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LUMINESCENCE CHARACTERISTICS OF ZnWO4 CRYSTALS IRRADIATED WITH 19.2 MEV CARBON IONS *

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$ZnWO_4$ is part of a family of metal tungstates that have a high potential for applications in various fields such as scintillators, laser hosts, acoustics, and photocatalysts [1, 2]. $ZnWO_4$ is attractive to researchers due to its unique combination of physical and chemical properties, including molecular and electronic versatility, reactivity, and stability. Zinc tungstate single crystals are unique materials for recording rare processes.

Irradiation of ZnWO4 single crystals with carbon ions with an energy of 19.2 MeV was carried out at the DC-60 accelerator (Nur Sultan, Kazakhstan) with fluences $F_1=4x10^{12}$, $F_2=1x10^{13}$, $F_3=3.3x10^{13}$, $F_4=1x10^{14}$ nucleon/cm^2. Using the SRIM-2013 code [3], the path length, as well as the electronic and nuclear energy losses for the carbon ion in the $ZnWO_4$ crystal, were calculated. The path length of a carbon ion in a single crystal was R = 10 μm. Photoluminescence was measured with a Solar CM2203 fluorometer. When excited by photons with a wavelength of 260 nm, all irradiated crystals luminesced with a maximum of 480 nm with a FWHM of 0.76 eV, for an unirradiated sample 0.72 eV (Fig.1.). The luminescence light yield decreases exponentially with fluence. For fluence F_1, the decrease in light output is 2 times, for F_2 - 3.1 times, for F_3 - 5.6 times, F_4 - 7 times. The results obtained are explained by taking into account that under the action of ion irradiation, the formation of point defects and the shift of the optical absorption edge occur.

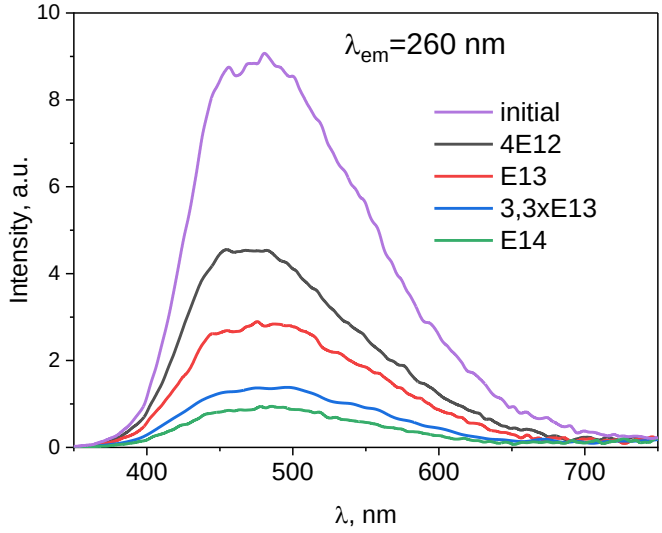

Fig.1. Luminescence spectra of unirradiated and carbon-irradiated $ZnWO_4$ crystals.

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