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Editorial: Advances in memristor and memristor-based applications

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Editorial on the Research Topic

[Advances in memristor and memristor-based applications](#)

This is my first editorial as Editor of Frontiers in Physics. I am honoured to be given this opportunity and I am looking forward to working with the Frontiers in Physics more in the future. Thank you very much to my collaborator, Professor Shaobo and Professor Chunlai Li. They have made a remarkable contribution to this Research Topic, *Advances in Memristor and Memristor-Based Applications*.

As we all know, in the past two and a half years, COVID-19 has seriously affected the development of scientific research in all aspects. However, there are still a number of scientists who overcome all difficulties and continue to work at the forefront of scientific research, their work ensures that considerable progress has been made in the study of Memristors and Memristor-Based Applications.

The memristor is an electronic component that has a memory effect on the amount of charge passing through it, and it is used in many fields. The characteristics of small size, low energy consumption and non-volatility make memristors efficient for information storage. It can be used in storage and computing fusion design, artificial intelligence and neural networks. Thus, it is very important to construct memristors and explore research in related fields for electronic information and intelligent science. And in-depth research on the memristor, meminductor and memcapacitor have been proposed, which not only improve the circuit theory, but also provide more application directions for memory elements.

Research on memristors has always been a hot issue. With the gradual deepening of research, memristor theory has become an interdisciplinary subject related to materials, physics and electronic information. Therefore, the research progress related to memristors has gradually accelerated, and a large number of valuable results have been obtained. However, there are still some problems and difficulties when disciplines cross. Therefore, we organize this Research Topic to discuss new situations and new challenges in memristors and applications based on memristors in the hope of showing some interesting research results.

In this Research Topic, 13 articles were published, these articles have been carefully reviewed and are related to memristors. Such as.

- 1) *The Simplest Memristor Circuit With Hyperchaos*
- 2) *Parameter Identification for Memristive Chaotic System Using Modified Sparrow Search Algorithm*
- 3) *A Chaotic System With Infinite Attractors Based on Memristor*
- 4) *A New Four-Dimensional Chaotic System and its Circuit Implementation*
- 5) *Dynamical Analysis of Two-Dimensional Memristor Cosine Map*
- 6) *Design of Grid Multi-Wing Chaotic Attractors Based on Fractional-Order Differential Systems*
- 7) *Coexistence of Multiple Attractors in a Novel Simple Jerk Chaotic Circuit With CFOAs Implementation*

These seven papers are based on memristor chaotic system design, fractional chaotic system design, system hardware implementation and parameter identification. The research of these articles is very distinctive and innovative, which provides new ideas and methods for the design and characteristic research of memristor chaotic system.

Some articles such as.

- 1) *A Novel 3D Image Encryption Based on the Chaotic System and RNA Crossover and Mutation*
- 2) *A Chaos-Based Image Encryption Scheme Using the Hamming Distance and DNA Sequence Operation*
- 3) *Multi-Image Encryption Algorithm for 2D and 3D Images Based on Chaotic System*
- 4) *A Novel Image Encryption Scheme Based on Memristive Chaotic System and Combining Bidirectional Bit-level Cyclic Shift and Dynamic DNA-level Diffusion*

These four papers focus on the application of memristor chaotic systems in secure communication, mainly in the field of image encryption. This is a research hotspot at the present stage, and the encryption algorithms proposed in these papers have good security and good application prospects.

Other papers such as.

- 1) *Detecting Boosting Weak Signal via A Meminductive Multistable Chaotic System*
- 2) *Classifying Beers With Memristor Neural Network Algorithm in a Portable Electronic Nose System*

These two papers apply memristor to signal detection and neural networks respectively, which are very novel. The application field of memristor is expanded.

Finally, I'm appealing to researchers and readers to support *Frontiers in physics*. Please consider submitting your best research to *Frontiers in physics*.

Thanks to all the staff of *Frontiers in Physics*, editors and reviewers.

Author contributions

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