

Al-Fe-Ni-Ti (Aluminum-Iron-Nickel-Titanium)

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For this quaternary system, [1997Kai] reported isothermal sections between 1300 and 900 °C on the FeAl-FeTi-NiTi-NiAl plane of the composition tetrahedron.

Binary Systems

For brief descriptions of the Al-Fe and Fe-Ti binary systems, see [2002Rag]. Brief descriptions of the Al-Ni, Al-Ti and Ni-Ti systems are given in [2005Rag1].

Ternary Systems

Updates on the Al-Fe-Ni, Al-Fe-Ti, and Al-Ni-Ti systems are presented by [2005Rag2], [2002Rag], and [2005Rag1] respectively. The review of the Fe-Ni-Ti system by [1990Gup] presented a liquidus projection, four isothermal sections at 1100, 1027, 900 and 700 °C, and three vertical sections.

Quaternary Phase Equilibria

Starting with pure elements, [1997Kai] induction melted, under Ar atmosphere, about 10 alloys, with the composition corresponding to 50 at.% (Ni + Fe) and (Al + Ti), respectively. Two-phase ($B2 + L2_1$) specimens or diffusion

couples were annealed at 1300-900 °C for 1-720 h. Microstructural examination was done by optical microscopy. The compositions of the coexisting phases were determined by the energy dispersive x-ray spectroscopy and listed. In all cases, the atomic percent of (Ni + Fe) or (Al + Ti) in the individual $B2$ and $L2_1$ phases was 50 ± 1 at.%. Isothermal sections at 1300, 1200, 1000, and 900 °C on the NiAl-NiTi-FeTi-FeAl plane constructed by [1997Kai] are redrawn in Fig. 1. The two-phase fields of ($B2 + L2_1$) and ($L2_1 + B2$) narrow down and disappear, as the Fe content increases. The $L2_1$ field shrinks as the Fe content increases.

References

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- 2002Rag:** V. Raghavan, Al-Fe-Ti (Aluminum-Iron-Titanium), *J. Phase Equilib.*, 2002, **23**(4), p 367-374
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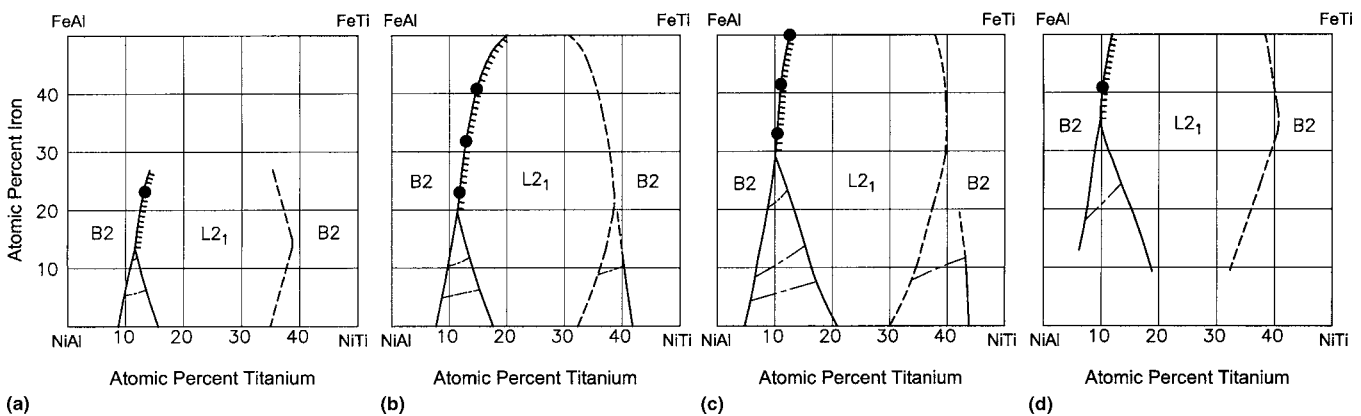


Fig. 1 Al-Fe-Ni-Ti partial isothermal sections at (a) 1300 °C, (b) 1200 °C, (c) 1000 °C, and (d) 900 °C [1997Kai]