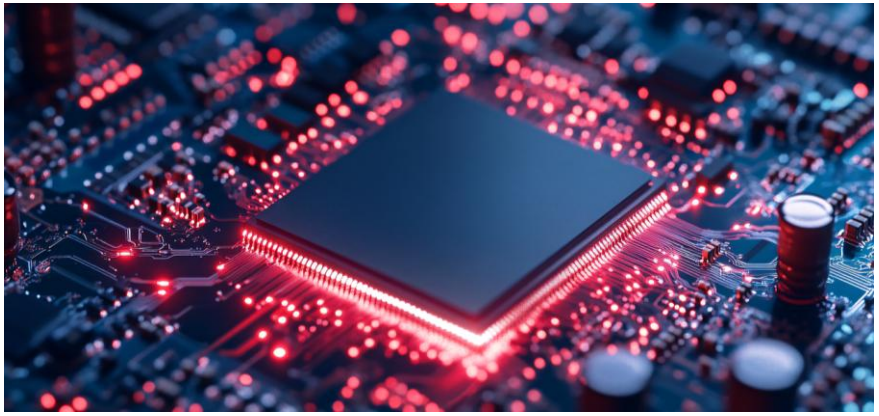
Technology Offer CSIC/AI/007

High- efficiency semiconductor memristor



An electronic component that alternates between as a resistor and a diode, retaining memory of its state without energy consumption. This technology enables the creation of faster and more efficient neuromorphic computing systems.

Intellectual Property

Priority patent application.

Stage of development

It is currently undergoing laboratory validation.

Intended Collaboration

Licensing and/or co-development

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Market need

The electronics and computing industry requires electronic components that intrinsically integrate both processing and memory, thereby overcoming the limitations of current transistors. These latter devices lack state memory and exhibit limited energy efficiency, particularly for advanced artificial intelligence applications.

There is a need for devices capable of cyclically switching between conduction states in a stable manner while maintaining low power consumption.

Proposed solution

This technology functions as a resistor with memory. Its unique structure ,made from special semiconductor materials with three energy bands, allows it to reversibly switch between a high-conductance state (like a resistor) and a low-conductance state (like a diode).

Its operation as a memristor has been experimentally proven, as well as its capacity to function as a photovoltaic solar cell. Other potential applications include its use in advanced sensors and power electronics, taking advantage of its robustness against high voltages.

Competitive advantages

- Increased spped thanks to purely electronic switching.
- Reduced energy consumption, with no ion movement required.
- High stability and long lifetime, as no degradation occurs.
- Dual funcionality proven as both a memristor and a solar cell.
- Capable of operating under high voltages without sustaining damage.