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Emulation with Organic Memristive Devices of Impairment of LTP Mechanism in Neurodegenerative Disease Pathology

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Abstract

© 2017 Silvia Battistoni et al. We explore and demonstrate the extension of the synapse-mimicking properties of memristive devices to a dysfunctional synapse as it occurs in the Alzheimer's disease (AD) pathology. The ability of memristive devices to reproduce synapse properties such as LTP, LTD, and STDP has been already widely demonstrated, and moreover, they were used for developing artificial neuron networks (perceptrons) able to simulate the information transmission in a cell network. However, a major progress would be to extend the common sense of neuromorphic device even to the case of dysfunction of natural synapses. Can memristors efficiently simulate them? We provide here evidences of the ability of emulating the dysfunctional synaptic behavior typical of the AD pathology with organic memristive devices considering the effect of the disease not only on a single synapse but also in the case of a neural network, composed by numerous synapses.

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