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I. URSU

A.M. PROKHOROV

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OPTICAL ABSORPTION CHANGES IN GAMMA-IRRADIATED GSAG CRYSTALS
WITH PHOTOTROPIC CENTRES

I.N. Nasyrov, A.M. Kurbanov, M. Kh. Ashurov, P. K. Khabibullaev Institute of Nuclear Physics, Uzbek Academy of Scienses 702132 Tashkent, Ulugbek, USSR (paper II.P.22)

The phototropic centres allow to combine the properties of an active medium and a modulator in one crystal and to use such crystals as passive modulators. The existance of phototropic centres in the new efficient laser materials based on chromium doped gadolinimescandium-aluminium garnet crystals (GSAG) that differ from gallimescandium-aluminium garnet conductivity and in mechanical strength seconditioned by the synthesis in oxidizing atmosphere and by the presence of divalent dopant ions of Mg, Ca, Zn /1/. The stability of the parameters of these materials affected by high energy photons (UV, X and gamma-irradiation) makes possible to extend the sphere of their application, to improve the reliability and economical characteristics of the units based on these materials. That is why the present paper deals with the influence of gamma-irradiation on the optical absorption of GSAG crystals with phototropic centres.

The thermal treatment in the appropriate medium has been shown to change the concentration of phototropic centres and the thermal regions of concentration changes have been identified. Non-monotonous dependence of optical absorption of the 300 K gamma-irradiated GSAG crystals with phototropic centres has been found, i.e. a significant decrease of phototropic centres absorption bands intensity in crystals with low chromium concentration (C_{Cr}=5·10¹⁹ cm⁻³) accompanied by the increase of the background absorbance has been observed. These changes are small in crystals with high chromium concentration (C_{Cr}=3·10²⁰ cm⁻³). Doze dependences of optical absorption changes have been derived and the thermal stability regions of these changes have been found. The interpretation of the observed non-monotonous dependence of the optical absorption changes in irradiated crystals on chromium concentration has been given /2/.

Denisov A.L., Zharikov E.V., Zagumennyi A.I. et al. Preprint of the Institute of General Physics of the USSR Academy of Sciences No. 123. Moscow, 1987, 17 p.

Ashurov M.Kh., Nasyrov I.N., Khabibullaev P.K. Preprint of the Institute of Nuclear Physics of the Uzbek SSR Academy of Scienses No.P-9-296. Tashkent, 1987, 12 p.