INFLUENCE OF FLUX ON LOOP NATURE IN NICKEL DURING ION IRRADIATION

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Nickel is widely used as a model material for face-centered cubic (fcc) alloys to obtain insight into fundamental mechanisms of radiation damage. In a previous study, large independent vacancy Frank loops were found in irradiated thin foils of Ni at high temperature [1]. The formation of these vacancy Frank loops were explained by supposing a production bias of at least ~10% interstitials due to a one dimension migration of interstitial clusters created within the displacement cascades. These very mobile clusters are assumed to disappear at surfaces. The rate theory equations showed that the ion flux can influence the formation of these vacancy loops.

In this work, we intend to study experimentally the influence of flux on the nature of defects created in heavy-ion irradiated thin-foil nickel. To do so, different experiments are carried out in the JANNuS facilities, with a variation of flux of 100 times. Loop nature is analyzed, results are discussed regarding our rate theory model.

[1] Kan Ma, Brigitte Décamps, Anna Fraczkiewicz, Thomas Jourdan, Frédéric Prima, Marie Loyer-Prost. Free surface impact on radiation damage in pure nickel by in-situ self-ion irradiation: can it be avoided? Acta Materialia, Volume 212, 2021, 116874, ISSN 1359-6454, https://doi.org/10.1016/j.actamat.2021.116874