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Al-Pr-Ti (Aluminum-Praseodymium-Titanium)

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Recently, [2000Zho] determined an isothermal section for this ternary system at 500 °C.

Binary Systems

The Al-Pr [2000Oka] depicts six intermediate compounds of fixed stoichiometry: Pr_3Al_{11} (orthorhombic or tetragonal), $PrAl_3$ (Ni_3Sn-type hexagonal), $PrAl_2$ ($MgCu_2$-type cubic), PrAl (orthorhombic), Pr_2Al (Co_2Si-type orthorhombic), and Pr_3Al (low-temperature form: Ni_3Sn-type hexagonal and high-temperature form: $AuCu_3$-type cubic). An update of the Al-Ti system appears in this issue. The Pr-Ti phase diagram [Massalski2] has no intermediate phases.

Isothermal Section

With starting metals of 99.9% purity, [2000Zho] melted 181 alloy compositions in an arc furnace under Ar atm. After a final anneal at 500 °C for 10 days, the samples were quenched in ice-water mixture. The phase equilibria were studied mainly by x-ray powder diffraction technique. The isothermal section at 500 °C constructed by [2000Zho] is redrawn in Fig. 1 to agree with the accepted binary data. Among the binary compounds, only Al_2Pr shows a significant solubility for the third component (17 at.% Ti). An Al-rich ternary compound $PrTi_2Al_{20}$ [1995Nie] (denoted τ here) is present. It has the $CeCr_2Al_{20}$-type cubic structure, space group *Fd*3 or *Fd*3*m*, $a = 1.4724$ nm.

References

1995Nie: S. Niemann and W. Jeitschko, Ternary Aluminides AT_2Al_{20} (A = Rare-Earth Elements and Uranium; T = Ti, Nb, Ta, Mo, and W) with $CeCr_2Al_{20}$ type Structure, *J. Solid State Chem.,* Vol 114, 1995, p 337-341

2000Oka: H. Okamoto, Al-Pr (Aluminum-Praseodymium), *J. Phase Equilibria,* Vol 21 (No. 2), 2000, p 207

2000Zho: H. Zhou, J. Yan, Y. Zhang, and J. Zeng, Phase Relation in the Pr-Ti-Al Ternary System at 500 °C, *J. Alloys Compd.,* Vol 299 (No. 1-2), 2000, p 232-234

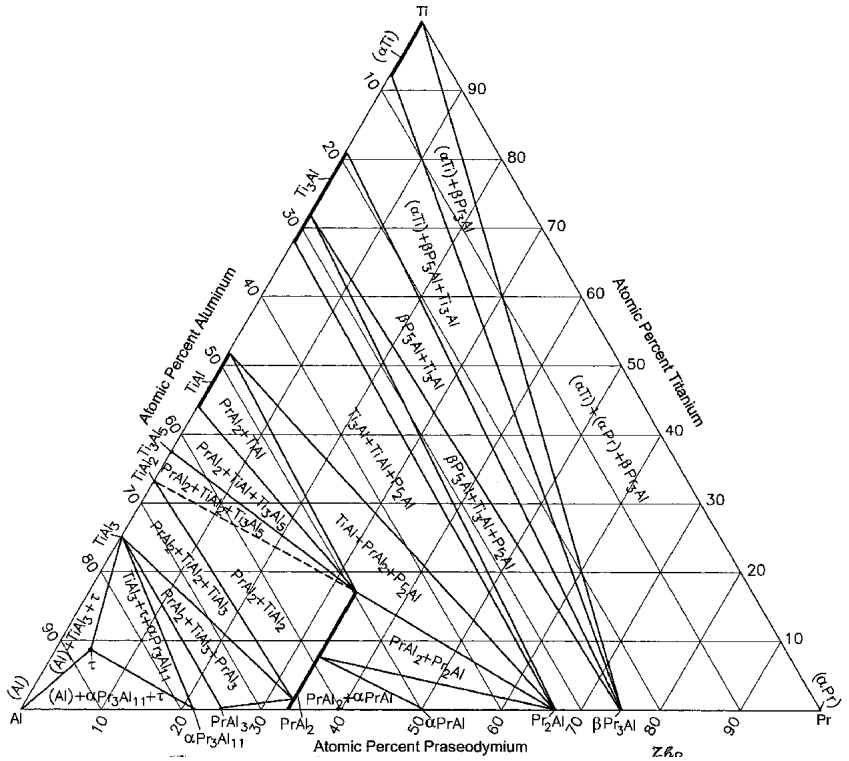

Fig. 1 Al-Pr-Ti isothermal section at 500 °C [2000Zho]; narrow two-phase regions around tie-triangles are omitted.