

EFFECT OF IRRADIATION TEMPERATURE ON THE MECHANICAL PROPERTIES AND STRUCTURE OF CU/SS JOINTS IRRADIATED TO LOW DOSES –

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Extended Abstract (the full paper will be published in the Journal of Nuclear Materials as Proceedings of the Ninth International Conference on Fusion Reactor Materials, October 10-15, 1999, Colorado Springs, Colorado).

A second generation of copper alloy/stainless steel joints manufactured in the RF, EU, and JA by Hot Isostatic Pressing (HIP) has been irradiated to 0.4 dpa at 150 and 300°C. Post-irradiation tensile tests and optical microscopy were performed.

Irradiation up to 0.4 dpa at 150°C increased the strength of GlidCopAl25/316 joints by about 150 MPa. The levels of uniform and total elongation of GlidCopAl25/316 specimens after irradiation up to 0.4 dpa at 150°C were very low.

The Cu-Cr-Zr/316SS joints were characterized by significantly less strengthening and for $T_{irr} = T_{test} = 150^\circ\text{C}$ ($\Delta\sigma_y$ was ~50 MPa). The level of uniform and total elongation of Cu-Cr-Zr/316SS specimens after irradiation up to 0.4 dpa at 150°C was in the range 5 to 7%.

Irradiation at 300°C only slightly strengthened the GlidCopAl25/316-type joints, but the uniform and total elongation of the GlidCopAl25/316-type joints was very low.

Irradiation at $T_{irr} = 300^\circ\text{C}$ did not affect the strength properties of Cu-Cr-Zr/316SS joints; the uniform elongation of the irradiated joint Cu-Cr-Zr/316SS was in the range of 3 to 8%, and total elongations ranged from 12 to 20%.

In general, the second generation of HIP joints irradiated to a higher dose (0.4 dpa) demonstrated a higher radiation resistance than the first generation of joints irradiated to 0.2 dpa.