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Characterization of neutron-induced defects in metals by positron annihilation spectroscopy TARA GRAY, Department of Physics and Astronomy, Bowling Green State University, PETR STEPANOV, Center for Photochemical Sciences, Bowling Green State University, DONALD WALL, Nuclear Radiation Center, Washington State University, FARIDA SELIM, Department of Physics and Astronomy and Center for Photochemical Sciences, Bowling Green State University
— The development of radiation-tolerant materials is crucial for the next generation of nuclear fission and fusion reactors. Recent molecular-dynamic simulations predict that nanostructured materials may demonstrate radiation resistance due to effective defect annealing at the grain boundaries. In this work, we investigate and compare neutron-induced defects in copper in the single crystal and ceramic forms. Samples were irradiated by neutrons inside a nuclear reactor and characterized by positron lifetime spectroscopy and Doppler broadening measurements. The study reveals the effect of grain boundaries on defect formation and annealing.

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