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Optical properties and structure of laser crystals Cr:Mg₂SiO₄ after irradiation

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At the present time the ionizing radiation is broadly used for modification of properties various materials, including elements of the quantum electronics. The researches of the change of structure and optical properties of laser crystals Cr:Mg₂SiO₄ after irradiation by ionizing radiation are represented the considerable interest.

The crystals forsterite with various concentration of doping elements was grew in different atmosphere by method of Chokhralsky.

The crystals was irradiated by electron beam with energy 21 MeV on booster "Microtrone ST", fluence of electrons (7×10^{14})/(1.7×10^{15}) e/cm². Also, the crystals was irradiated by braking gamma quantum with energy of 1 MeV and irradiation dose of 10⁵ Gy on linear booster electron "UD-10".

The spectrums of induced absorption of irradiated sample were measured by spectrophotometer Lambda 900 (Perkin Elmer) within the range of 200-3300 nm.

The crystals Cr:Mg₂SiO₄ before irradiated and after irradiated electron high energy was researched by method RSA on X-ray diffractometer DRON-3M.

It was established, that the kind of ionizing radiation and its dose did not influence on quantity and position of maxima in induced spectrums of the crystals forsterite after irradiation. The saturation of the induced absorption was observed in range 430-460 nm on forsterite crystal spectrums after irradiation by electron with fluence (2.8×10^{14})/(3.5×10^{14}) e/cm². The parameter of elementary cell of crystal forsterite within the limits of an error did not change after doped chromium and irradiated by electron beam.