

Al-Co-Cu-Ti (Aluminum-Cobalt-Copper-Titanium)

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The data on this quaternary system are limited to the $B2$ - $L2_1$ - $B2$ phase boundaries in the Co-rich region on the CoAl-CoTi-CuTi-CuAl 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 binary systems, see the Al-Co-Ti update in this issue. For Cu-Al, Co-Cu, and Cu-Ti phase diagrams, see [Massalski2]. Compilations of phase diagram data on the Al-Co-Cu, Al-Cu-Ti, and Co-Cu-Ti ternary systems are given in [1995Vil]. An update of the Al-Co-Ti system appears in this issue.

Quaternary Phase Equilibria

With starting metals of 99.99+ % Al, 99.9+ % Co, 99.9+ % Cu, and 99.5+ % Ti, [2002Ish] melted in an arc furnace under Ar atm a very limited number of alloy compositions that lie on the CoAl-CoTi-CuTi-CuAl 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 and CoTi have the CsCl-type $B2$ structure. The Heusler-type $L2_1$ phases Co_2AlTi is present along the CoAl-CoTi join. The partial phase relationships on the CoAl-CoTi-CuTi-CuAl 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 in nature at higher temperatures. At 1000 °C, the transitions are first-order and the ($B2 + L2_1$) two-phase region is present.

References

1995Vil: P. Villars, A. Prince, and H. Okamoto, *Handbook of Ternary Alloy Phase Diagrams*, ASM International, 1995, Vol 3, p 3006-3009 (Al-Co-Cu), Vol 3, p 3371-3383 (Al-Cu-Ti), and Vol. 6, p 8210 (Co-Cu-Ti)

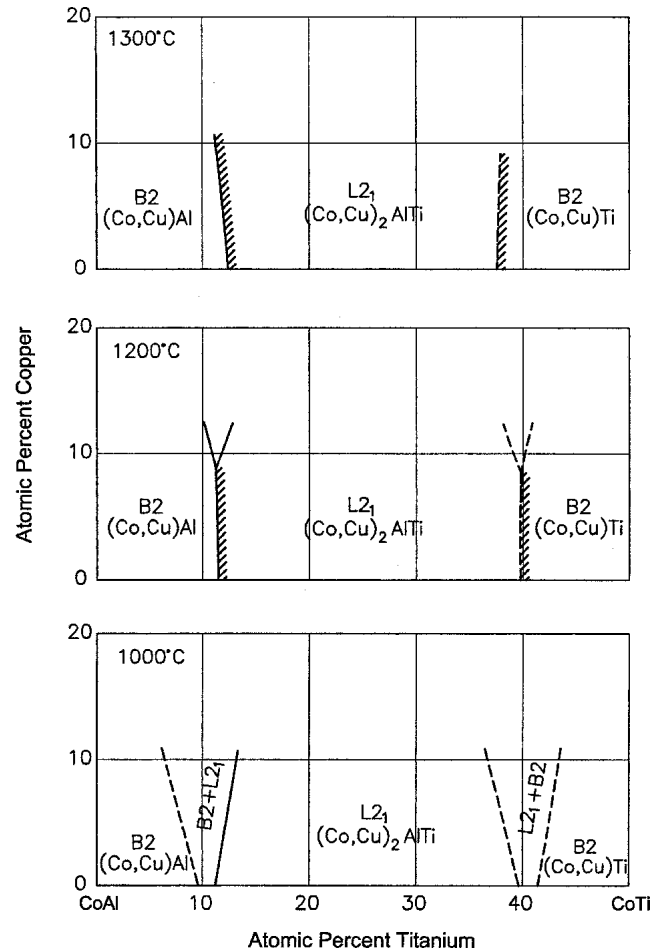


Fig. 1 Al-Co-Cu-Ti partial $B2$ - $L2_1$ - $B2$ phase equilibria on the CoAl-CoTi-CuTi-CuAl plane of the composition tetrahedron [2002Ish]

2002Ish: K. Ishikawa, R. Kainuma, I. Ohnuma, K. Aoki, and K. Ishida, Phase Stability of the X_2AlTi (X: Fe, Co, Ni and Cu) Heusler and $B2$ -Type Intermetallic Compounds, *Acta Mater.*, Vol 50, 2002, p 2433-2443