

Heavy ion induced damage in NaCl and KCl crystals

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NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION B-BEAM INTERACTIONS WITH MATERIALS AND ATOMS 229 (2005) 397-405

NaCl and KCl single crystals were irradiated with swift heavy ions (An, Ph, Bi and U) of energy between 560 and 2640 MeV. The damage induced by the ions was studied using optical absorption spectroscopy, chemical etching and small-angle X-ray scattering. The damage in the tracks is dominated by the creation of simple color centers (F and V_3 centers). Their concentration increases as a function of fluence, saturating when single tracks overlap. The F-center containing track zone extends up to several tens of nanometers. In addition to this large track halo, there exists also a much smaller region (1-2 nm) close to the ion trajectory in which defect aggregates are formed. Indications for this track core are given by the preferential chemical etchability of ion tracks and also by the anisotropic pattern produced by small-angle X-ray scattering. This halo-core track structure is very similar as in LiF, however given by the higher mobility of the primary hole centers in NaCl and KCl, recombination with electrons is facilitated resulting in a lower efficiency for defect creation.