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Microstructural evolution of Fe-9Cr alloys under 3.5 MeV Fe¹³⁺ ion irradiation

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Abstract: The microstructural evolution of two Fe-9Cr model alloys with different C content after irradiation was investigated by transmission electron microscopy. These two steels were both irradiated with 3.5 MeV Fe¹³⁺ ions at 450°C to a peak damage level of 3 dpas. TEM results indicate that <100> loops and 1/2<111> loops coexist in the two irradiated steels. Furthermore, the loop size of Fe-9Cr alloy with higher C content is about twice that of the Fe-9Cr alloy with lower C content. The difference in the size of the dislocation loops between the two steels may be attributed to the difference in C content. The carbon–vacancy complexes are effective traps for SIA loops and contribute to the growth of the loops, which may cause larger size dislocation loops in Fe-9Cr alloy containing higher C content.

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