

UNUSUAL RESPONSE OF THE BINARY V-2Si ALLOY TO NEUTRON IRRADIATION IN FFTF AT 430-600C - S. Ohnuki, H. Kinoshita (Hokkaido University), F. A. Garner (Pacific Northwest National Laboratory) and H. Takahashi (Hokkaido University)

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Abstract

When V-2Si was irradiated in FFTF at 430, 500 and 600C to doses as high as 80 dpa, a very unusual swelling response was observed in which the swelling appeared to saturate rather quickly at ~35% at 430 and 540C, but approached this swelling same level much more slowly at 600C.

Microstructural examination revealed that a peculiar form of microstructural self-organization had occurred that is linked to the saturation behavior. Each individual grain was observed to have subdivided into cells surrounded by relatively void-free walls of V_3Si . The cells contain very little silicon inside their boundaries and develop average sizes that increase with increasing irradiation temperature. These cell walls enclose regions of very high swelling with strong gradients in void size and density in the vicinity of the cell walls. At lower irradiation temperatures the cell size does not appear to change with increasing displacement level, mirroring the early saturation observed in the swelling at these temperatures.

The possible causes of this phenomenon are discussed as well as the implications of these findings on the swelling behavior of other high swelling vanadium binary alloys.

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