

Nb-Sb (Niobium-Antimony)

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The Nb-Sb phase diagram in [Massalski2] was primarily based on [1966Myz]. Four intermediate compounds Nb_3Sb , Nb_3Sb_2 , $NbSb$, and Nb_4Sb_5 were shown, but available crystal structure data were inconsistent.

[2006Lom] investigated Nb-Sb crystal structures and found that there are three stable intermediate phases, i.e., Nb_3Sb , Nb_5Sb_4 , and $NbSb_2$. A new phase diagram was proposed by [2006Lom], as shown in Fig. 1.

This phase diagram has the following unlikely features.

- (1) The (Nb) solvus is expected to reach 0 at.% Sb at 0 K. Therefore, vertical solvus below ~800 °C is unlikely.

- (2) Liquidus and solidus of Nb_3Sb would cross when extrapolated above 1750 °C unless unlikely inflections are introduced.
- (3) The Nb_5Sb_4 liquidus appears to have a peak at around $NbSb_2$. It should be at the stoichiometry.
- (4) Extension of the Nb_5Sb_4 liquidus to the Sb side would cross the Sb line unless a sharp change of slope is introduced.

Apparently, further experimental investigations are needed for this system.

Table 1 shows Nb-Sb crystal structure data.

Table 1 Nb-Sb crystal structure data

Phase	Composition, at.% Sb	Pearson symbol	Space group	Struktur bericht designation	Prototype
(Nb)	0 to 20	<i>cI2</i>	<i>Im</i> $\bar{3}m$	A2	W
Nb_3Sb	24 to 28	<i>cP8</i>	<i>Pm</i> $\bar{3}n$	A15	Cr_3Si
Nb_5Sb_4	44.4	<i>tI18</i>	<i>I4/m</i>	...	Ti_5Te_4
$NbSb_2$	66.7	<i>mC12</i>	<i>C2/m</i>	...	$OsGe_2$
(Sb)	100	<i>hR2</i>	<i>R</i> $\bar{3}m$	A7	αAs

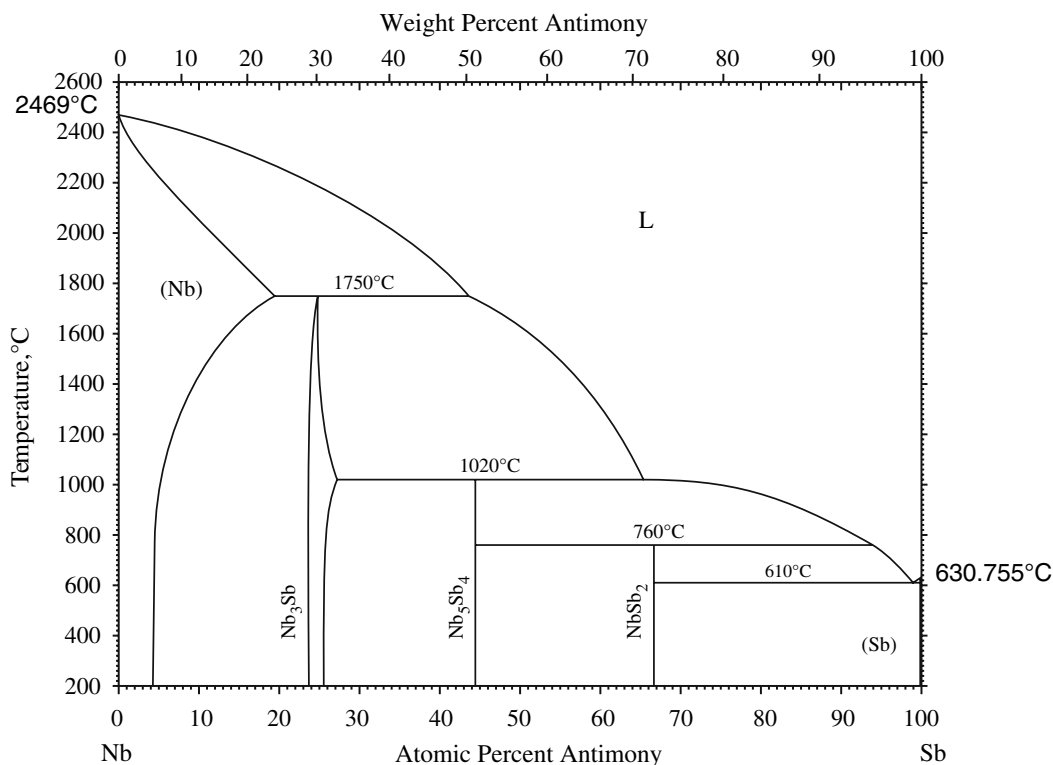


Fig. 1 Nb-Sb phase diagram

Section III: Supplemental Literature Review

References

- 1966Myz:** L.F. Myzenkova, V.V. Baron, and Ye.M. Savitskiy, Constitution Diagram of the Niobium-Antimony System, *Izv. Akad. Nauk, SSSR, Met.*, 1966, (2), p 163-165 in Russian; TR: *Russ. Met.*, 1966, (2), p 89-91
- 2006Lom:** Ya.F. Lomnytska and Yu.B. Kuz'ma, The Nb-Sb System, *J. Alloys Compds.*, 2006, **413**, p 114-117