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OPTICAL EFFECTS AND TRACKS IN BAFBR CRYSTALS IRRADIATED WITH FAST KRYPTON IONS.

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In this work using photoluminescence (PL), X-Ray excited optical luminescence (XEOL), pulsed cathodoluminesence (PCL), optical absorption (OA), Raman spectroscopy (RS) and atomic force microscopy (AFM) the radiation damage and degradation of BaFBr crystals irradiated with 147 MeV ^{84}Kr ions to fluences (10^{10}-10^{14}) ion/cm^2 were investigated. BaFBr crystals were grown by the Steber method in a graphite crucible in a helium-fluoride atmosphere using stoichiometric mixtures of $BaBr_2$ and BaF_2. The effect of the oxygen impurity, which is present in the studied crystals, is also considered. In the spectra of PL and XEOL detected bands associated with oxygen impurity placing the halide sites. In the XEOL spectrum, except for the emission band associated with oxygen impurity the luminescence band of a self-trapped exciton is also observed. The quenching and shift of the PL and XEOL maximum with increasing fluence is due to the overlapping of tracks and aggregation of defects. Electronic and hole aggregate color centers arise mainly in the bromide sublattice. High irradiation doses lead to crystal degradation. In the process of recording the spectra of PCL in the region of 2-4 eV, a change in the intensity of the glow was observed both in the microsecond and nanosecond ranges. The absorption bands found in the ultraviolet region at 4.2 eV are attributed to the exciton emission of Br^- [1].

REFERENCES

[1] E A Radzhabov and A V Egranov, “Exciton emission in BaFBr and BaFCl crystals,” J. Phys. Condens. Matter, vol. 6, pp. 5639-5645, 1994.