Models Defect in GaAs with Multicharge Implantation.

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Abstract - **In this paper the models defect in GaAs with multicharge implantation are given.**

Keywords - **multicharge implantation, cluster**, **pores, cracks, dislocation.**

I. INTRODUCTION

Formed during implantation of radiation structural defects play an important role in the formation of doped layers in submicron technology big integrated schemes (BIS).

II. RESULTS

Defect in GaAs can be seen in the same position as in silicon. However, taking into account a more complex composition and structure of gallium arsenide, is not difficult to imagine significant complication mechanisms of formation of defects, their transformation and annealing process of implantation and subsequent annealing. If silicon these mechanisms are sufficiently studied, the general theory of radiation defects in GaAs today is still far from end and sometimes inconsistent character. Because radiation defects strongly affect the electrical properties, ion-doped layers of GaAs, respectively, and then we will consider models of their formation and growth.

As a result of implantation round a track of everyone enter ion forming region with strongly deformed crystal structure, which is called cluster defects. By modern presentation of clusters containing as simple defects such betweenknots and vacancies and their clusters and conglomerates mikroem-ptiness betweenknots. The difference in electrical properties of GaAs between disabilities and untouched areas of pronounced than in silicon.

In heavy-ion implantation defect clusters are amorphous phase of embryo development which leads to a dose amorphous to the formation of near-surface amorphous layer. That multiple implantation, result in reduced energy and dose of such amorphous layer decreases in the case of light ion implantation of transition in amorphous GaAs is happening when you reach a certain critical concentration of some defects. The minimum energy density required to transfer gallium arsenide in amorphous state, is $5 \cdot 10^{16} sm^{-2}$, the high concentration of structural defects can be a barrier for complete cristalization amorphouslayer temperature annealing to 773 K. In Fig. 1 presents the dependence of dose amorphous. Dame GaAs at 300 K of ion mass M. At doses close to the dose amorphous, its surface changes its optical properties and is colored with milk. It is important to note that at temperatures greater than 723 K amorphous GaAs layer does not occur even for large multiple doses. Dose amorphous also decreases with increasing ion flux density using the multiple ion/

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Ion implantation of large doses reduces the amount of GaAs in amorphous region and, consequently, increases its density. This may have great mechanical strain on the verge of distribution amorphous layer - boule. Even when larger doses of ions $5 \cdot 10^{16} sm^{-2}$ begins intense destruction of the surface: the formation of pores, cracks, dislocation.

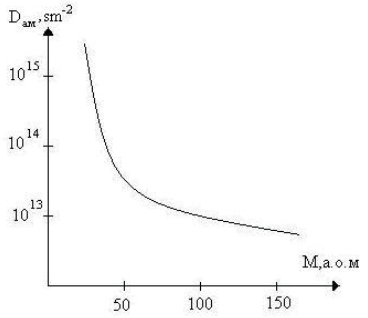

Figure. 1. Dose dependence of mass amorphous GaAs implanted ions

In the technology of ion implantation BIS structures in GaAs is the most locally through the windows in the masking layer (SiO_2, Si_3N_4, photoresist). If there is a very strong difference in properties of irradiated and not irradiated areas. Bombing of the surface of GaAs leads to intense evaporation of arsenic in the irradiated area and, as a conclusion to the formation of nonequilibrium vacancies in the substrate As. In a large glut of jobs listed may form stable clusters, which are converted to deployment. When implanted under local masking surface defects radiation can penetrate distance of more than 1 micron, even when the implanted ion mileage does not exceed 0.1 microns. This suggests the need for incorporation process defect in GaAs technology in developing local doping structures of submicron size.

Unlike silicon recrystallization of amorphous GaAs does not hold to a high degree of electrical activity of impurities. Therefore, to achieve high activation required higher annealing temperature 873 K. Amorphous GaAs epitaxial recrystallization accompanied by formation of large numbers of twins, defects in packaging and deployment.

CONCLUSION

In these studies we used the results of multicharge implantation in silicon structures submicronic big integrated schemes.

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