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Co-Nb (Cobalt-Niobium)

H. Okamoto

The Co-Nb phase diagram in [Masslski2] was redrawn from [1967Par]. [1998Har] calculated the Co-Nb phase diagram by taking into account more recent data, as reviewed by [2000Oka].

Figure 1 shows the Co-Nb phase diagram reinvestigated by [2008Ste] by means of EPMA, DTA, and x-ray diffraction for the temperature range from 1550 to 750 °C. This phase diagram was expanded to higher and lower temperatures by this editor following the trend shown in the phase diagram of [1998Har]. An interesting feature of this phase diagram is that Co_2Nb exists in three forms side by side. αCo_2Nb and βCo_2Nb were shown as line compounds and named Co_3Nb and $Co_{16}Nb_9$, respectively, in the diagram of [1998Har]. However, their crystal structures

Table 1 Co-Nb crystal structure data

Phase	Composition, at.% Nb	Pearson symbol	Space group	Strukturbericht designation	Prototype
(αCo)	0-5.5	*cF*4	$Fm\bar{3}m$	*A*1	Cu
(εCo)	0	*hP*2	$P6_3/mmc$	*A*3	Mg
Co_7Nb_2	22.2-22.5	...	...	...	...
αCo_2Nb	24-25	*hP*24	$P6_3/mmc$	*C*36	$MgNi_2$
γCo_2Nb	25-35.5	*cF*24	$Fd\bar{3}m$	*C*15	Cu_2Mg
βCo_2Nb	36-37.5	*hP*12	$P6_3/mmc$	*C*14	$MgZn_2$
Co_6Nb_7	47-57	*hR*13	$R\bar{3}m$	$D8_5$	Fe_7W_6
(Nb)	94.7-100	*cI*2	$Im\bar{3}m$	*A*2	W

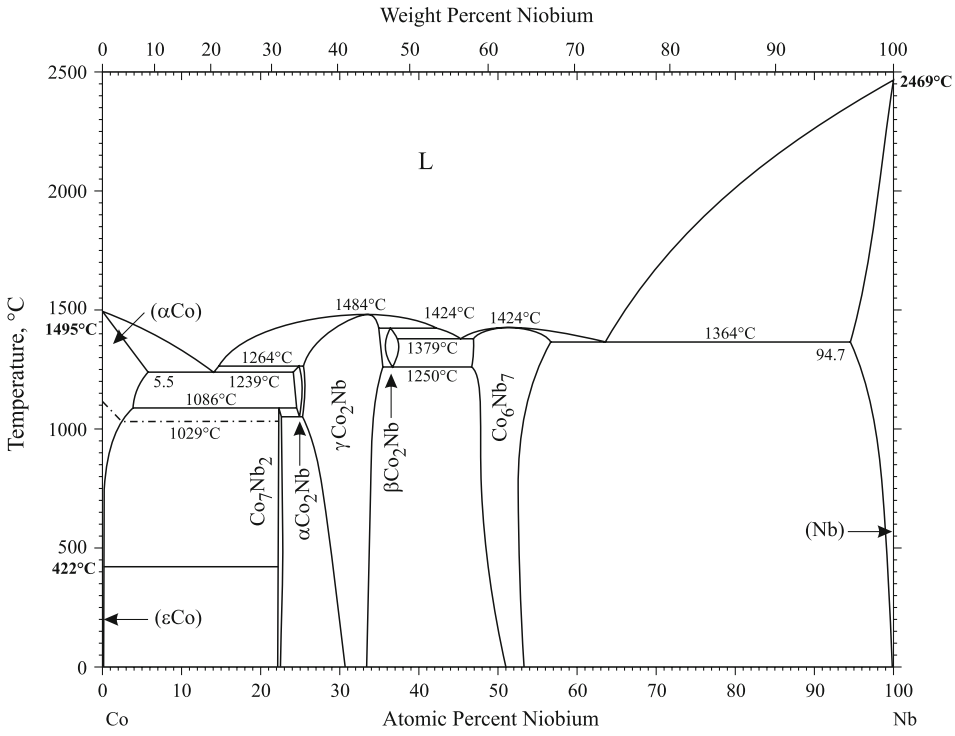

Fig. 1 Co-Nb phase diagram

suggest that Co_2Nb may be a better designation for both phases (see Table 1). In Fig. 1, smooth extrapolation of the liquidus and solidus of each phase appears to form congruent melting at around Co_2Nb stoichiometry. Therefore, Co_2Nb seems to be a good designation not only for the center phase but also for the two phases on both sides. α, β, and γ have been added to distinguish them in the order of possible melting point (from low to high).

Co_6Nb_7 in Fig. 1 was inadvertently mislabeled Co_7Nb_6 in [Massalski2]. Because this phase exists in the Nb-rich side of the equiatomic composition, Co_6Nb_7 should be the correct designation.

Table 1 gives Co-Nb crystal structure data.

References

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