

The joint research group of Moscow State University named after M.V. Lomonosov and NIC “Kurchatov Institute” has achieved a significant improvement in the characteristics of memristors – promising elements for neuromorphic computing systems. These devices simulate the work of biological neurons and can become the basis for computers of the future.

Scientists have used the method of controlled defect formation by irradiation of alpha particles. The impact on the structure of membrane has led to an increase in the number of stable resistive conditions by almost three times. The ratio of resistance in high -resistance and low -ox state has grown more than doubled.

An important result was an increase in the reliability of devices. The number of switching cycles increased one and a half times compared to conventional samples. The irradiation caused the formation of controlled defects in a layer of titanium oxide, which contributed to the formation of stable conductive channels.

These achievements are especially significant for the development of neuromorphic systems that imitate the functioning of the human brain. The more stable states the membrane can store, the higher its plasticity is the ability to teach, similar to synaptic plasticity of neurons.

The study was carried out as part of the activity of the interdisciplinary scientific and educational school of Moscow State University “Photon and Quantum Technologies. Digital medicine. “