Diffusion Enhancement in FeNi Alloys During Fast Neutron Irradiation

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The search for radiation damage resistant material is important for the development of nuclear technology. In this framework, the irradiation produced diffusion enhancement is of special interest for the understanding of the mobility of point defects and its agglomerates and consequently the micro and macroscopic physical properties changes,such as, swelling. In irradiated materials an excess concentration of point defects is created by high - energy particle bombardment. In present work the effect of fast neutron (E>1 MeV) irradiation on FeNi (50-50 at.%) alloy is analyzed, at high temperatures (T>650K), by means of Magnetic After Effect. It was observed that for temperatures $T>T_m/2$ (T_m = 1,710K - absolute melting temperature) the enhanced diffusion conditions existed due to fast neutron produced vacancies with an activation energy of 1.41 eV. For $T>T_m/2$, the diffusion is described by the predominant thermal effect with an activation energy of 3.06 eV, becoming independent of the irradiation. Results of FeNi alloy doped with 0.1 at% Cr and 50 ppm Mo are also presented.