

Al-Pr-Sb (Aluminum-Praseodymium-Antimony)

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Recently, an isothermal section at 500 °C for this ternary system was determined by [2008Zen]; this depicts a ternary compound of unknown structure.

Binary Systems

The Al-Pr phase diagram [Massalski2] shows the following intermediate compounds: $\alpha\text{Pr}_3\text{Al}$ ($D0_{19}$, Ni_3Sn -type hexagonal), $\beta\text{Pr}_3\text{Al}$ ($L1_2$, AuCu_3 -type cubic), Pr_2Al ($C23$, Co_2Si -type orthorhombic), αPrAl (ErAl -type orthorhombic), βPrAl (CeAl -type orthorhombic), PrAl_2 ($C15$, MgCu_2 -type cubic), PrAl_3 (Ni_3Sn -type hexagonal), PrAl_4 or $\beta\text{Pr}_3\text{Al}_{11}$ ($D1_3$, Al_4Ba -type tetragonal), and $\alpha\text{Pr}_3\text{Al}_{11}$ ($\alpha\text{La}_3\text{Al}_{11}$ -type orthorhombic). The Al-Sb phase diagram depicts the equiatomic compound AlSb , which melts congruently at 1058 °C [Massalski2]. The Pr-Sb phase diagram [Massalski2] depicts the following compounds: Pr_2Sb (La_2Sb -type tetragonal), Pr_5Sb_3 (Mn_5Si_3 -type hexagonal), Pr_4Sb_3 (Th_3P_4 -type cubic), βPrSb (stable above 1950 °C), αPrSb (NaCl -type cubic), and PrSb_2 (SmSb_2 -type orthorhombic).

Ternary Isothermal Section

With starting metals of 99.9% Al, 99.8% Pr, and 99.9% Sb, [2008Zen] arc-melted or induction-melted a total of 98 binary/ternary alloys. The alloys were given a final anneal at 500 °C for 10 days and quenched in liquid nitrogen. X-ray powder diffraction and scanning electron microscopy with energy dispersive analyzer were used to study the phase equilibria. The isothermal section constructed by [2000Zen] at 500 °C is redrawn in Fig. 1. A ternary compound $\sim\text{Al}_{11}\text{Pr}_{24}\text{Sb}_{63}$ (τ) of unknown structure was found.

Reference

2008Zen: L. Zeng, J. Liao, P. Qin, H. Qin, and L. Nong, Phase Relations in the Al-Pr-Sb System at 773 K, *J. Alloys Compd.*, 2008, **450**, p 252-254

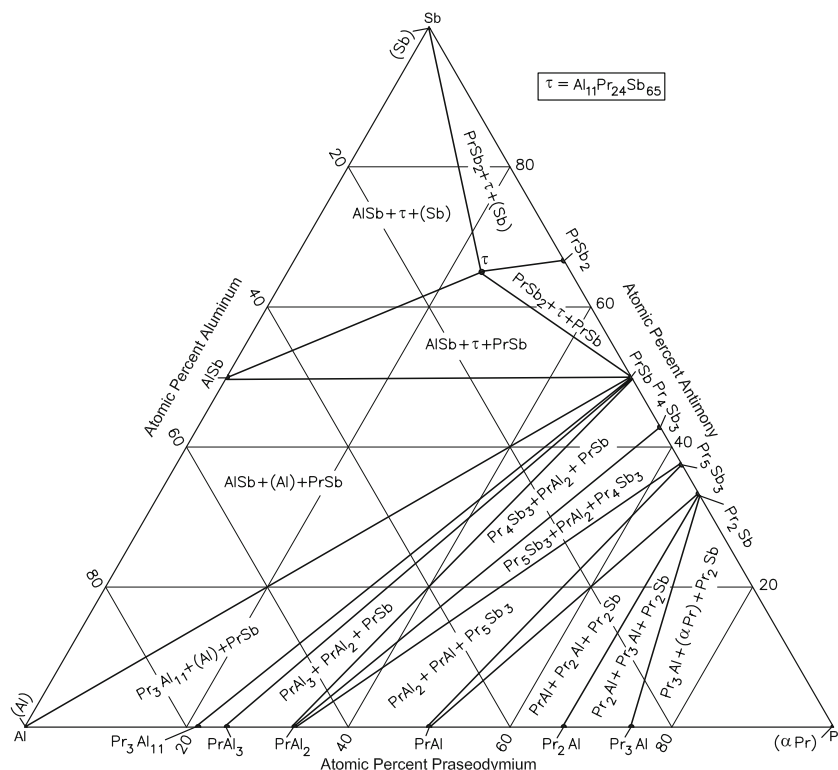


Fig. 1 Al-Pr-Sb isothermal section at 500 °C [2008Zen]. Two-phase regions are omitted