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Discussion on near-surface conicity of latent tracks observed in TiO2 single crystals after swift heavy ion irradiation.

The morphology of swift heavy ion induced latent tracks in ceramic materials continue to stay one of the most attracting problems in radiation materials science. This is due to the high potential for the use of energetic heavy ions for materials properties modification, the formation of nanostructures and the simulation of the effects of fission fragments and cosmic radiation in structural materials used in nuclear and space industry. From the data on the structure of latent tracks that have been accumulated for the long time of the problem's existence, one can distinguish between two main groups of materials: amorphizable and non-amorphizable. Recently it has been shown that the internal structure of the tracks is not the only difference between amorphizable and non-amorphizable materials. A certain conicity of latent tracks is observed generally in non-amorphizable materials while homogeneous cylindrical tracks are observed in amorphizable materials. To date, the understanding of the causes of the resulting cylindrical and conical tracks in near-surface region of various materials is missing.

In this work a attempt to explain the observed conicity has been done. The near-surface material strain and Coulomb explosion are considered as possible factors leading to near-surface conicity of latent tracks observed in TiO2 single crystals.

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