

## Damage and track morphology in LiF crystals irradiated with GeV ions

Schwartz K, Trautmann C, Steckenreiter T, Geiß O, Krämer M  
*PHYSICAL REVIEW B 58 (1998) 11232-11240*

The nature of the radiation damage in lithium fluoride crystals irradiated with various ion species between nickel and uranium was studied by techniques such as optical absorption spectroscopy, small-angle x-ray scattering (SAXS), and chemical etching complemented by annealing experiments. The results indicate a complex track structure and defect morphology:

Single defects such as  $F$  and  $F_2$  centers are produced in a large halo with a radius of several tens of nanometers around the ion trajectory. Above a critical energy loss of about 10 keV/nm, new effects occur within a very small core region of about 2–4 nm in diameter, resulting in a strong anisotropic x-ray scattering and in the etchability of tracks. It is concluded that in this core region, the defects are complex aggregates such as small Li colloids, and fluorine and vacancy clusters. Using Monte Carlo calculations, the spatial distribution of energy deposited around the ion trajectory is compared with the track radius as extracted from the SAXS experiments. For all ion species, this radius corresponds to a critical dose, which can be regarded as a threshold for the creation of defect aggregates in the core region.