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Abstract

The elastic and plastic properties of filaments of non-crystalline Pd 20 a/o Si alloy and the changes that occur on crystallization during and after heating at various temperatures have been examined. The transformation to the crystalline states was examined with X-ray and electron diffraction, electrical resistivity and electron microscopy. The mechanical tests were performed over a temperature range between −195 and 500°C through a range of strain rates from 10^{-2} to 10^{-4} sec.$^{-1}$ The non-crystalline structure was stable below 275°C but transformed on heating at 300°C or above to a face centered cubic structure (a_0=4.00–4.05 Å), then to an unknown structure and finally to the stable orthorhombic Pd_3Si.

The relatively high strength and brittle behavior of the non-crystalline form changed to lower strength but with more ductility on transforming to the metastable crystalline states. The temperature dependence of the mechanical properties of both the non-crystalline and crystalline states was measured.

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