MAT Science Week
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Verification of velocity effect in yttrium iron garnet by HR-STEM observations of latent tracks.

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The characterization of swift heavy ion induced latent tracks morphology in various materials allows one to see general trends and plays an important role for correct understanding of material damage process due to high density electronic excitations. To date, a number of direct and indirect methods (such as TEM, RBS/c, XRD, SAXS, AFM) have been used to evaluate latent track parameters (diameter and threshold of formation) as a function of electronic energy losses, ion velocity and irradiation temperature. However, there is a certain discrepancy between experimentally measured track sizes when direct and indirect methods are used as well as contradictions between two most commonly used theoretical models (analytical and inelastic thermal spike), regarding the validity of so-called "velocity effect" (VE). Such discrepancies are probably related to a lack of a clear representation of latent tracks morphology in various materials. In this work low and high velocity Kr and Xe ion irradiation of Y3Fe5O12 single crystalls (YIG) have been performed to verify a validity of VE in YIG by means of HR-STEM observation technique. It has been shown that there is a difference in the latent tracks size for low and high velocity irradiated YIG, indicating on the velocity effect. A discussion of possible reasons of inconsistency in track sizes from direct and indirect measurements will be presented.

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