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A bioinspired flexible neuromorphic device with a physically transient behavior

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Synaptic devices and neuromorphic systems as a critical fundamental of data storage, are aimed to emulate the human brain's functionality by facilitating massive neural-network parallelism. Here we suggest an implementation of a renewable material as an essential building block of a nanoelectronic device. We investigated a flexible and transparent synaptic device based on a biomolecule for emerging neuromorphic technology. The flexible synaptic device with a simple MIM structure, which indicates reliable neuromorphic functionality, is totally transparent. An easy and inexpensive solution process has been applied to device fabrication on a flexible substrate under ambient condition. The biomemristor based artificial synapse exhibits reliable memristor characteristics with promising neuromorphic applications. The proposed synaptic device has a good potential to be a physically transient due to water-soluble electrodes and biomaterial as a naturally abundant polymer. The electrical measurement results confirm the feasibility of using bioneuristor to emulate memory transitions for synaptic systems. This study is a fundamental leap toward realizing a flexible, bendable and completely disposable bioinspired neuromorphic systems.

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