

Electronic excitations and heavy-ion-induced processes in ionic crystals

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This report reviews typical effects occurring in alkali halides and some other ionic crystals due to irradiation with swift heavy ions. While damage creation and subsequent luminescence in ionic crystals are dominated by the exciton mechanism, the appearance of specific track effects above a critical energy loss indicates the onset of collective electronic excitations. A large number of different data is presented obtained by experimental techniques such as scanning force microscopy, high-resolution electron microscopy, chemical etching, surface profilometry, small-angle X-ray scattering as well as spectroscopy in the vacuum ultraviolet, ultraviolet and visible spectral region. Ionic crystals being non-amorphizable exhibit tracks with a complex damage morphology, including single defects, aggregates and mechanical stress. Damage efficiencies of swift ions are discussed in direct comparison with the effects due to the conventional exciton mechanism.