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Dy-Fe-Pt (Dysprosium-Iron-Platinum)

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Recently, [2007Lei] determined an isothermal section for this system at 900 °C, which depicts no ternary compounds.

Binary Systems

The Dy-Fe phase diagram [Massalski2] shows the following intermetallic compounds: $Fe_{17}Dy_2$ ($Ni_{17}Th_2$-type hexagonal), $Fe_{23}Dy_6$ ($D8_a$, $Mn_{23}Th_6$-type cubic), Fe_3Dy (Be_3Nb-type rhombohedral), and Fe_2Dy ($C15$, $MgCu_2$-type cubic). The Dy-Pt [2006Oka, 2007Lei] depicts the following compounds: Dy_3Pt ($D0_{11}$, Fe_3C-type orthorhombic), Dy_2Pt ($C23$, Co_2Si-type orthorhombic), Dy_5Pt_3 ($D8_8$, Mn_5Si_3-type hexagonal), Dy_5Pt_4 (Ge_4Sm_5-type orthorhombic), DyPt ($B27$, FeB-type orthorhombic), Dy_3Pt_4 (Pd_4Pu_3-tpe rombohedral), $DyPt_2$ ($C15$, $MgCu_2$-type cubic), $DyPt_3$ ($L1_2$, $AuCu_3$-type cubic), and $DyPt_5$ (orthorhombic). The Fe-Pt phase diagram [Massalski2] shows three ordered phases: Fe_3Pt ($L1_2$, $AuCu_3$-type cubic), FePt ($L1_0$, AuCu-type tetragonal), and $FePt_3$ ($AuCu_3$-type cubic).

Ternary Isothermal Section

With starting metals of >99.9 mass % purity, [2007Lei] arc-melted under Ar atm 62 alloy samples containing up to 75 at.% Dy. The samples were annealed at 900 °C for 15 days and quenched in water. The phase equilibria were studied with x-ray powder diffraction, scanning electron microscopy, and energy dispersive spectroscopy. The isothermal section at 900 °C constructed by [2007Lei] is redrawn in Fig. 1. The solubility of Dy in (αFe), (γFe), FePt, $FePt_3$, and (Pt) was 3, 2, 2, 1.5, and 1.5 at.%, respectively. Fe_2Dy dissolves up to 5 at.% Pt. The solubility of Fe in Dy-Pt compounds was found to be less than 1 at.%. No ternary compounds were found.

References

2006Oka: H. Okamoto, Dy-Pt (Dysprosium-Platinum), *J. Phase Equilb. Diffus.*, 2006, **27**(4), p 429

2007Lei: M. Lei, G. Zhengfei, Z. Xiaping, C. Gang, Z. Bo, and X. Chengfu, Solid State Phase Equilibria in the Fe-Pt-Dy Ternary System at 900 °C, *J Alloys Compd.*, 2007, **427**, p 130-133

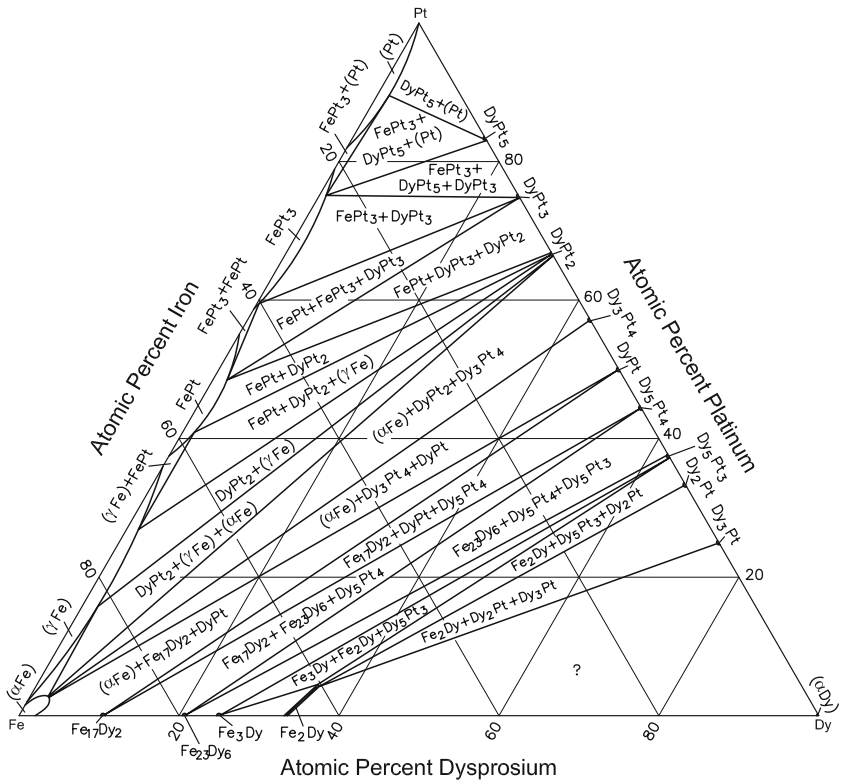

Fig. 1 Dy-Fe-Pt isothermal section at 900 °C [2007Lei]. Narrow two-phase regions are omitted