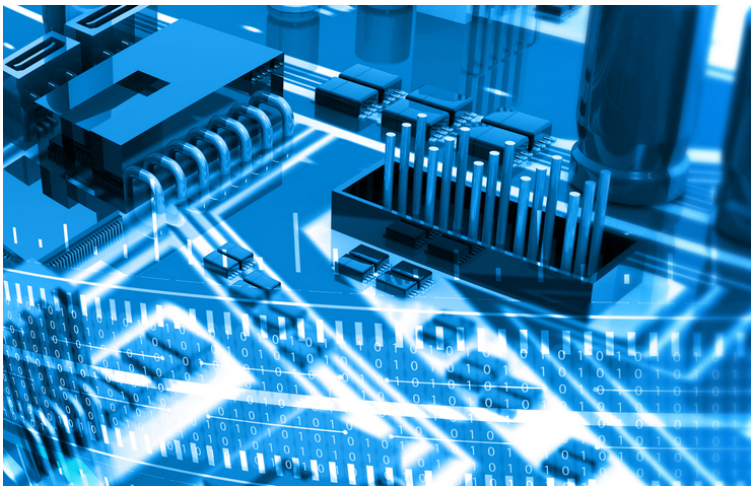
INNOVATION PARTNERSHIPS
UNIVERSITY OF MICHIGAN

Nanoscale Metal Oxide Resistive Switching Element

TECHNOLOGY NUMBER: 4707



Technology ID
4707

Category
Hardware
Engineering & Physical Sciences
Semiconductor, MEMS, and Electronics

Inventor
Sung Hyun Jo
Wei Darren Lu

Further information
Joohee Kim
jooheek@umich.edu

View online

OVERVIEW

Nanoscale resistive memory with analog memory effects using tungsten oxide

- Enhances flexibility and decreases fabrication temperature
- Data storage, CMOS integrated circuits, low-power memory devices

BACKGROUND

Various materials and mechanisms, such as phase-change materials and silicon dioxide, have been tested for nonvolatile data storage. These traditional approaches often faced challenges including high power consumption, complex fabrication processes, and limited scalability. With the growing demand for efficient, reliable, and scalable memory solutions for modern electronics, there is a need to explore new materials and methods. Tungsten oxide has emerged as a promising candidate due to its modifiable conductivity and unique electronic properties, coupled with its compatibility with low-temperature processes. By leveraging these properties, the development of more efficient and versatile memory devices becomes feasible.

INNOVATION

Researchers at the University of Michigan have developed resistive memory devices, exhibiting both analog and digital memory effects using tungsten oxide as the switching layer. This new

memory leverages the modifiable conductivity of tungsten oxide, which can be precisely controlled through the density of oxygen vacancies. Unlike previous technologies, this approach does not require specific top electrodes such as silver or copper, allowing greater flexibility in the fabrication process. Additionally, all fabrication processes employed are low-temperature, making it suitable for integration with current CMOS technology. Applications include data storage systems, advanced CMOS integrated circuits, and low-power consumption memory devices. The capability to achieve both rectifying and non-rectifying behaviors also makes it a versatile solution for various next-generation electronic applications.

ADDITIONAL INFORMATION

INTELLECTUAL PROPERTY:

US9508425 "Nanoscale metal oxide resistive switching element"