

Al – Sc (Aluminum – Scandium)

Phase diagram

Murray [98 Mur] have published an assessed phase diagram which has been calculated on the basis of known or estimated thermodynamic functions including enthalpies of mixing of the liquid alloys. In addition, phase equilibria determined by Naumkin et al. [65 Nau] (taking not in consideration the Al-rich part) were used by [98 Mur] to construct the assessed diagram.

Fig. 1 gives the thus obtained phase diagram, which superseded that one assessed by Gschneider et al. [89 Gsc].

Thermodynamics

Enthalpies of mixing of liquid alloys have been determined by Batalin et al. [85 Bat] and by Litovskii et al. [86 Lit]. Integral enthalpies of mixing at 1873 K assessed by [98 Mur] are shown in Fig. 2.

Using direct synthesis calorimetry, Meschel et al. [93 Mes] have determined the standard enthalpy of formation of AlSc. The value amounts to

$$\Delta H_{298}^S = -41.1 \pm 1.5 \text{ kJ g-atom}^{-1}$$

Jung et al. [91 Jun], using a high-temperature calorimeter at 1473 K determined for the enthalpy of formation for Al_2Sc the value:

$$\Delta H_{298}^S = -47.7 \pm 0.9 \text{ kJ g-atom}^{-1}$$

Figures

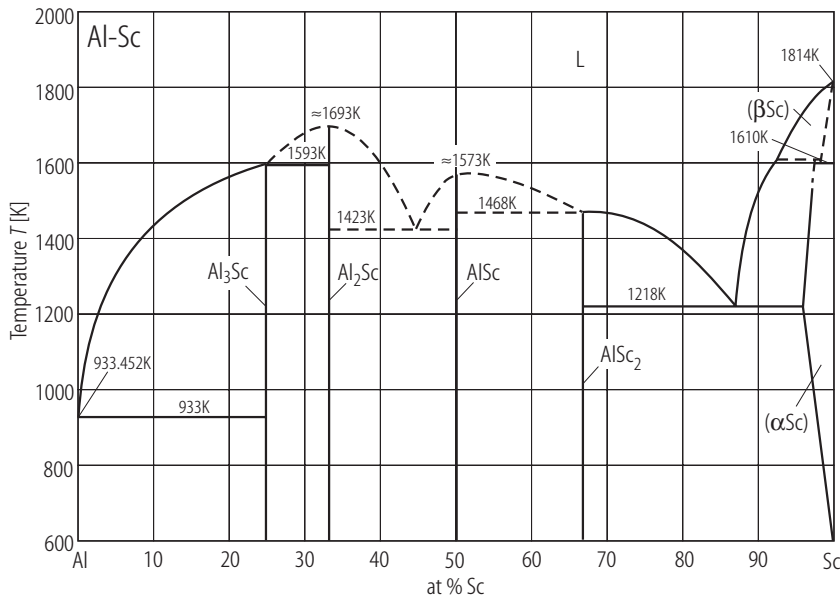


Fig. 1. Al–Sc. Assessed phase diagram [98 Mur].

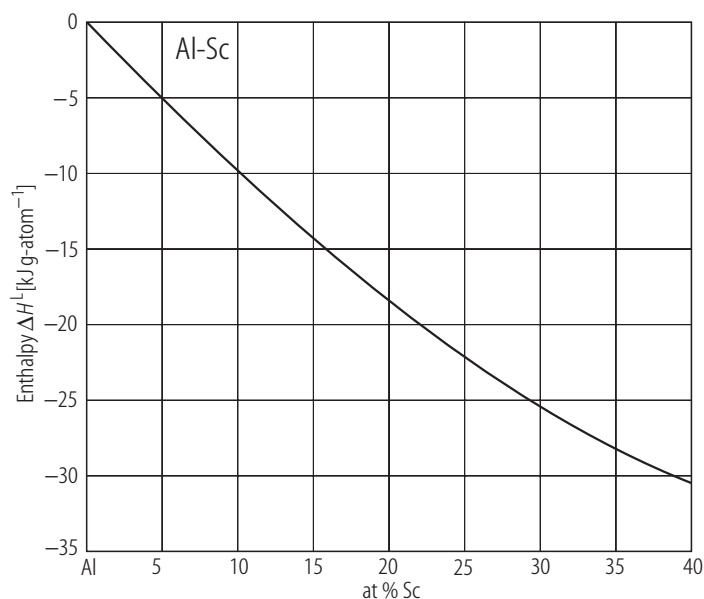


Fig. 2. Al-Sc. Assessed enthalpies of mixing at 1873 K [98 Mur].

References

- [65 Nau] Naumkin, O.P., Terekhova, V.T., Savitskii, E.M.: *Izv. Akad. Nauk SSSR, Met.* (1965) 176, In Russian, *Russ. Metall* (1965) 128
- [85 Bat] Batalin, G.J., Sudavtsova, V.S., Maryanchik, N.N.: *Ukr. Khim. Zh.* **51** (1985) 817
- [86 Lit] Litovskii, V.U., Valishev, M.G., Esin, Yu.O., Geld, P.V., Petrushevskii, M.S.: *Russ. J. Phys. Chem.* **60** (1986) 1385
- [89 Gsc] Gschneidner, K.A., Calderwood F.W.: *Bull. Alloy Phase Diagrams* **10** (1989) 34, Addendum **10** (1989) 219
- [91 Jun] Jung, W.G., Kleppa, O.J., Topor, L.: *J. Alloys and Comp.* **176** (1991) 309
- [93 Mes] Meschel, S.V., Kleppa, O.J., in: "Metallic Alloys, Experimental and Theoretical Perspectives", Faulkner, J.S., Jordan, R.G. (eds.), NATO Series, Serie E, Applied Sciences, Vol. **256** (1993) 103
- [98 Mur] Murray, J.L.: *J. Phase Equilibria* **19** (1998) 380