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Abstract

Using a personal computer, we have simulated the diffusion and agglomeration of point defects in thin foil under high energy electron irradiation. The physical model has been developed by using the Monte Carlo technique. Four types of reactions are assumed to take place: di-interstitial creation by agglomeration of two free interstitials, vacancy-interstitial annihilation, interstitial trapping by dislocation loops and interstitial annihilation on the sample surfaces. In the simulation only interstitials are mobile and extended defects are assumed to be

interstitial type. We have calculated the concentration of point defects, extended defects and the size of the latter. We compared them to the results of the Chemical Reaction Rate Theory (CRRT). It has been found that the dislocation loops are distributed in the center of material leaving areas denuded close to the surface and the loops radius is also strongly dependent on the location of the defect in thin foil with respect to the results of experimental and CRRT. To explain the origin of these phenomena we have exploited the spatial distribution of vacancies close to free surfaces and around dislocation loops. These types of informations are totally missing in the CRRT and experimental.

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Index Terms

Computer Science

Applied Sciences

Keywords

Dislocation loops; Atomic Scale Simulation; Diffusion; thin foil; Electronic irradiation.

