

As – Sn (Arsenic – Tin)

Phase diagram

The phase diagram is drawn by Gokcen [Massalski] (see also [Moffatt]) on the basis of results published by Parravano [11 Par], Mansuri [23 Man] and Peretti [69 Per]. Fig. 1 is reproduced from the diagram published by [90 Gok]. Metastable phases do not occur by splat cooling [92 Gok]. Fig. 2 is the middle part of the phase diagram in an enlarged version (taken from [90 Gok]).

Crystal structure

Crystallographic data of intermediate phases are given in Table 1.

Table 1. As-Sn. Crystallographic data of intermediate phases.

Phase	Composition [at% Sn]	Structure	Prototype	Lattice parameters [nm]			Reference
				<i>a</i>	<i>b</i>	<i>c</i>	
AsSn	50	cub	NaCl	0.5716			[74 Vdo]
As ₃ Sn ₄	57 ... 60	hex	Mo ₂ B ₅	0.4090		3.606	[68 Eck]

Thermodynamics

Using direct synthesis calorimetry Fitzner et al. [96 Fit] have determined the standard enthalpy of formation of the intermediate phase AsSn. The value is

$$\Delta H^{\circ} = -9.5 \pm 3.2 \text{ kJ g-atom}^{-1}$$

The same authors have calculated the enthalpies of mixing of liquid alloys. The results can be expressed by the approximate expression (As-Sn, 987 K):

$$\Delta H^L = - (16.87 + 8.90 x_{\text{As}}) \cdot x_{\text{As}} \cdot x_{\text{Sn}}$$

Figures

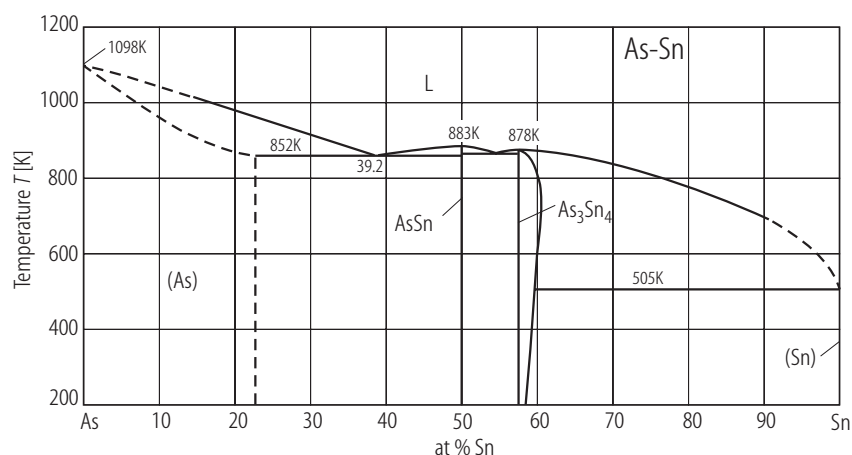


Fig. 1. As-Sn. Phase diagram [Moffatt].

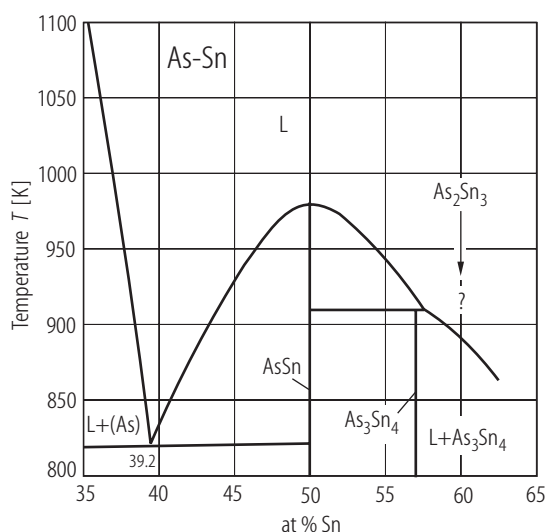


Fig. 2. As-Sn. Middle part of the phase diagram (taken from [90 Gok]).

References

- [11 Par] Parravano, N., de Cesaris, P.: Atti Acad. Lincei. **20** (1911) 593
- [23 Man] Mansuri, Q.A.A.: J. Chem., Soc. (London) **123** (1923) 214
- [68 Eck] Eckerlin, P., Kischio, W.: Z. Anorg. Allg. Chem. **363** (1968) 1
- [69 Per] Peretti, E.A., Paulsen, J.K.: J. Less-Common Met. **17** (1969) 283
- [74 Vdo] Vdovina, T.Z., Medvedeva, Z.S.: Zh. Neorg. Khim. **19** (1974) 2257
- [92 Gok] Gokcen, N.A., in: [Massalski]
- [96 Fit] Fitzner, K., Kleppa, O.J.: J. Alloys and Comp. **238** (1996) 187
- [Massalski] Massalski, T.B., (ed.): "Binary Alloy Phase Diagrams", Second Edition, The Materials Information Society, ASM International, Materials Park, Ohio (1992)
- [Moffatt] Moffatt, W.G., (ed.): "Handbook of Binary Phase Diagrams", Business Growth Services, General Electric Co., Schenectady, New York (1976)