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Y₂Ti₂O₇ and Me₂₃C₆ nanoparticles in swift heavy ion irradiated ODS alloys

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Y-Ti oxides and Me₂₃C₆ precipitates are typical representatives of nanoparticle population in ferritic oxide dispersion strengthened (ODS) steels. Their stability during dense ionization in the so-called swift heavy ion regime has received considerable attention in recent years because the change in nanoparticle morphology should inevitably affect the mechanical properties of the first few subsurface microns of cladding material that is in contact with fissionable fuel and exposed to fission fragments. In this report we present and discuss the results of a TEM study of structural changes induced by krypton and xenon ions of fission fragment energy (1.2 MeV/nucleon) in Y₂Ti₂O₇ and Me₂₃C₆ nanoparticles in EP450 ODS steel. It was found that swift heavy ion irradiation leads to formation of amorphous latent tracks in both materials. The electronic stopping power threshold for track formation in pyrochlore nanoparticles lies in the range 7.4– 9.7 keV/nm and the mean track diameter varies linearly with the electronic energy loss.

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