

## **Hardening and formation of dislocation structures in LiF crystals irradiated with MeV-GeV ions**

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Material modifications of LiF crystals irradiated with Au, Pb and Bi ions of MeV to GeV energy are studied by means of microindentation measurements and dislocation etching. Above a critical irradiation fluence of  $10^9$  ions/cm<sup>2</sup>, the microhardness can improve by a factor of 2 in the bulk and by more than 3 on the surface. Radiation-induced hardening follows the evolution of the energy loss along the ion path. Annealing experiments indicate that complex defect aggregates created in the tracks play a major role for the hardness change. Evidence for severe structural modifications is found when etching indentation impressions in highly irradiated crystals leading to similar pattern as in amorphous or micro-grained materials. Dislocation etching also reveals long-range stress fields extending far beyond the implantation zone deep into the nonirradiated crystal.