

Color-center creation in LiF under irradiation with swift heavy ions: Dependence on energy loss and fluence

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Single crystals of LiF exposed to swift heavy ions respond by the creation of color centers and defect aggregates. We present a comprehensive study by means of optical absorption spectroscopy using various MeV-GeV ions from ^4He to ^{238}U and a broad range of fluences. In the single-track regime, the defect characteristics such as the F-center concentration as a function of fluence and energy loss are analyzed. At large fluences, track overlapping occurs and the damage process is dominated by the formation of complex F_n centers and defect aggregates. The evolution of F-center and defect clusters is discussed in terms of aggregation as well as recombination of electron and hole centers. Limited efficiency for defect creation with heavy ions is mainly ascribed to annihilation processes of electron and hole centers.