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Al-Sb-Y (Aluminum-Antimony-Yttrium)

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In the previous work on this ternary system, two isothermal sections have been reported: at 500 °C by [1971Mur] and at 527 °C by [2003Zen]. The latter study was reviewed briefly by [2008Rag]. Recently, [2009Zha] reported a thermodynamic assessment of this system.

Binary Systems

The Al-Sb phase diagram depicts the stoichiometric compound AlSb (*B*3, Sphalerite-type cubic). The Al-Y phase diagram [Massalski2] has the following intermediate phases: αAl_3Y ($D0_{19}$, Ni_3Sn-type hexagonal), βAl_3Y (BaP_3-type rhombohedral), Al_2Y (*C*15, $MgCu_2$-type cubic), AlY (B_f, CrB-type orthorhombic), Al_2Y_3 (Al_2Zr_3-type tetragonal), and AlY_2 (*C*23, Co_2Si-type orthorhombic). The Sb-Y phase diagram [Massalski2] depicts the following intermediate phases: SbY_3 (PTi_3-type tetragonal), Sb_3Y_5 ($D8_8$, Mn_5Si_3-type hexagonal), Sb_3Y_4 ($D7_3$, Th_3P_4-type cubic, stable between 2120 and 1660 °C), and SbY (*B*1, NaCl-type cubic).

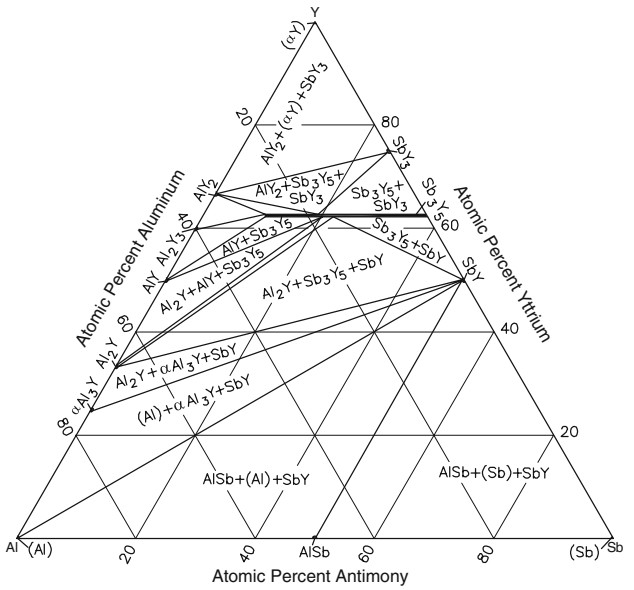

Fig. 1 Al-Sb-Y computed isothermal section at 500 °C [2009Zha]. Narrow two-phase regions are omitted

Computed Ternary Phase Equilibria

[2009Zha] described the liquid, fcc, bcc, cph and rhombohedral phases as substitutional solutions. The binary compounds were treated as stoichiometric phases. The solubility of Al up to 27 at.% in Sb_3Y_5 was taken into account. The binary descriptions were used from the literature data. The ternary interaction parameters were set to zero. The optimized parameters were listed. Two isothermal sections at 527 and 500 °C and a liquidus projection were computed by [2009Zha]. The computed isothermal section at 527 °C agrees with that determined experimentally by [2003Zen]. The computed isothermal section at 500 °C is shown in Fig. 1. The triangulations of (Al) + αAl_3Y + SbY, (Al) + AlSb + SbY and AlSb + SbY + (Sb) agree with those found by [1971Mur], who studied the system up to 33.3 at.% Y. No experimental data are available for comparison with the computed liquidus projection of [2009Zha] (not shown here).

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