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Al-Nb-V (Aluminum-Niobium-Vanadium)

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In a previous study, an isothermal section at 1000 °C was determined for this system by [1966Ram], which depicts one ternary compound. Recently, [2005Jia] reported partial isothermal sections at 1500, 1300, and 1100 °C, showing the tie-lines between the *A*15 compound Nb_3Al and the bcc solid solution (Nb,V).

Binary Systems

The Al-Nb phase diagram [Massalski2] depicts three intermediate phases: Nb_3Al (*A*15, Cr_3Si-type cubic), Nb_2Al ($D8_b$, σCrFe-type tetragonal), and $NbAl_3$ ($D0_{22}$, $TiAl_3$-type tetragonal). The Al-V phase diagram [2004Gon, Massalski2] depicts five intermetallic compounds: V_5Al_8 ($D8_2$, Cu_5Zn_8-type cubic), VAl_3 ($D0_{22}$, $TiAl_3$-type tetragonal), V_4Al_{23} (hexagonal), V_7Al_{45} (monoclinic), and V_2Al_{21} (cubic). Nb and V form a continuous bcc solid solution at all temperatures below the melting range.

Ternary Isothermal Sections

[2005Jia] prepared seven Nb-rich ternary alloys in a transferred-arc plasma melter under Ar atm. The alloys were given a final anneal at 1500, 1300, and 1100 °C for 200 h and quenched in water. The phase equilibria were studied with scanning and transmission electron microscopy and energy dispersive x-ray spectroscopy. The partial isothermal sections constructed by [2005Jia] at 1500, 1300, and 1100 °C are shown in Fig. 1. The tie-lines between co-existing compositions of *A*15 and bcc phases are shown [2005Jia]. Nb_3Al (*A*15) dissolves at least 25 at.% V at these temperatures.

The morphology of the precipitate (Nb_3Al) and its orientation relationship with the bcc matrix are among the other features studied by [2005Jia].

References

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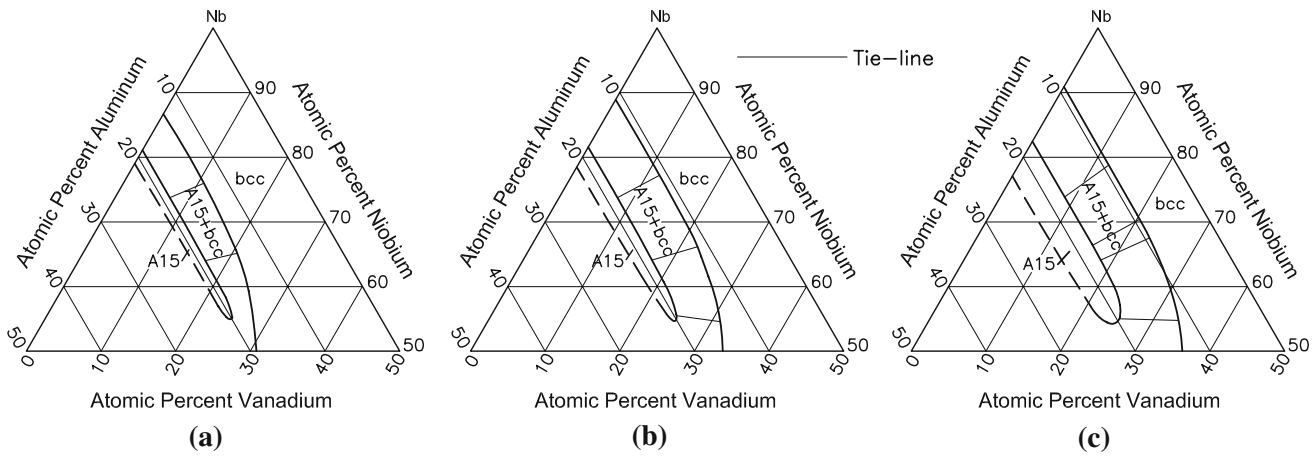

Fig. 1 Al-Nb-V partial isothermal sections at (a) 1500, (b) 1300, and (c) 1100 °C [2005Jia]