

Al – Hf (Aluminum – Hafnium)

Phase diagram

Mainly on the basis of results published by Rath et al. [60 Rat], Pötzschke et al. [62 Pöt], Tsyganova et al. [70 Tsy], and Murray et al. [98 Mur] have constructed an assessed phase diagram, which is reproduced in Fig. 1.

The solubility of Hf in liquid as well as in solid Al has been determined by Rath et al. [60 Rat] using resistivity measurements. The resulting equilibria at high Al-concentrations, as proposed by [98 Mur], are shown in Fig. 2.

Using splat cooling, Hori et al. [82 Hor] succeeded in metastable dissolving of up to 0.96 at% Hf in solid Al. At higher Hf-concentrations (up to 1.6 at% Hf) besides this metastable solid solution a metastable phase (γ -Al₃Hf) occurs. By aging this phase transforms to β -Al₃Hf.

Thermodynamics

Balducci et al. [95 Bal] have determined the vapor pressure of Al above the alloys at temperatures between 1280 K and 1680 K. Evaluating these results, thermodynamic functions of liquid alloys have been determined. The results obtained are collected in Table 1.

Table 1. Al–Hf. Enthalpies of formation for intermediate phases in kJ g-atom⁻¹.

Phase	ΔH^s
Al ₃ Hf	- 44.7 ± 2.4
Al ₂ Hf	- 43.8 ± 1.3
Al ₃ Hf ₂	- 40.8 ± 2.6
(AlHf)	- 36.1 ± 4.3
(Al ₄ Hf ₅)	- 33.5 ± 5.0

Figures

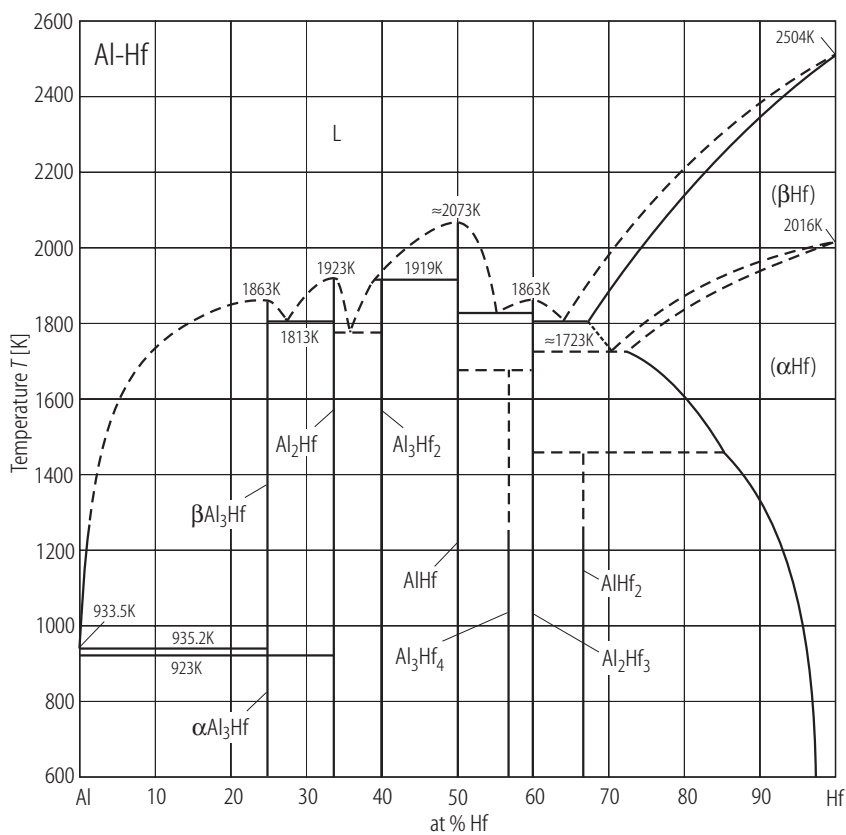


Fig. 1. Al-Hf. Assessed phase diagram [98 Mur].

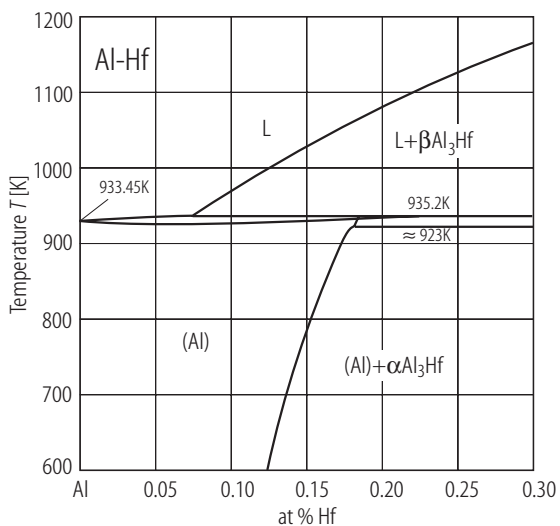


Fig. 2. Al-Hf. Solubility of Hf in liquid as well as in solid Al determined by [98 Mur].

References

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