JPEDAV (2005) 26:193
DOI: 10.1361/15477030523184
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# Al-Co-Fe-Ti (Aluminum-Cobalt-Iron-Titanium)

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The data on this quaternary system are limited to the $B2$-$L2_1$-$B2$ phase boundaries on the CoAl-CoTi-FeTi-FeAl plane of the composition tetrahedron [2002Ish].

## Binary and Ternary Systems

An update of the Al-Ti phase diagram appears in this issue. For brief descriptions of the Co-Al and Co-Ti systems, see the Al-Co-Ti update in this issue. For Co-Fe phase diagram, see the Al-Co-Fe update by [2005Rag]. For descriptions of the Al-Fe and Fe-Ti phase diagrams, see the Al-Fe-Ti update by [2002Rag].

Recent updates on the ternary systems are: Al-Co-Fe [2005Rag], Al-Co-Ti (this issue), Al-Fe-Ti [2002Rag], and Co-Fe-Ti [2003Rag].

## Quaternary Phase Equilibria

With starting metals of 99.99+ % Al, 99.9+ % Co, 99.9+ % Fe, and 99.5+ % Ti, [2002Ish] melted in an arc furnace under Ar atmosphere a limited number of alloy compositions that lie on the CoAl-CoTi-FeTi-FeAl plane. Diffusion couples prepared by welding were annealed at the desired temperatures. The compositions of the coexisting phases were measured by energy dispersion x-ray spectroscopy. The binary phases CoAl, CoTi, FeTi, and FeAl all have the CsCl-type $B2$ structure. Complete solid solubility exists along the CoAl-FeAl and CoTi-FeTi joins. The Heusler-type $L2_1$ phase $Co_2AlTi$ is present along the CoAl-CoTi join. The phase relationships on the CoAl-CoTi-FeAl-FeTi plane determined by [2002Ish] at 1300, 1200, and 1000 °C are redrawn in Fig. 1. The $B2$-$L2_1$ and $L2_1$-$B2$ boundaries are second-order boundaries without a two-phase region. Only at 1000 °C is the two-phase region seen in a narrow composition range close to the CoAl-CoTi line.

### References

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**2002Rag:** V. Raghavan, Al-Fe-Ti (Aluminum-Iron-Titanium), *J. Phase Equilibria,* Vol 23 (No. 4), 2002, p 367-374

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**2005Rag:** V. Raghavan, Al-Co-Fe (Aluminum-Cobalt-Iron), *J. Phase Equilibria,* Vol 26 (No. 1), 2005, p 57-58

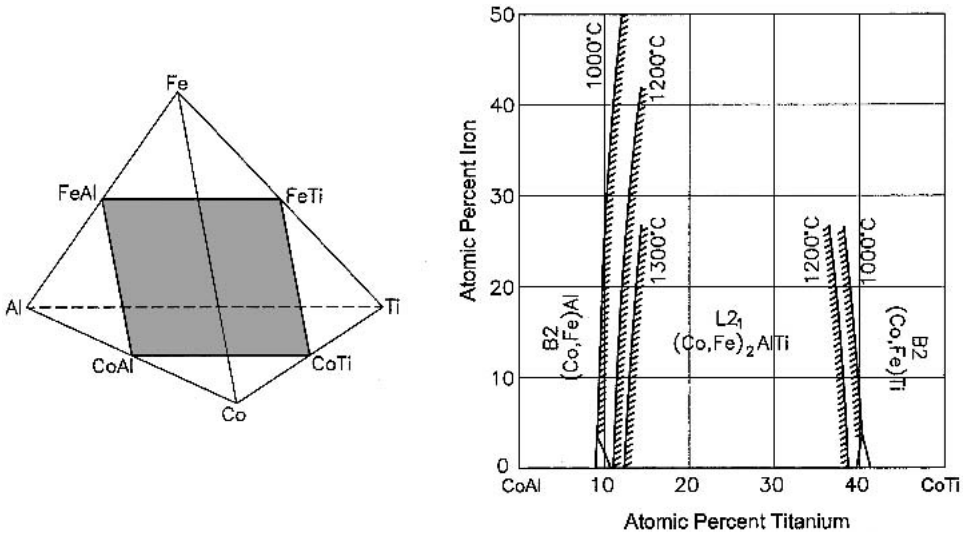


**Fig. 1** Al-Co-Fe-Ti partial $B2$-$L2_1$-$B2$ phase equilibria on the CoAl-CoTi-FeTi-FeAl plane of the composition tetrahedron [2002Ish]