



## Memristors: New Innovation Trends in Future of Electronics

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### ABSTRACT

The Memristor is a fourth basic circuit element that is a short form of memory-resistor. However, it is radically different from the other fundamental circuit elements where it has the ability to remember its past state history even when the current is turned off. With its inherent nonvolatile property, it has drawn wide attention in the international research community of electronic and computer engineers and physicists, which opens up new horizons to future applications with a new design trends. Where, it is becoming a very promising candidate in the future of electronic design for many applications, such as, nonvolatile VLSI memories, logic and analog electronics, neuromorphic electronics, and cellular neural networks.

This presentation starts with memristors theoretical concepts: a definition of the memristors, its mathematical representation in circuits, I-V characteristics and their different physical behaviors. Then it provides the different implementation and fabrication materials. Furthermore, it investigates the recent trends and main challenges of memristors modeling and optional applications. Finally, fields of further research are outlined.

### • Conclusion:

- After reviewing of many literatures about Memristors, it is found that the most of them concluded the following:
- Memristor has the capability to follow Moore's Law and provides the gap to miniaturizing the physical limit currently being approached upon by transistor technology.
- Memristors has the ability to combine with traditional circuit-design elements to redesigning certain types of circuits to obtain the same function with fewer components, making the circuit itself less expensive and significantly decreasing its power consumption.
- Memristor open door to a wide area of research in the field of computer hardware and memory storage devices that has much higher data density.