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Object Kinetic Monte Carlo Simulations of Radiation Damage In Bulk Tungsten[1] GIRIDHAR NANDIPATI, WAHYU SETYAWAN, HOWARD HEINISCH, KENNETH ROCHE, RICHARD KURTZ, Pacific Northwest National Laboratory, BRIAN WIRTH, University of Tennesse, Knoxville — Results are presented for the evolution of radiation damage in bulk tungsten investigated using the object KMC simulation tool, KSOME, as a function of dose, dose rate and primary knock-on atom (PKA) energies in the range of 10 to 100 keV, at temperatures of 300, 1025 and 2050 K. At 300 K, the number density of vacancies changes minimally with dose rate while the number density of vacancy clusters slightly decreases with dose rate indicating that larger clusters are formed at higher dose rates. Although the average vacancy cluster size increases slightly, the vast majority exists as mono-vacancies. At 1025 K void lattice formation was observed at all dose rates for cascades below 60 keV and at lower dose rates for higher PKA energies. After the appearance of initial features of the void lattice, vacancy cluster density increased minimally while the average vacancy cluster size increases rapidly with dose. At 2050 K, no accumulation of defects was observed over a broad range of dose rates for all PKA energies studied in this work. Further comparisons of results of irradiation simulations at various dose rates and PKA spectra, representative of the High Flux Isotope Reactor and future fusion relevant irradiation facilities will be discussed.

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