a. defects of structure responcible for the bands at λ_{se}=270, 290 and 520 nm; at T=77K
b. self-localised excitons (SLE), self-localised holes (ALH) (λ_{se} = 317nm; T = 77 - 200K);
c. SLH near TR^{3+} impurity (λ_{se}=340 nm, T≥150 K);
d. SLH near cation vacancy with formation of O^- centre. The following recombination of mobile electrons on them gives rise to luminescence band λ ~400 nm (T≥150 K).

The purpose of this work was study of electron excitation decay in YAG crystals, containing 10^{18} cm^{-3} of cation vacancy at the expense of impurity Si^{4+} at 10^{-2} mass % (content of other impurities did not exceed 10^{-4} mass %)

Spectrum of radio luminescence at 77 K consists of bands with maxima at 317 and 390 - 400 nm. As the temperature increases up to 270 K the intensity of the 317 nm band decreases and the 390 nm band increases. Next increasing of the temperature up to 400 K brings to full quenching. The behaviour of the luminescence band of 390 - 400 mm in the YAG crystals confirms its belonging to the centre of cation vacancy. In our opinion in the condition such a high concentration of cation vacancy (10^{12} cm^{-3}), forming at 77 K under γ - irradiation hot holes $(O^-)^*$ is captured by more deep trap on the cation vacancy up to autolocalization in regular lattice. Recombination of active electrons on these centres gives luminescence band 390 - 400 nm simultaneously with the luminescence ALE on regular site. They migrate to cation vacancy and other traps, providing extra increasing luminescence intensity λ_{se} = 390 - 400 nm at the temperature of ALH T≥150 K.

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LUMINESCENCE PROPORTIES OF CUBIC CRYSTALS OF ZrO_2-Y_2O_3

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This work is devoted to study of luminescence properties of yttrium dioxide crystals stabilised by zirconia (8-12 %) ZrO_2-Y_2O_3 . The crystals investigated were grown by technique described in [1]. The spectral composition and luminescence intensity of crystals depending on fluence of preliminary fast neutron irradiation (E>0.1 MeV) at 10^{16} - 5.10^{18} n/cm^2 range were measured at the 77 - 300 temperature interval.

In the photo -, γ - and thermo-luminescence spectra of non-irradiated crystals two band at the 2.57 and 2.3 eV (excitation at the 5.08 and 4.58 eV, consequently) are observed. With the increasing of temperature around 180 K the short wave band is quenched, while the long wave one is flamed up. The short wave band positions is independent on admixtures. And basic component relation, a large half - width and excitation near to the fundamental absorption edge enables ascribing the luminescence band at 2.57 eV to radiation decay of the

electron excitation located in the regular lattice. Intensity of this band decreases proportionally to the preliminary neutron irradiation fluency, as a result of non-radiative electron excitation of the structure defects.

The intensity of long wave luminescence strongly depends on the relation of matrix component relation, which indicates it's connection with the structure defect. In fact, intensity of this luminescence increases as fluence neutrons increases, making defects shifts. Luminescence at 2.3 eV is considered as radiation transition to F - like center, taking into account heterovalent character of substitution $Y^{3+} \rightarrow Zr^{4+}$ and necessity of formation of the vacancy of oxygen for the charge compensation.

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RADIATIVE RECOMBINATION AND DEFECT CENTRES IN YTTRIUM -STABILISED ZIRCON SINGLE CRYSTALS

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Yttrium stabilised zircon (YSZ) is well known as solid electrolyte. Introduction of Y^{3+} in the zirconium sublattice of YSZ implies the formation of oxygen vacancies which control it's properties. This work reviews some results on radiative recombination. The γ- and thermo-stimulated luminescence in ZrO_2-Y_2O_3 (12%) were studied.

Characteristic green luminescence under γ-ray excitation was observed. In order to elucidate the origin of this luminescence the temperature dependence of the emission spectrum was taken. Two salient features are observed: (i) the emission band shape is obvious asymmetric, and (ii) the band peak position shifts from 2.6 to 2.3 eV as the temperature is increased from 77 to 300 K. These features indicate the luminescence band is not simple and, it supposed, that it consists of two elemental bands, as minimum, which have contrariwise intensity temperature dependence.

The two thermo-luminescence bands of 2.6 and 2.3 eV were excited at 190 and 290 K respectively. When the short-wave luminescence band quenches, one can see the bleaching of typical low-temperature broad absorption band at the 2.2 eV. High-temperature treament in air leads to increasing of the intensity of the 2.6 eV band and decreasing of the 2.3 eV one. This supposed the 2.6 eV emission is intrinsic and is caused by radioactive decay of the exciton-like state. This is a result of recombination of gree electron wits hole centre, responsible for the 2.2 eV absorption band. The 2.3 eV emission is ascribed to an intrinsic defect in cubic stabilised zircon.