

Al – Fe (Aluminum – Iron)

Phase diagram

In the course of an assessment of the ternary Al-Fe-Si system by Liu et al. [99 Liu], these authors, on the basis of thermodynamic data from literature, have calculated the phase diagram Al-Fe. At concentrations < 50 at% Fe it is in agreement with that shown in [Landolt-Börnstein] (see there Fig. 1). At higher Fe-content [99 Liu] have neglected the rather complicated equilibria as found by [80 Kös]. The reader therefore is referred to [Landolt-Börnstein].

Crystal structure

By X-ray diffractography Kleykamp et al. [97 Kle] have determined lattice constants at room temperature for α -Fe(Al) and $\text{Al}_{1-x}\text{Fe}_x$ annealed at 1000 K and 1273 K as a function of concentration. The results are shown in Fig. 2.

Burghardt et al. [94 Bur] have investigated Al_5Fe_2 . Its structure is orthorhombic with lattice constants

$$a = 0.76559(8) \text{ nm}$$

$$b = 0.64154(6) \text{ nm}$$

$$c = 0.42184(4) \text{ nm}.$$

Thermodynamics

Assuming AlFe_3 associates, Akinlade et al. [00 Aki] have calculated entropies of mixing and enthalpies of mixing of liquid Al-Fe alloys. The results obtained are reproduced in Fig. 3 (as ΔS^L at 1873 K) and Fig. 4 (as $\Delta H/RT$), respectively.

Figures

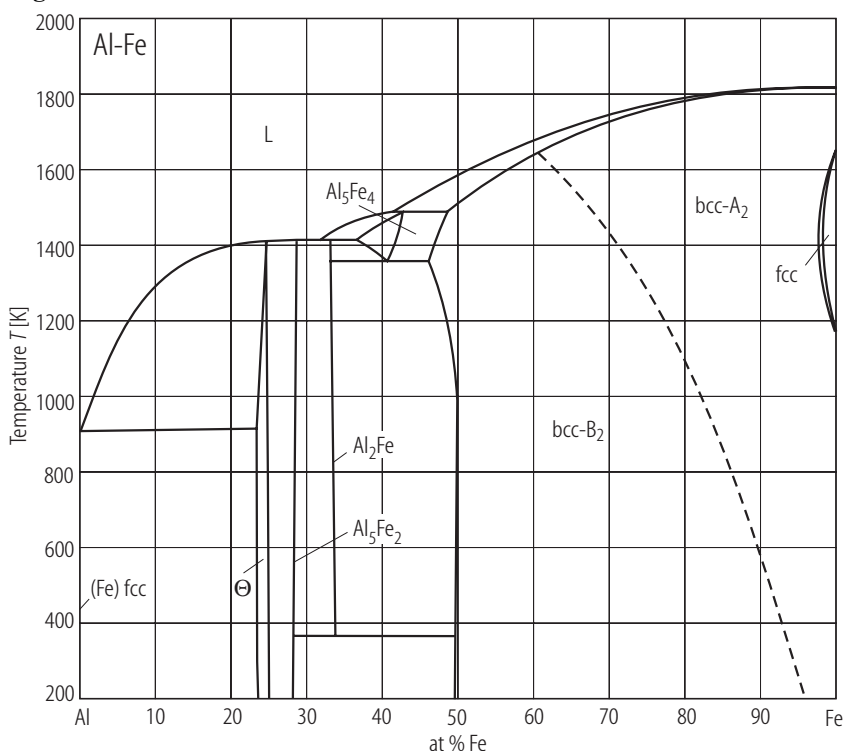


Fig. 1. Al-Fe. Phase diagram [99 Liu].

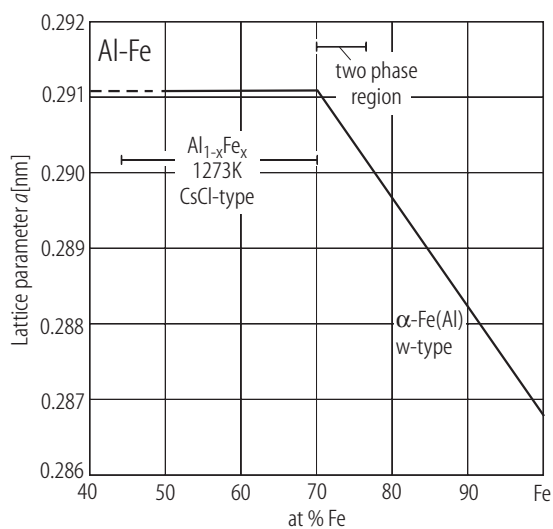


Fig. 2. Al-Fe. Lattice constants of $\alpha\text{-Fe(Al)}$ and $\text{Al}_{1-x}\text{Fe}_x$ [97 Kle].

References

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