F-AGGREGATE CENTERS FORMATION IN $BaLiF_3$ CRYSTALS

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Fluoroperovskites are potentially hosts for laser active media. Among them, $Pb^+(1)$ centers in $BaLiF_3:Pb^{2+}$ have shown good optical properties as a candidate for laser medium [1-3]. Therefore a controlled radiation defect formation was undertaken to optimize the formation of $Pb^+(1)$ centers, in both pure and doped $BaLiF_3$ crystals. This study comprised the defect formation in electron irradiated crystals as a function of four parameters: temperature and dose of irradiation, crystal growth direction and impurity concentration [3].

In this work the kinetics of F-aggregate centers formation is investigated in the inverted fluoroperovskite of $BaLiF_3$ submitted to electron-irradiation. By studying the changes in the absorption spectra during storage of samples in the dark, at room temperature, it was possible to verify a surprising and interesting dependence of the defect formation with the crystal growth direction. In spite of its cubic structure, crystals grown in the <100> and <111> directions and submitted to the same conditions of irradiation, supported in each case different species of F-aggregated centers. Radiation-induced primary defects in <111> crystals are comparatively more stable. Otherwise, for <100> crystals, it was possible to enhance the production of a 630 nm absorption band which we believe corresponds to the F_2^+ centers in $BaLiF_3$ [3].

Although it is not well understood why the above differences occur, we can consider the following tentative explanation to these distinct behaviors. It could be correlated to the crystalline quality of crystals grown in different directions. Baldochi et al. [4] observed, by neutron diffraction techniques, that besides the fact that both crystals grown in <100> and <111> directions presented good crystalline quality, the <111> crystals have a larger number of mosaic domains compared to the <100> crystals. We discuss the possible role of these different numbers of domains in the migration and aggregation defect processes.

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