

The Mechanical Properties of Palladium 20 a/o Silicon Alloy Quenched from the Liquid State*

T. MASUMOTO** and R. MADDIN

*School of Metallurgy and Materials Science and Laboratory for Research on the
Structure of Matter, Univ. of Pennsylvania, Philadelphia*

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 ($a_0=4.00-4.05 \text{ \AA}$), 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.

* The 1584th report of the Research Institute for Iron, Steel and Other Metals. Published in the *Acta Metallurgica*, **19** (1971), 725.

** On leave of absence from the Research Institute for Iron, Steel and Other Metals, Tohoku University.