

# Degradation of Light-Emitting Diodes on the Basis of Semiconductors of A3B5 by Influence $\gamma$ -Irradiation

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**Annotation** - Influence of  $\gamma$  - irradiation on characteristics of the light-emitting diodes is considered.

**Keywords** - light-emitting diodes, radiation, degradation.

## I. INTRODUCTION

Properties of semiconductor materials and devices made on their basis suffer the changes because originate different radiation defects which change the concentration, time of life, mobility of charge carriers in the process of irradiation. That brings to the change of parameters of electronic apparatus, reduction of terms of its work and breakage.

## II. RESEARCH RESULTS

In connection with the importance of use of the elements of group of A3B5 interest to researches of radiation effects in them the grows. The process of defects origins in such structures have the features, that is related with structure of the crystalline grate, character of atoms connection and presence of different thresholds of the energies of displacement for atoms, etc. The radiation defects spectrum in structures on the basis of semiconductors A3B5 is very various, that presents large problems in authentication of defects and description of their influencing on a crystals properties. But such defects must be more stable than in elementary semiconductors and have high temperature-stability. Relatively small doses of irradiation by  $\gamma$ -quant  $Co^{60}$  allow control inserting the non-radiating centers of recombination into the basic region of hetero-structure and in others layers that participate in the processes of generation

and out putting of photons. Research of characteristics of multi-layered hetero-structures at  $\gamma$ -irradiation is needed for prognostication of the parameters changes at irradiations structures with the control of variations of concentration of non-radiating centers in the process of making of these structures. The influence of the  $\gamma$ -irradiation to the light-emitting diodes lead to appears radiation defects that are cause of change both type of volt-amperes characteristics (VAC) and cause of change of electroluminescent emission. Found complication of change  $p$ - $n$ -transition VAC at influence of radiation. Growth the drop in forward voltage and reverse current is general regardless of type of radiation. At the large doses of the irradiation  $p$ - $n$ -junction loses nonlinear properties and can grow into resistance. Most changes because  $\gamma$ -irradiation are observed on a straight branch VAC.

It is determined that the quantum output of electroluminescent strongly diminishes at  $\gamma$ -irradiation of light-emitting diodes, thus, this lowering is observed by the irradiation by such streams of particles which do not cause substantial changes VAC. For VAC of light-emitting diodes on the basis of semiconductors of A3B5 at the irradiation by the small integral streams  $\gamma$ -quant characteristically growth of current in a region fit of recombination in the layer of by space charge. At the further irradiation the drop in voltage on a diffusive area VAC growth. Reverse currents and breakdown voltage also increase while the barrier capacity of diode diminishes.

## III. CONCLUSION

Diminishing of common time of life time of not basic of charge carriers is responsible for the change VAC of radiation diodes at the small levels of irradiation, and growth of the drop in voltage on a diffusive area VAC and growth of breakdown voltage is related to the increase of resistivity of diodes material in the less dope base region.

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