

Structural modifications induced by swift heavy ions in cubic stabilized zirconia: An X-ray diffraction investigation

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X-ray diffraction (XRD) was used to investigate the damage and the correlated stress induced by the slowing-down of swift heavy ions in cubic zirconia polycrystals doped with 10 mol% Y_2O_3 . Samples were irradiated at room temperature with 944 MeV Pb ions at the GANIL accelerator in Caen and 2.6 GeV U ions at the UNILAC accelerator in Darmstadt at fluences ranging from 5×10^{11} to 4×10^{13} cm^{-2} . Changes of XRD profiles with increasing fluences were then examined using the X-ray diffractometer of the LEMHE/ ICMMO in Orsay. Residual macroscopic stresses induced by irradiation were determined by the $\sin^2\psi$ method. The lattice strain, obtained by a Williamson-Hall analysis of the XRD profiles, obeys a single impact model and the measured diameter of the Pb-ion track is 4.7 nm.