

Au – Nd (Gold – Neodymium)

Phase diagram

The phase equilibria have been investigated experimentally by Saccone et al. [99 Sac]. As techniques they applied the differential thermal analysis, X-ray diffraction, metallography, and scanning electron microscopy.

The resulting phase diagram is shown in Fig. 1 and Fig. 2.

Crystal structure

Crystallographic data for intermediate compounds are collected in Table 1 (taken from [99 Sac]).

Table 1. Au–Nd. Crystal structure of intermediate phases (taken from [99 Sac]).

Phase	Structure	Prototype	Lattice parameters [nm]			Reference
			<i>a</i>	<i>b</i>	<i>c</i>	
AuNd ₂	ort	Co ₂ Si	0.7213	0.5025	0.9235	[99 Sac]
α-AuNd	ort	FeB	0.7320	0.4610	0.5890	[71 McM]
β-AuNd	ort	CrB	0.3840	1.107	0.4700	[71 McM]
γ-AuNd	cub	CsCl	0.3659	-	-	[71 Cha]
Au ₄ Nd ₃	hex	Pu ₃ Pd ₄	1.3739	-	0.6088	[94 For]
Au ₃₆ Nd ₁₇	tet	Nd ₁₇ Au ₃₆	1.5835	-	1.5835	[94 For]
Au ₅₁ Nd ₁₄	hex	Gd ₁₄ Ag ₅₁	1.269	-	0.9225	[69 Don]
Au ₆ Nd	mon	PrAu ₆	0.774	0.772	0.907	[74 Mor]
				β= 100.1°		

Thermodynamics

Standard enthalpies of formation of three intermediate phases have been calculated from enthalpies of formation determined by Fitzner et al. [94 Fit] at 1473 K. The results are shown in Table 2.

Table 2. Au–Nd. Standard enthalpies of formation of intermediate phases in [kJ g-atom⁻¹]

Phase	ΔH_{298}°
Au ₅₁ Nd ₁₄	- 49.3 ± 4.9
Au ₂ Nd	- 60.7 ± 3.7
AuNd	- 70.2 ± 3.7

The same authors have determined enthalpies of mixing of liquid alloys. The results are plotted in Fig. 3.

Figures

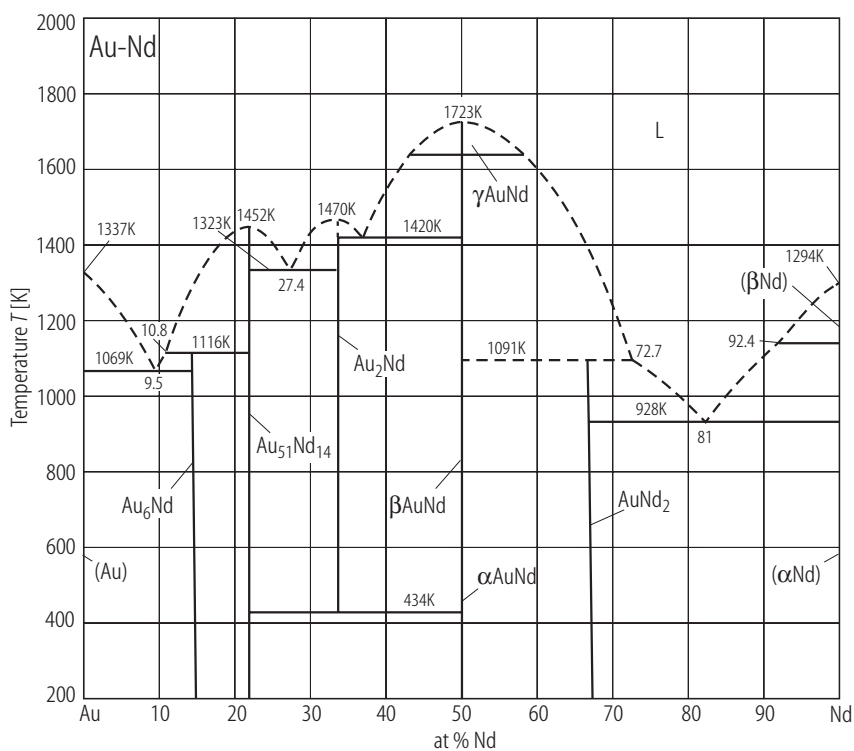


Fig. 1. Au-Nd. Phase diagram [99 Sac].

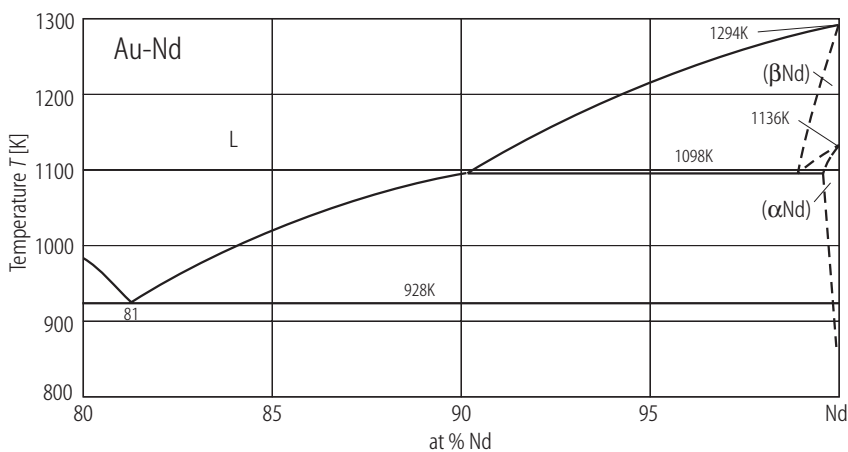


Fig. 2. Au-Nd. Partial phase diagram, enlarged version [99 Sac].

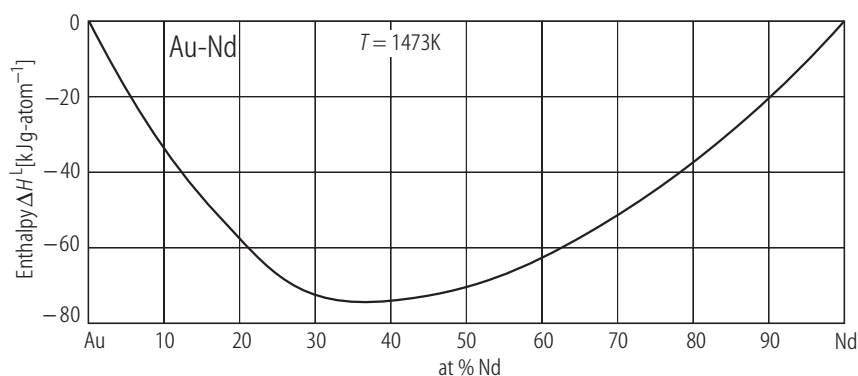


Fig. 3. Au–Nd. Enthalpies of mixing of liquid alloys [94 Fit].

References

- [69 Don] Donalato, C., Steep, S.: J. Less-Common Met. **18** (1969) 18
- [71 Cha] Chao, C.C., Luo, H.L., Duwez, P.: J. Appl. Phys. **34** (1963) 1971
- [71 McM] Mc Masters, O.D., Gschneidner Jr., K.A., Bruzzone, G., Palenzona, A.: J. Less-Common Met. **25** (1971) 135
- [74 Mor] Moreau, J.M., Parthé, E.: Acta Crystallogr. **B30** (1974) 1743
- [94 Fit] Fitzner, K., Jung, W.G., Kleppa, O.J.: Metallurg. Trans. A **25A** (1994) 1495
- [94 For] Fornasini, M.L. Saccone, A.: Z. Kristallogr. **209** (1994) 657
- [99 Sac] Saccone, A., Meccio, D., Delfino, S.; Ferro, R.: Metall. Mater. Trans. A **30A** (1999) 1169