Structural changes in La, Ga: YIG under laser irradiation

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Laser irradiation of high power acting on monocrystalline ferrite-garnet films (FGF) significantly affects their structural reorganization. With the help of laser irradiation can effectively recover the crystal structure of monocrystalline films and deliberately generate defects of different nature, which cause certain characteristics of irradiated samples. The nature of the structural transformations in the irradiated sample essentially depends on the ratio between the energy of the quantum laser radiation hv and a band gap of monocrystalline FGF E_g.

Irradiation La, Ga-substituted FGF, implanted with ions of fluoride in the dose range of $1 \cdot 10^{13}$ - $1 \cdot 10^{14}$ cm^{-2} with the energy of 90 keV, was performed by pulses YAG: $: Nd^{3+}$- of laser, which worked in the modulated merit mode, with radiation energy – $E = 0{,}04$ J ($\tau = 15$ ns, f = 56 Hz) for t = 30 s. The structure of the subsurface layers FGF was investigated by the method of X-ray structural analysis.

With the implantation of fluorine ions at doses of $6 \cdot 10^{13}$ cm^{-2} and $1 \cdot 10^{14}$ cm^{-2} deformation profile is nonmonotonic with decreasing, almost the equal speed in both directions from the position where the deformation is maximal. It is established that under the laser irradiation there is a decrease in deformation maximum value and its gradient from the side of the surface. This is, first of all, due to the motion of defects to the film surface, ie, under laser irradiation the determining factor of movement and relaxation of defects is a temperature gradient, which stimulates the diffusion of defects. Using statistical-dynamical theory of X-rays, parameters of complex radiation defects were calculated.