COLOR CENTERS IN UNDOPED LITHIUM FLUORIDE LiF

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MOTIVATION:
Irradiation of broad-band alkali-halide crystals leads to the formation of color centers. A halogen vacancy that has captured an electron creates the well-known F-center. The number of such color centers increases when crystals are heated in alkali metal vapors. The formation of F-centers can be explained by the decay of electronic excitations into radiation defects.

OBJECTIVE:
Study of the formation of radiation defect color centers in undoped LiF crystals. The studied samples were irradiated with electrons at an energy of 18 MeV at room temperature on the M-30 microtron of the Department of Photonuclear Processes of the Institute of Electron Physics of the National Academy of Sciences of Ukraine. The optical absorption of irradiated samples was measured with a SF-46 spectrophotometer.

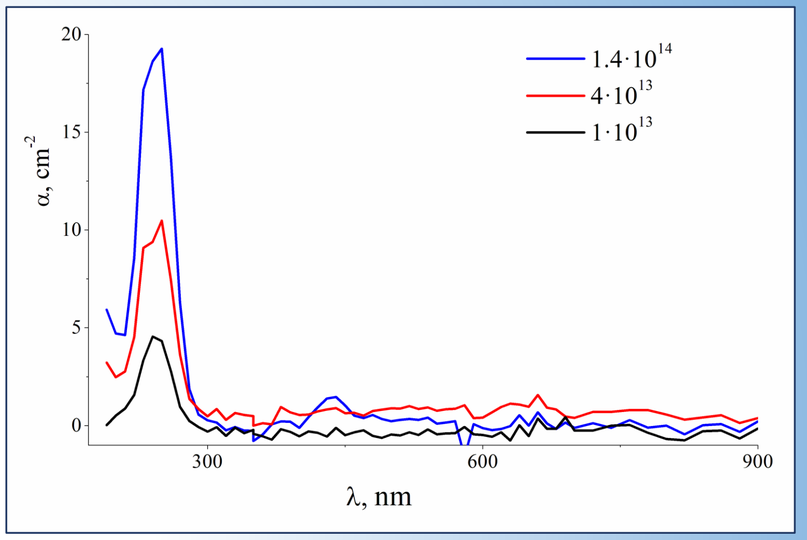

Figure 1 – Optical absorption spectrum after electron irradiation on M-30 with E=18 MeV at different fluences

RESULTS:
It was established that the following color centers are observed upon irradiation with high-energy electrons: 240 nm (F-centers) – at low doses and 450 nm (M-center) – at higher doses.
Determination of the concentration of color centers depending on the radiation dose is calculated by the Smakula-Dexter ratio.
The obtained number of color centers is not related to the formation of radiation defects, but only to the filling of existing vacancies.

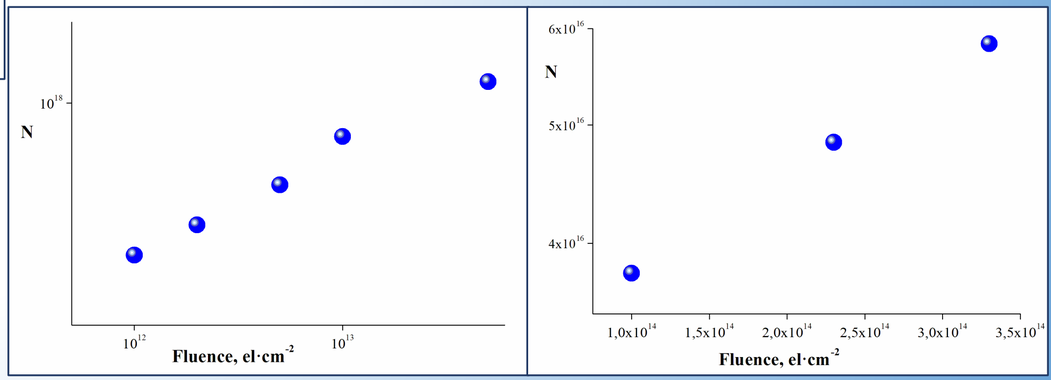

Figure 2 – Dependence of the concentration of absorbing centers on the fluence of irradiation for wavelengths of 250 nm (a) and 450 nm (b)