

Al – Pt (Aluminum – Platinum)

Phase diagram

The assessment of the Al-Pt system has been done by [00 Wu]. The results are shown in Fig. 1.

By equilibrating the alloy with metal oxide under controlled oxygen partial pressure in the temperature range between 1425 K and 1725 K, thermodynamic activity coefficients have been determined. The values are:

$$2.2 \cdot 10^{-10} < \gamma_{\text{Al}} < 3.6 \cdot 10^{-8}$$

$$2.3 \cdot 10^{-7} < \gamma_{\text{Pt}} < 7.4 \cdot 10^{-5}$$

Crystal structure

Bronger et al. [96 Bro] succeeded in preparing single crystals of Al_3Pt_5 from elements at 1543 K. These crystals were used for structure determination. The structure is isotypic with orthorhombic Ge_3Rh_5 – type [58 Kle].

The crystallographic data of Al_3Pt_5 are:

Structure:	orthorhombic
Lattice parameters:	$a = 0.5402 \text{ nm}$
	$b = 1.0711 \text{ nm}$
	$c = 0.3949 \text{ nm}$

Using a chemical transport method intermediate phases could be prepared [92 Sau]: $\text{Al}_3\text{Pt}_{13}$, AlPt_3 , AlPt_2 and Al_3Pt_5 .

Thermodynamics

Nanko et al. [98 Nan] applied the EMF method using a galvanic cell with solid CaF_2 as an electrolyte to determine thermodynamic activities in Al-Pt solid solutions. The results are plotted in Fig. 2 as a function of reciprocal temperature.

Jung et al. [91 Jun] have used high-temperature calorimetry to determine the standard enthalpy of formation of AlPt . Its value amounts to

$$\Delta H^{\text{S}} = -195 \pm 10 \text{ kJ g-atom}^{-1}$$

Figures

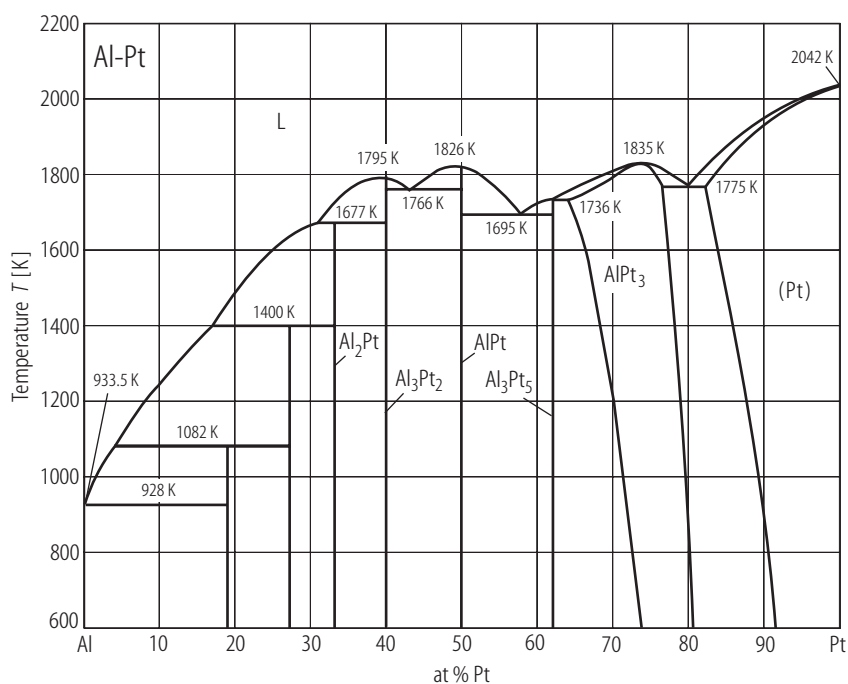


Fig. 1. Al-Pt. System Al-Pt assessed by Jung et al. [91 Jun].

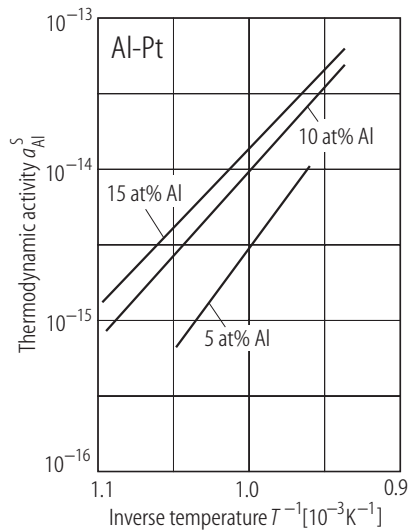


Fig. 2. Al-Pt. Thermodynamic activities of solid solutions [98 Nan].

References

- [58 Kle] Klemm, W., Dorn, F., Huch, R.: Naturwiss. **45** (1958) 490
- [91 Jun] Jung, W.G., Kleppa, O.J., Topor, L.: J. Alloys and Comp. **176** (1991) 309
- [92 Sau] Sauer, M., Engel, A., Lueken, H.: J. Alloys and Comp. **183** (1992) 281
- [96 Bro] Bronger, W., Wrzesien, K.: J. Alloys and Comp. **244** (1996) 194
- [98 Nan] Nanko, M., Kishi, Y., Maruyama, T.: Mater. Trans. Jap. Inst. Metals **39** (1998) 1238
- [00 Wu] Wu, K., Jin, Z.: J. Phase Equilibria **21** (2000) 321