Al-La-Sb (Aluminum-Lanthanum-Antimony)

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Recently, [2010Che] determined an isothermal section for this ternary system at 500 °C, which depicts no ternary compounds.

Binary Systems

The Al-La system [2006Zho, 2010Che, Massalski2] depicts the following intermetallic compounds: La_3Al ($L1_2$, AuCu₃-type cubic), La_2Al (tetragonal, lattice parameters $a = 1.70942$ nm and $c = 0.53790$ nm [2010Che]), La_5Al_4 (La_5Al_4 -type hexagonal, space group $P62m$), LaAl (AlCe-type orthorhombic), LaAl_2 ($C15$, MgCu₂-type cubic), LaAl_3 ($D0_{19}$, Ni₃Sn-type hexagonal) and $\beta\text{La}_3\text{Al}_{11}$ ($D1_3$, Al_4Ba -type tetragonal) and $\alpha\text{La}_3\text{Al}_{11}$ ($\text{La}_3\text{Al}_{11}$ -type orthorhombic). The Al-Sb phase diagram [Massalski2] depicts the stoichiometric compound AlSb ($B3$, sphalerite-type cubic). The La-Sb system [2010Che] has the following intermediate compounds: La_2Sb (La_2Sb -type tetragonal), La_5Sb_3 ($D8_8$, Mn₅Si₃-type hexagonal), La_4Sb_3 ($D7_3$, P_4Th_3 -type cubic), and LaSb (NaCl-type cubic).

Ternary Isothermal Section

With starting metals of 99.95% Al, 99.5% La and 99.9% Sb, [2010Che] arc-melted under Ar atm a number of binary and ternary alloys. The samples were annealed at 500 °C for 30 d and quenched in liquid nitrogen. The phase equilibria were studied with x-ray powder diffraction and scanning electron microscope equipped with energy dispersive x-ray analyzer. The isothermal section at 500 °C constructed by [2010Che] is shown in Fig. 1. There are no ternary phases. The solubility of the third component in the binary compounds is negligible.

References

- 2006Zho:** S.H. Zhou and R.E. Napolitano, Phase Equilibria and Thermodynamic Limits for Partitionless Crystallization in the Al-La Binary System, *Acta Mater.*, 2006, **54**, p 831-840
- 2010Che:** Y. Chen, Q. Feng, L. Zeng, J. He, and W. He, Phase Relationships of the La-Al-Sb System at 773 K from 0 to 50.0 at.% Sb, *J. Alloys Compd.*, 2010, **492**, p 208-212

Fig. 1 Al-La-Sb isothermal section at 500 °C [2010Che]. Narrow two-phase regions are omitted