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Al-B-Ir (Aluminum-Boron-Iridium)

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Recently, [2006Kim] determined an isothermal section at 1000 °C for Ir-rich alloys, which depicts the $E2_1$-type ternary compound Ir_3AlB.

Binary Systems

There are two intermediate phases in the Al-B system: AlB_2 ($C32$, AlB_2-type hexagonal) and AlB_{12} (AlB_{12}-type tetragonal). The Al-Ir phase diagram [Massalski2] depicts the following intermediate phases: Ir_2Al_9 ($D8_d$, Co_2Al_9-type monoclinic), Ir_4Al_{13} (monoclinic), $IrAl_3$ ($D0_{18}$, Na_3As-type hexagonal), Ir_2Al_5 (or $IrAl_{2.7}$, cubic), and IrAl ($B2$, CsCl-type cubic). The B-Ir phase diagram is not established. In the Ir-rich region, two intermediate phases, Ir_5B_3 and Ir_3B_2, are present [2006Kim].

Ternary Isothermal Section

On the basis of a limited number of experiments, [2006Kim] constructed an isothermal section at 1000 °C for Ir-rich alloys of this system as shown in Fig. 1. The $E2_1$-type ternary phase with the nominal composition Ir_3AlB is present. Selected area diffraction in the transmission electron microscope showed the ordering of B atoms and vacancies in the octahedral interstitial sites, indicating a deficiency of B atoms as compared to the nominal formula Ir_3AlB [2006Kim]. However, the results of the electron probe microanalysis by [2006Kim] indicated a B concentration higher than the nominal formula, implying the possibility of B behaving both as an interstitial and as a substitutional solute.

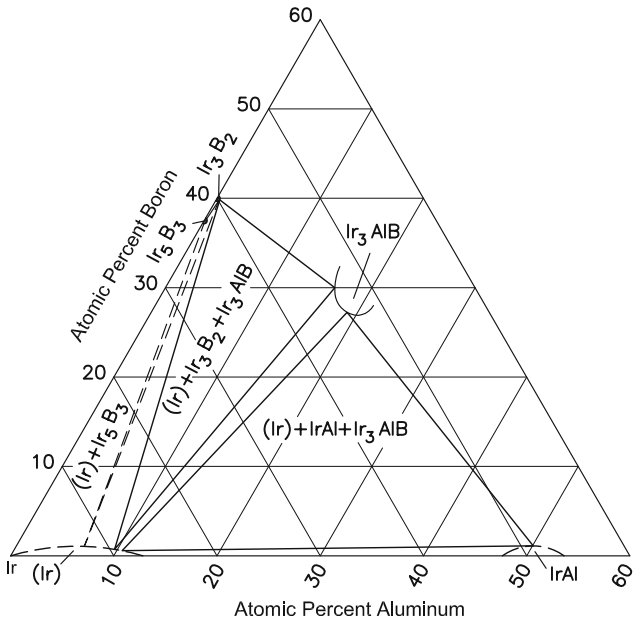

Fig. 1 Al-B-Ir partial isothermal section at 1000 °C [2006Kim]

Reference

2006Kim: Y. Kimura, K. Iida, F.G. Wei, and Y. Mishima, Phase Equilibria in the T-Al-C (T: Co, Ni, Rh, Ir) and T-Al-B (T: Rh, Ir) Systems for the Design of $E2_1$-Co_3AlC Based Heat Resistant Alloys, *Intermetallics*, 2006, **14**, p 508-514