Fe-Sb-Zn (Iron-Antimony-Zinc)

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An isothermal section at 297 °C for this ternary system was determined by [2000Chu] and briefly reviewed in the update by [2001Rag]. Recently, an isothermal section at 450 °C was determined by [2010Zhu].

Binary Systems

The Fe-Sb phase diagram depicts two intermediate phases: FeSb (40-47 at.% Sb; $B8_1$, NiAs-type hexagonal) and stoichiometric FeSb₂ (orthorhombic). In the Fe-Zn system, the intermediate phases are: Γ (Fe₃Zn₁₀; Cu₅Zn₈-type cubic), Γ_1 (Fe₁₁Zn₄₀; cubic), δ (FeZn₁₀-type hexagonal) and ζ (CoZn₁₃-type monoclinic). The Sb-Zn phase diagram shows the following intermediate phases: SbZn (B_e , CdSb-type orthorhombic), Sb₃Zn₄ and Sb₂Zn₃ (two orthorhombic forms).

Ternary Isothermal Section

With starting metals of 99.99 % purity, [2010Zhu] melted alloys in evacuated quartz tubes. The final anneal at 450 °C

was for 30 days, followed by water quenching. The phase equilibria were studied with optical and scanning electron microscopy, x-ray powder diffraction and wavelength dispersive x-ray spectroscopy. The isothermal section at 450 °C constructed by [2010Zhu] is shown in Fig. 1. Out of the two ternary phases found at 297 °C [2000Chu, 2001Rag], only FeZnSb (denoted τ ; $C1_b$, MgAgAs-type cubic) was found at 450 °C. The solubility of the third component in the binary phases was limited.

References

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Fig. 1 Fe-Sb-Zn isothermal section at 450 °C [3]. Narrow two-phase regions are omitted