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Al-C-Ir (Aluminum-Carbon-Iridium)

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Recently, [2002Kim] determined an isothermal section at 1100 °C for this system in the Ir-rich region. No ternary carbide of the $E2_1$, Co_3AlC-type was found.

Binary Systems

In the Al-C system, the stoichiometric compound Al_4C_3 ($D7_1$-type rhombohedral) is present. 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 C-Ir system [Massalski2] is of the simple eutectic type, with the eutectic temperature at 2296 °C.

Ternary Phase Equilibria

Starting with high purity elemental powders, [2002Kim] prepared by means of arc-melting under Ar atm (or spark plasma sintering in vacuum) just one alloy with the composition 66.7Ir-22.2Al-11.1C (in atomic percent). This composition corresponds to a possible ternary carbide with the stoichiometry of $Ir_3AlC_{0.5}$. Alloy samples were annealed at 1100 °C for 72-144 h. The phase equilibria were studied with electron microscopy, x-ray diffraction and electron probe microanalysis. Differential thermal analysis was carried out at a heating/cooling rate of 10 °C per min. The microstructure showed primary crystals of (Ir), IrAl ($B2$) phase, and graphite. There was no evidence for the presence of a ternary carbide. The partial isothermal section at 1100 °C and the liquidus projection constructed by [2002Kim] are shown in Fig. 1 and 2 respectively.

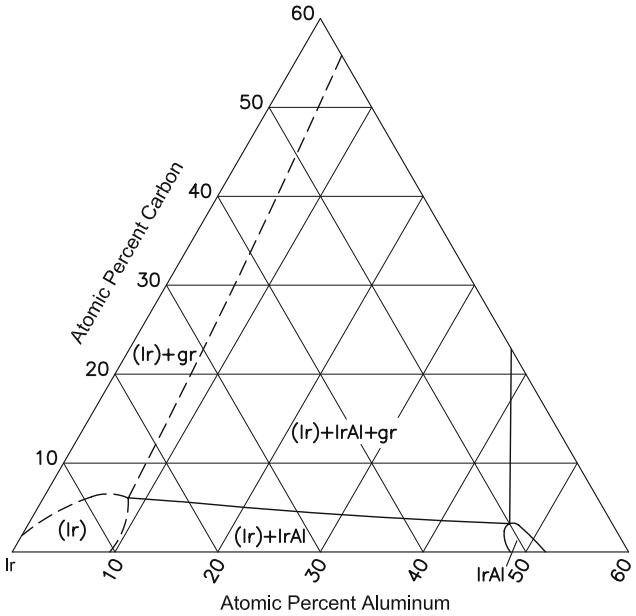

Fig. 1 Al-C-Ir partial isothermal section at 1100 °C [2002Kim]

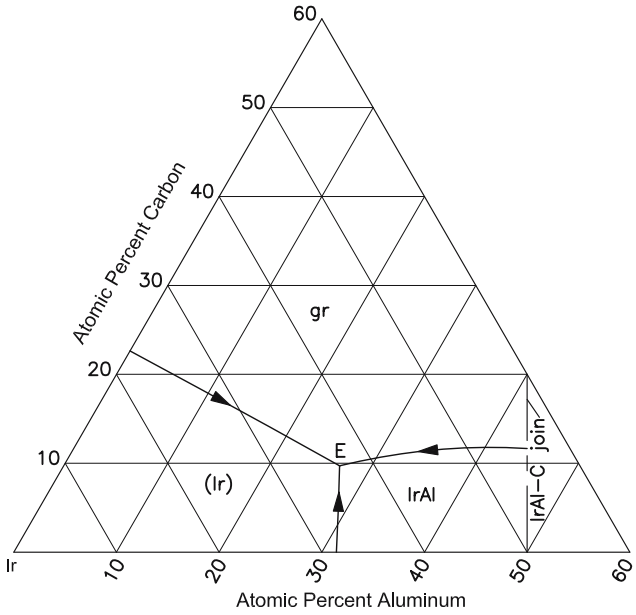

Fig. 2 Al-C-Ir partial liquidus projection [2002Kim]

Reference

2002Kim: Y. Kimura, K. Iida, and Y. Mishima, Microstructures and Phase Equilibria of the Transition Metal Corner in the Rh-Al-C and Ir-Al-C Ternary Systems, *Intermetallics*, 2002, **10**, p 933-944