

# Dy-Ti (Dysprosium-Titanium)

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The Dy-Ti phase diagram shown in [Massalski2] was a monotectic type with the monotectic temperature at  $\sim 1400^\circ\text{C}$ . The miscibility gap in the liquid phase was speculated to be limited to a narrow range because a miscibility gap was observed in the Gd-Ti system and not in the Er-Ti system (atomic numbers of Gd, Dy, and Er are 64, 66, and 68, respectively). A eutectic reaction was shown at  $1280^\circ\text{C}$ .

[2004Bul] doubted the monotectic type of this system because the Tb-Ti system is not a monotectic type (atomic number of Tb is 65). Figure 1 shows the Dy-Ti phase diagram proposed by [2004Bul], which was determined based on DTA data measured at 18 and 95 at.% Ti. The eutectic type was concluded because of the characteristic microstructure of the 18 at.% Ti alloy.

According to the criteria given by [1991Oka], however, the opening angle of the L + ( $\beta\text{Ti}$ ) two-phase field at 100 at.% Ti in Fig. 1 is too broad. The initial slope of the liquidus is probably much steeper (the opening angle may

be about a half). Then, it could be assumed that the phase diagram includes a monotectic reaction, as shown in [Massalski2]. This assumption does not contradict the result of [2004Bul] because a eutectic reaction also exists in the phase diagram. If the monotectic reaction does not exist, as concluded by [2004Bul], there would be a nearly horizontal section in the liquidus curve in the center region of the phase diagram. Further experimental data are needed to reach the conclusion.

## References

- 1991Oka:** H. Okamoto and T.B. Massalski, Thermodynamically Improbable Phase Diagrams, *J. Phase Equilibria*, 1991, **12**(2), p 148-168
- 2004Bul:** M. Bulanova, Yu. Podrezov, Yu. Fartushnaya, K. Meleshevich, and A. Samelyuk, Structure and Properties of As-Cast Ti-Dy Alloys, *J. Alloys Compd.*, 2004, **370**, p L10-L13

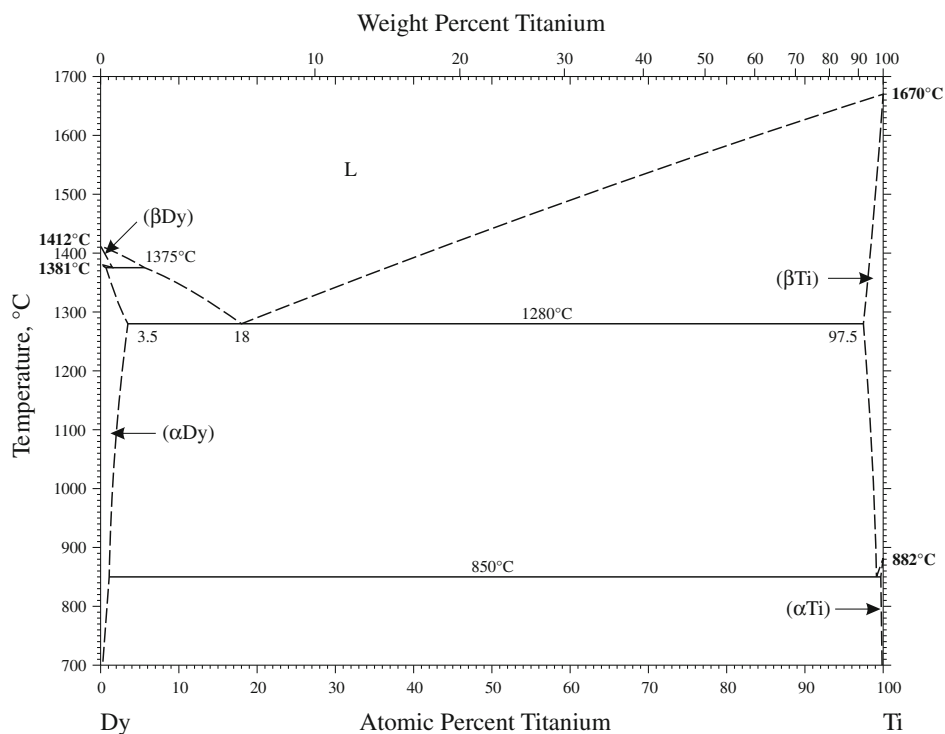


Fig. 1 Dy-Ti phase diagram