

Au – Sc (Gold – Scandium)

Phase diagram

Palenzona et al. [97 Pal], using differential thermal analysis, metallographic observation, X-ray diffractography and electron microscopy, have determined the phase equilibria between 10 and 80 at% Sc. A short discussion of the results is given by Okamoto [98 Oka]. The phase diagram obtained is shown in Fig. 1.

Crystal structure

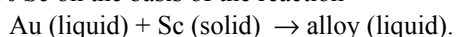
Crystallographic data of found intermediate phases are given in Table 1 (taken from [97 Pal]).

Table 1. Au–Sc. Crystallographic data of intermediate phases.

Phase	Structure	Type	Lattice parameters [nm]			Reference
			<i>a</i>	<i>b</i>	<i>c</i>	
Au ₄ Sc	tet	MoNi ₄	0.6546	-	0.40320.	[97 Pal]
			0.6549	-	4039	[87 Oka]
Au ₃ Sc	ort	TiCu ₃	0.5800	0.823	0.5003	[97 Pal]
Au ₂ Sc	tet	MoSi ₂	0.3510	-	0.8728	[97 Pal]
			0.3509	-	0.8730	[87 Oka]
AuSc	cub	CsCl	0.3369	-	-	[97 Pal]
			0.3370	-	-	[87 Oka]
AuSc ₂	ort	Anti-PbCl ₂	0.6470	0.667	0.8358	[97 Pal]
AuSc _{3,5}	ort	AuSc _{3,5}	1.360	1.476	1.4833	[97 Pal]

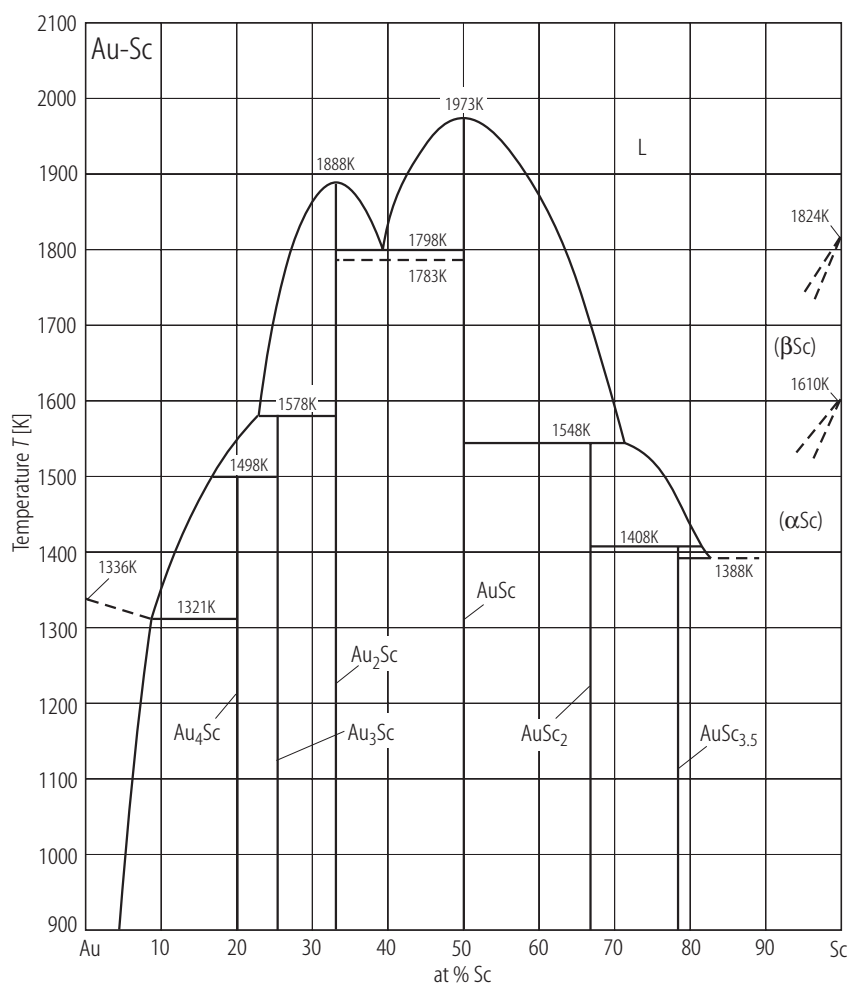
Thermodynamics

By high-temperature calorimetry Fitzner et al. [91 Fit] have determined the enthalpy of mixing at 1473 K and 50 at% Sc on the basis of the reaction



Their result:

$$\Delta H^L = -46.2 \pm 2.7 \text{ kJ g-atom}^{-1}$$

Figure**Fig. 1. Au-Sc.** Phase diagram [98 Oka].**References**

- [87 Oka] Okamoto, H., Massalski, T.B. (eds.): „Phase Diagram of Binary Gold Alloys“, ASM International, (1987) 261
- [91 Fit] Fitzner, K., Jung, W.G., Kleppa, O.J.: Metallurg. Trans. A **22A** (1991) 1103
- [97 Pal] Palenzona, A., Manfrinetti, P.: J. Alloys and Comp. **257** (1997) 224
- [98 Oka] Okamoto, H.: J. Phase Equilibria **19** (1998) 599