

Ni-Sn (Nickel-Tin)

H. Okamoto

The Ni-Sn phase diagram in [Massalski2] was redrawn from [1991Nas].

[2007Sch] reinvestigated the Ni-Sn phase diagram by means of XRD, DTA, EPMA, and metallography. The result is shown in Fig. 1. In [Massalski2], one low-temperature modification

of Ni₃Sn₂ was shown schematically, but [2007Sch] found three modifications below 508 °C, as shown in Fig. 2.

Table 1 shows Ni-Sn crystal structure data summarized by [2007Sch] based on their own measurements and recent literature data.

Table 1 Ni-Sn crystal structure data

Phase	Composition, at.% Sn	Pearson symbol	Space group	Strukturbericht designation	Prototype
(Ni)	0-10.7	<i>cF4</i>	<i>Fm$\bar{3}m$</i>	<i>A1</i>	Cu
β Ni ₃ Sn	24.1-26.3	<i>cF16</i>	<i>Fm$\bar{3}m$</i>	<i>D0₃</i>	BiF ₃
α Ni ₃ Sn	24.8-25.5	<i>hP8</i>	<i>P6₃/mmc</i>	<i>D0₁₉</i>	Ni ₃ Sn
β Ni ₃ Sn ₂	36.7-44	<i>hP6</i>	<i>P6₃/mmc</i>	<i>B8₂</i>	Ni ₂ In
α' Ni ₃ Sn ₂	38.3-39	...	<i>Cmcm</i>
α Ni ₃ Sn ₂	39.3-41.1	<i>oP20</i>	<i>Pnma</i>
α'' Ni ₃ Sn ₂	41.15-42.7	...	<i>Cmcm</i>
Ni ₃ Sn ₄	53-57	<i>mC14</i>	<i>C2/m</i>
(β Sn)	100	<i>tI4</i>	<i>I4₁/amd</i>	<i>A5</i>	β Sn
(α Sn)	100	<i>cF8</i>	<i>Fd$\bar{3}m$</i>	<i>A4</i>	C (diamond)

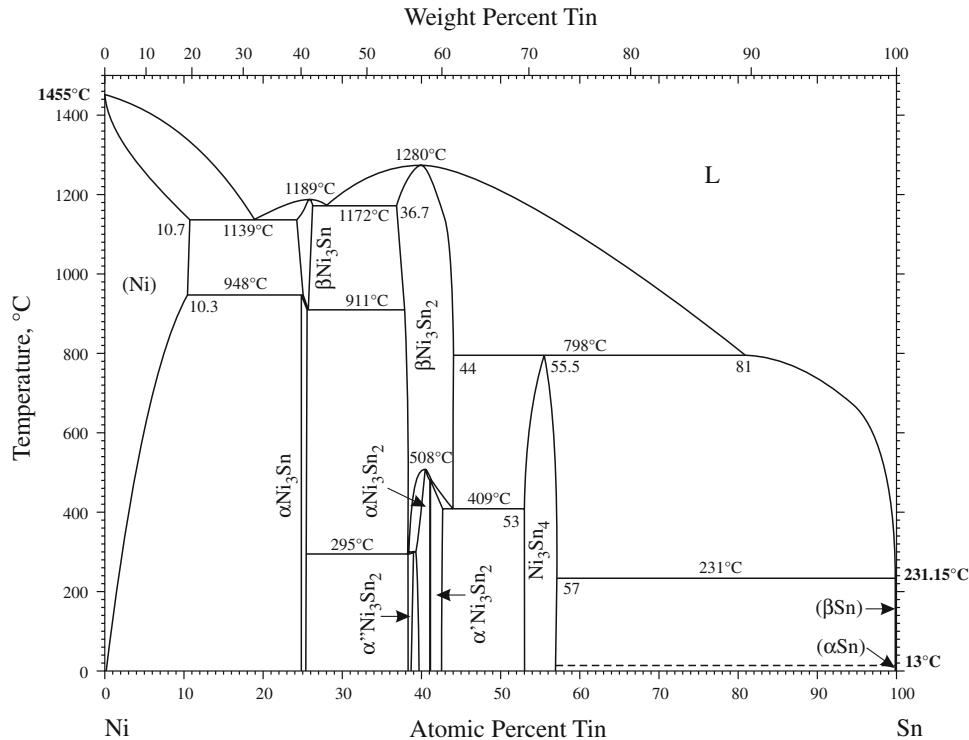


Fig. 1 Ni-Sn phase diagram

Section III: Supplemental Literature Review

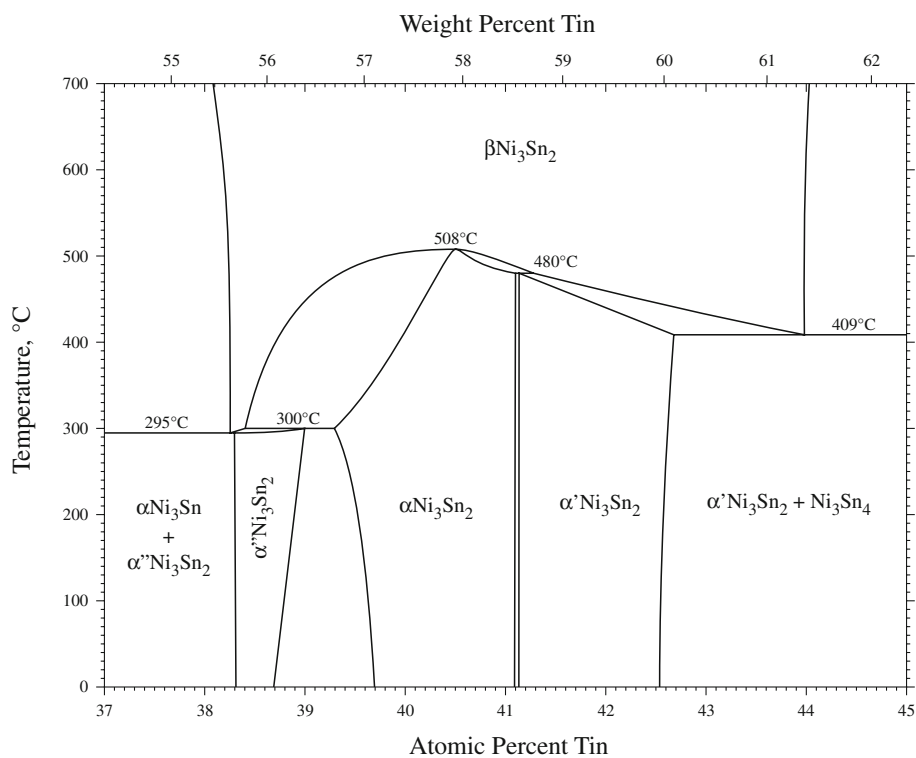


Fig. 2 Partial Ni-Sn phase diagram showing details of three low-temperature modifications of Ni₃Sn₂

References

1991Nas: P. Nash and A. Nash, Ni-Sn (Nickel-Tin), *Phase Diagrams of Binary Nickel Alloys*, P. Nash, Ed., ASM International, Materials Park, OH, 1991, p 310-318

2007Sch: C. Schmetterer, H. Flandorfer, K.W. Richter, U. Saeed, M. Kauffman, P. Roussel, and H. Ipsier, A New Investigation of the System Ni-Sn, *Intermetallics*, 2007, **15**(7), p 869-884