DAMAGE STRUCTURE OF ISOTOPICALLY TAILORED HT9 STEELS IRRADIATED AT 400°C IN THE HFIR – N. Hashimoto, J. P. Robertson (Oak Ridge National Laboratory), and S. Jitsukawa (Japan Atomic Energy Research Institute)

Extended Abstract (the full paper will be published in the Journal of Nuclear Materials as Proceedings of the Ninth International Conference on Fusion Reactor Materials, October 10-15, 1999, Colorado Springs, Colorado).

The microstructures of reduced-activation martensitic steel, HT9-std. (12Cr-1MoVW), and HT9 doped with ^{58}Ni and ^{60}Ni, irradiated at 400°C to 16.3 dpa in the High Flux Isotope Reactor (HFIR) were investigated by transmission electron microscopy. Cavities were observed in HT9-std. And HT9 doped with ^{58}Ni irradiated to 16.3 dpa, while cavities were not observed in HT9 doped with ^{60}Ni. Swelling of HT9-std. And HT9-1.4wt% ^{58}Ni was estimated to be 0.002 and 0.004% respectively; these values correlate with the helium concentrations in each alloy. Irradiation-induced a_0<100> and $a_0/2$)<111> type dislocation loops were observed in all alloys; the number density and the mean diameter of a_0<100> type loops were higher and larger than those of ($a_0/2$)<111> Type loops, respectively. The loop density was highest in the HT-91.4 wt. of ^{58}Ni, which contained the highest concentration of helium. Irradiation-induced precipitates, which were identified as M_6C (η) carbide, α'-phase and M_2X phase, were observed in all alloys. The M_6C (η) and α' were formed along dislocation loops, suggesting that dislocation loops are sites of Cr-rich precipitates during irradiation.