

## **INTRINSIC RADIATIVE COLOR CENTERS IN ALKALI HALIDES CRYSTALS AND FILMS: FORMATION AND APPLICATIONS**

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**Abstract.** Alkali halides (AH) crystals, containing radiative color centers (CCs), are widely applied as active and passive laser media. They are also used in optoelectronics and in radiation dosimetry. Among them, lithium fluoride (LiF) crystals and films with CCs have found the most successful applications. LiF samples can be colored by irradiation with ionizing radiation, as X-rays,  $\gamma$ -rays, elementary particles and ions.

The processes of CCs formation under LiF irradiation with ionizing radiation and electrons are considered in the report. Charged particles are appeared into the crystals or films during their irradiation. The most numerous and important particles are electrons, fluorine ions, shifted from the lattice site into the interstitial position, and positively charged vacancies  $F^+$ , positioned on the lattice sites where the fluorine ions were situated before shifting. All of these particles are moving inside the crystal or film. Their diffusion results in the CCs formation.

The formation processes and efficiency hardly depend on the temperature during and after irradiating and the temperature of particles mobility. The formation features which depend upon these temperatures are discussed in the report. Two cases are considered: a) irradiating temperature is higher than temperature of vacancies mobility, b) irradiation temperature is lower than temperature of vacancies mobility but temperature of annealing which followed the irradiation is higher than last one. The difference in the CCs formation processes is noted for these two cases.

The particularities of the CCs formation processes in a bulk, a near-surface layer, a film, nano-sized structures of LiF crystals are given. They are determined by concentrations of electrons, vacancies, different kinds of traps and ratio of electrons and vacancies concentrations.

The examples of CCs applications are presented. Lasers, optoelectronics, dosimetry are considered as an illustration of such applications.