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METHODOLOGY FOR THE FORMATION OF ANN's ELEMENTS

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Elaboration of two main Artificial Neural Networks elements – nonlinear switch (neuron) and linear connecting element (synapse) is based on layered hybrid structures [1].

The relevance of this construction was determined by the development of technological capabilities and the convenience of varying the characteristics of transitions on the other. The formation of a planar Josephson Junction is based on the formation of a multilayer superconducting heterostructure, in the simplest cases consisting of three functional layers.

In fact, the required characteristics of the Josephson transition are laid down during the formation of a superconducting heterostructure. The intermediate layer or interlayer enclosed between two layers of a superconductor completely determines the mechanism of current transport and, accordingly, the characteristics of the Josephson Junction [2].

The most convenient method of forming a superconducting heterostructure is the method of magnetron sputtering of materials. This method, in the presence of several magnetrons in a vacuum installation, makes it possible to form a superconducting heterostructure in a single vacuum cycle, which completely eliminates the introduction of additional contaminants at the interface of the layers. The magnetron sputtering method is characterized by a relatively low energy of the process, which practically eliminates mutual diffusion, especially of refractory materials, at the interface of layers and provides atomic sharpness of the boundaries during the formation of a superconducting heterostructure.

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SUPERCONDUCTING PROPERTIES OF NANOSTRUCTURES SUPERCONDUCTOR/FERROMAGNET

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An original vacuum technology for reliable and reproducible preparation of high quality nanostructures "superconductor/ferromagnet" (S/F) using magnetron sputtering is developed.

Superconducting properties of Nb/Ni bilayers prepared by on atomic smooth glass subtrates are investigated. The quality of the films was characterized by small-angle X-ray diffraction analysis(XRD Θ-2Θ). The thickness of the layers was determined by the Rutherford backscattering spectrometry (RBS). For specimens with constant Nb layer thickness we observed distinct oscillations of the superconducting critical temperature upon increasing the thickness of the Ni layer. The results are interpreted in terms of Fulde-Ferrell-Larkin-Ovchinnikov (FFLO) like inhomogeneous superconducting pairing in the ferromagnetic Ni Layer.

The obtained results can be used for superconducting electronics and spintronics.

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