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DPA modeling in the PHITS code

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To predict the operating lifetime of materials in radiation environments, the displacement per atom(dpa) value, which is the average number of displaced atoms per atom of a material based on the Norgett-Robinson-Torrens (NRT) model, is widely used as an exposure unit and is defined by elastic energy transfer to Primary Knock on Atoms (PKAs), as well as high-energy effects (e.g., nuclear interaction) that results in atomic displacements. Because the NRT-dpa is a simple function of the damage energy of a projectile, it has been incorporated in the Particle and Heavy Ion Transport code System (PHITS). The PHITS code also includes the athermal-recombination-corrected dpa (arc-dpa) model, which is a more realistic model than the NRT model. A comparison of the measured displacement cross sections with the calculated results of the NRT-dpa and the arc-dpa cross sections indicates that arc-dpa provide better quantitative descriptions of the displacement cross section than NRT-dpa.

This presentation introduces the dpa modelling in the PHITS code.

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