

Al-Hf-Nb-Pd (Aluminum-Hafnium-Niobium-Palladium)

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Recently, [2004Mis] investigated the phase equilibria of this system at 1200 °C and constructed a projection on the Al-Hf-Pd triangle of the tie-tetrahedra with phases in equilibrium with a Nb-rich phase at this temperature.

Lower Order Systems

For the binary phase diagrams, see [2002Wan] (Al-Hf), [2001Yur] (Al-Pd), [1995Tri] (Hf-Pd) and [Massalski2] for Al-Nb, Hf-Nb, and Nb-Pd systems. The known data on the Al-Hf-Nb and Al-Hf-Pd systems were compiled by [1995Vil]. The Al-Nb-Pd and Hf-Nb-Pd systems do not appear to have been investigated. The ternary phase that is of interest in the results reviewed here is the Heusler-type phase Pd_2HfAl ($L2_1$, $AlCu_2Mn$ -type cubic, $a = 0.6378$ nm).

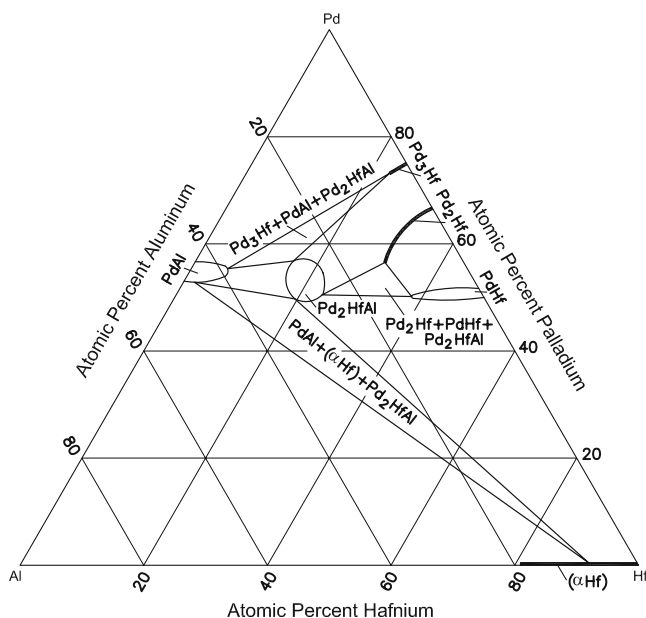


Fig. 1 Al-Hf-Nb-Pd projection of tie-tetrahedra at 1200 °C on the Al-Hf-Pd plane. All triangular fields additionally contain (Nb) [2004Mis]

Quaternary Phase Equilibria

With starting metals of 99.999% Al, 99.9% Hf, 99.8% Nb, and 99.95% Pd, [2004Mis] arc-melted in an Ar atm six alloys with nominal Nb contents of 40, 50, 60 and 80 at.% Nb. The alloys were annealed at 1500 or 1200 °C for 200 h. The phase equilibria were studied with scanning electron microscopy, x-ray powder diffraction, and energy dispersive spectral analysis. The identified phases and the measured composition of the phases were listed for some samples annealed at 1500 or 1200 °C. The projections on to the Al-Hf-Pd plane of the tie-tetrahedra with the Pd_2HfAl phase at 1200 °C are shown in Fig. 1 [2004Mis]. The Nb content of the phases in most cases was less than 1 at.%. In Fig. 1, the phases of each tetrahedra are in equilibrium with the Nb-rich bcc solid solution containing more than 80 at.% Nb. Preliminary results of the above studies were earlier presented by [2002Mis].

References

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