

Learning mechanisms in memristor networks based on GaN nanomembranes

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Abstract

We demonstrate experimentally that single crystalline GaN nanomembranes arranged in simple networks exhibit learning mechanisms such as habituation and dishabituation followed by storage of the response to a certain electrical stimulus. These artificial learning mechanisms are analogous to non-associative learning processes which are identical in simple animals and human beings. We found that the learning time depends on the number of GaN membranes in parallel, and this parameter decreases by 30% when three memristors are connected in parallel compared to the learning time of a single memristor. Moreover, an increased number of parallel memristors reduces the eventual asymmetry in the temporal response of the circuit at positive and negative step voltages.

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