SURFACE ION TRACKS CREATED BY SWIFT HEAVY IONS UNDER GRAZING INCIDENCE

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The previous work has proven that the nature of transient molten phase in the solid materials induced by swift heavy ions (SHI) and recrystallization are the key factors for the final state of ion track [1,2]. For grazing incidence of SHI, the recrystallization is suppressed, while the nature of nanoscale liquid as the initial ion track can be further disclosed by study of the surface ion track. In the present work, single crystals TiO_2, TeO_2, CaF_2, $Y_3Al_5O_{12}$ (YAG) etc. were irradiated with swift heavy ions under grazing incidence at Heavy Ion Research Facility in Lanzhou (HIRFL) in Institute of Modern Physics, Chinese Academy of Sciences. The irradiated samples were characterized by using atomic force microscopy (AFM) in tapping mode. It was found that the morphology of surface ion tracks strongly depends on materials and electronic energy loss. The experimental results do not support the so-called periodic oscillation of electronic energy loss previously proposed by Akcöltekin et al. [3]. We propose that the formation mechanism of surface ion track irradiated with grazing-incidence SHI is mainly attributed to Rayleigh-Plateau instability.

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