ABSTRACT

Master's thesis: 82pages, 17 figures, 4 tables, 35 sources.

The object of study – diffusion of elements of thin-film tunnel structures.

Purpose – to develop methodology for evaluating the diffusion coefficient, the implementation of which requires considerable time and expenses, is quite simple and safe.

Methods: Electron-beam deposition, modified volt-ammeter method, metallography.

Scientific novelty of the results study the technique of diffusion characteristics of MTJ structures and tested on Fe/MgO/Fe sample.

The practical significance of the results, the technique can be used for the estimation of diffusion coefficients of tunnel junction elements.

Application: nanoelectronics, spintronics.

As nanotechnology each year becomes more popular and nanofilms are used in nearly every field, study of the properties and characteristics of nanoscale systems is an urgent task. Magnetic tunnel structures and their diffusion characteristics are no exception. Despite all the diffusion methods, scientists do not stop searching for method, that is more accurate, faster and easier to implement.

Studied literature related with nanofilms, namely features of magnetic tunnel junction and methods of diffusion studies in thin films. The method of evaluetion of diffusion coefficient of conductive element in insulator by the change of conductivity was obtained. To test this methodology installation for obtaining the current-voltage characteristics of magnetic tunnel structures was constructed. Methodology was approbated by defining diffusion coefficients of iron in MgO and oxygen in iron.

The work was done under the theme science №: Ш-3-12 "Physical phenomena in solids accompanying the unsteady mass transfer with a pulsed exposure." State registration number 0112U002229 that was carried out by order of the Bureau VFA NAS of Ukraine from September 20, 2011 №6.

MAGNETIC TUNNEL JUNCTION, NANOFILM, IRON, MAGNESIUM OXIDE, DIFFUSION COEFFICIENT, TUNNELING CURRENT.