

Modification of the Structure and Nano-Mechanical Properties of LiF Crystals Under Irradiation with Swift Heavy Ions

Maniks J, Manika, I, Zabels, R, Grants R, Schwartz K, Sorokin M

Materials Science (MEDŽIAGOTYRA), ISSN 1392-1320, Vol 17, No 3 (2011) 223-228

The modifications of the structure and hardness of LiF crystals under high-fluence irradiation with MeV- and GeV-energy Au ions have been studied using nanoindentation and atomic force microscopy. The formation of ion-induced dislocations and bulk nanostructures consisting of grains with nanoscale dimensions (50 nm – 100 nm) has been observed. The structural modifications are accompanied by a strong ion-induced hardening which is related to dislocation impeding by assemblies of defect aggregates, dislocation loops of vacancy and interstitial types and grain boundaries. For MeV ions, the modifications are localized in a thin surface layer (few μm) where much higher density of deposited energy is reached and deeper stage of aggregation of radiation defects is achieved than for GeV ions with the same absorbed energy.