

Bi-Fe-Zn (Bismuth-Iron-Zinc)

V. Raghavan

Recently, [2008Li] determined an isothermal section at 450 °C for this ternary system, which depicts no ternary phases.

Binary Systems

The Bi-Fe phase diagram [Massalski2] shows very little solubility between Bi and Fe in the liquid and solid states. In the Bi-Zn phase diagram [Massalski2], there are no intermediate phases. A liquid miscibility gap closes at 576 °C, with a monotectic reaction at 416 °C. In the Fe-Zn system [2003Rag], the intermediate phases are: Γ ($\text{Fe}_3\text{Zn}_{10}$; Cu_5Zn_8 -type cubic), Γ_1 ($\text{Fe}_{11}\text{Zn}_{40}$; cubic, space group $F\bar{4}3m$), δ (FeZn_{10} ; FeZn_{10} -type hexagonal), and ζ (CoZn_{13} -type monoclinic).

Ternary Isothermal Section

With starting metals of 99.99% purity, [2008Li] melted about 20 ternary alloy samples in evacuated quartz tubes.

The alloys were given a final anneal at 450 °C for 30 d and quenched in water. The phase equilibria were studied with scanning electron microscope, energy dispersive x-ray analysis, and x-ray powder diffraction. The isothermal section constructed by [2008Li] is redrawn in Fig. 1 to agree with accepted binary data. There are no ternary phases in the system. All Fe-Zn compounds and (αFe) form tie-lines with the Bi-rich liquid L_1 . The composition range of L_1 in two-phase equilibrium with (αFe) is 0-8.2 at.% Zn. The range of L_1 in two-phase equilibrium with ζ is 22.9-43.5 at.% Zn.

References

- 2003Rag:** V. Raghavan, Fe-Zn (Iron-Zinc), *J. Phase Equilib.*, 2003, **24**(6), p 544-545
2008Li: Z. Li, X. Su, and Y. He, 450 °C Isothermal Section of the Zn-Fe-Bi Ternary Phase Diagram, *J. Alloys Compd.*, 2008, **462**, p 320-327

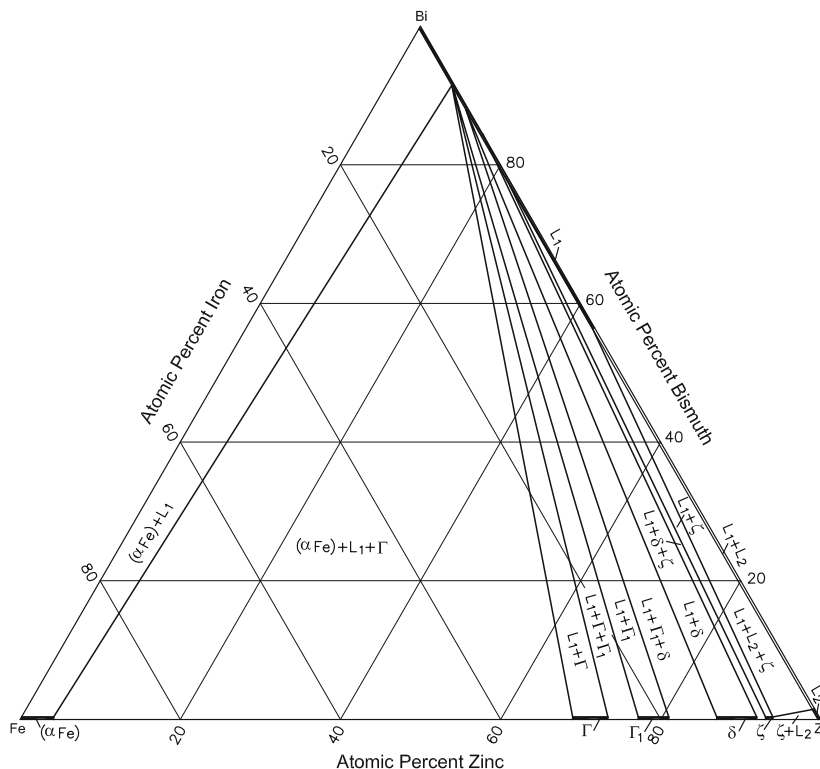


Fig. 1 Bi-Fe-Zn isothermal section at 450 °C [2008Li]