

Dy-Fe-Sb (Dysprosium-Iron-Antimony)

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An isothermal section at 500 °C for this ternary system was recently reported by [2008Liu], which depicts one ternary compound FeDy_6Sb_2 (τ).

Binary Systems

The Dy-Fe phase diagram [Massalski2] has four line compounds: $\text{Fe}_{17}\text{Dy}_2$ ($\text{Ni}_2\text{Th}_{17}$ -type hexagonal), $\text{Fe}_{23}\text{Dy}_6$ ($D8_a$, $\text{Mn}_{23}\text{Th}_6$ -type cubic), Fe_3Dy (Be_3Nb -type rhombohedral), and Fe_2Dy ($C15$, MgCu_2 -type cubic). The Dy-Sb phase diagram depicts the following line compounds: Dy_5Sb_3 ($D8_8$, Mn_5Si_3 -type hexagonal), $\beta\text{Dy}_4\text{Sb}_3$, $\alpha\text{Dy}_4\text{Sb}_3$ ($D7_3$, Th_3P_4 -type cubic), βDySb , and αDySb (NaCl -type cubic). The Fe-Sb phase diagram [Massalski2] has two intermediate phases: FeSb_{1-x} (40-48 at.% Sb; $B8_1$, NiAs -type hexagonal) and FeSb_2 ($C18$, marcasite -type orthorhombic).

Ternary Isothermal Section

With starting metals of 99.9% Dy, 99.9% Fe, and 99.99% Sb, [2008Liu] arc-melted under Ar atm 112

alloys, which were given a final anneal at 500 °C for 10-20 days and quenched in water. The phase equilibria were studied with x-ray powder diffraction. They found that the binary compound Dy_4Sb_3 is not stable at 500 °C and decomposes after prolonged annealing. The isothermal section at 500 °C constructed by [2008Liu] is shown in Fig. 1. The ternary compound FeDy_6Sb_2 (τ) is present. It has the Fe_2P -type of hexagonal structure, with $a = 0.81449$ nm and $c = 0.41641$ nm [2007Zen]. No solubility of the third component in the binary compounds was observed.

References

- 2007Zen:** L. Zeng, P. Qin, H. Qin, and J. Zhang, Crystal Structure and Magnetic Properties of the Compound FeDy_6Sb_2 , *Mater. Lett.*, 2007, **61**(1), p 300-303
- 2008Liu:** J. Liu, B. Zong, X. Yang, X. Cui, K. Su, X. Wang, and J. Li, The Isothermal Section of the Dy-Fe-Sb Ternary System at 773 K, *J. Alloys Compd.*, 2008, **468**, p 103-106

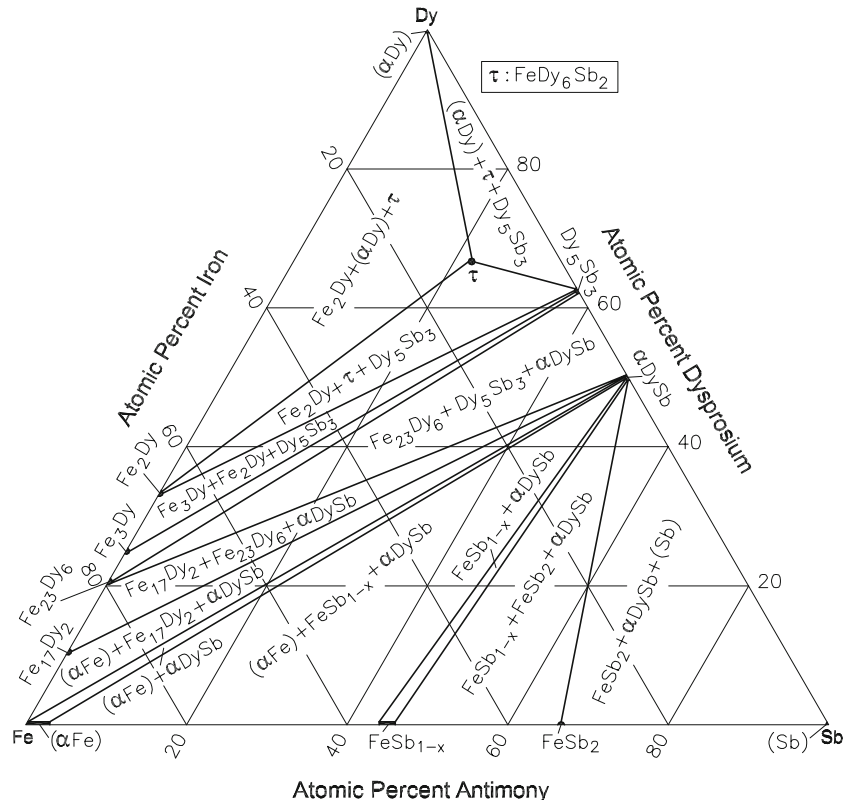


Fig. 1 Dy-Fe-Sb isothermal section at 500 °C [2008Liu]