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Fe-Nd-Pt (Iron-Neodymium-Platinum)

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Recently, [2006Che] determined an isothermal section for this ternary system at 900 °C, which depicts no ternary compounds.

Binary Systems

The Fe-Nd phase diagram depicts two intermediate phases: $Fe_{17}Nd_2$ (Th_2Zn_{17}-type rhombohedral) and $Fe_{17}Nd_5$ (hexagonal, space group $P6_3/mcm$). In the Fe-Pt system, the three ordered structures Fe_3Pt ($L1_2$, $AuCu_3$-type cubic), FePt ($L1_0$, AuCu-type tetragonal) and $FePt_3$ ($AuCu_3$-type cubic) are known. The Nd-Pt phase diagram [Massalski2, 2006Che] depicts the following intermediate phases: Nd_7Pt_3 ($D10_2$, Fe_3Th_7-type hexagonal), Nd_3Pt_2 (Er_3Ni_2-type rhombohedral), βNdPt (B_f, CrB-type orthorhombic), αNdPt ($B27$, FeB-type orthorhombic), Nd_3Pt_4 (Pd_4Pu_3-type rhombohedral), $NdPt_2$ (66.7-75 at.% Pt; $C15$, $MgCu_2$-type cubic), and $NdPt_5$ ($D2_d$, $CaCu_5$-type hexagonal).

Ternary Isothermal Section

With starting metals of >99.9 mass % purity, [2006Che] arc-melted under Ar atm 80 alloy samples containing up to 70 at.% Nd. The samples were annealed at 900 °C for 360 h and quenched in water. The phase equilibria were studied with X-ray powder diffraction, scanning electron microscopy, and energy dispersion spectroscopy. The isothermal section at 900 °C constructed by [2006Che] is redrawn in Fig. 1. The solubility of Nd in (αFe), (γFe), FePt, $FePt_3$, and (Pt) was 4, 2.5, 3, 3, and 1.5 at.%, respectively. $NdPt_2$ and βNdPt dissolve up to 5 and 1 at.% Fe, respectively. The other Nd-Pt compounds dissolve less than 1 at.% Fe. The binary phase $Fe_{17}Nd_5$ is not stable at 900 °C. The homogeneity ranges of the Fe-Pt compounds shown in Fig. 1 are those given by [2006Che]. No ternary compounds were found.

References

2006Che: X. Chengfu, G. Zhengfei, C. Gang, M. Lei, and Z. Bo, Isothermal Section of the Fe-Pt-Nd Phase Diagram at 900 °C, *J. Alloys Compd.*, 2006, **424**, p 128-130

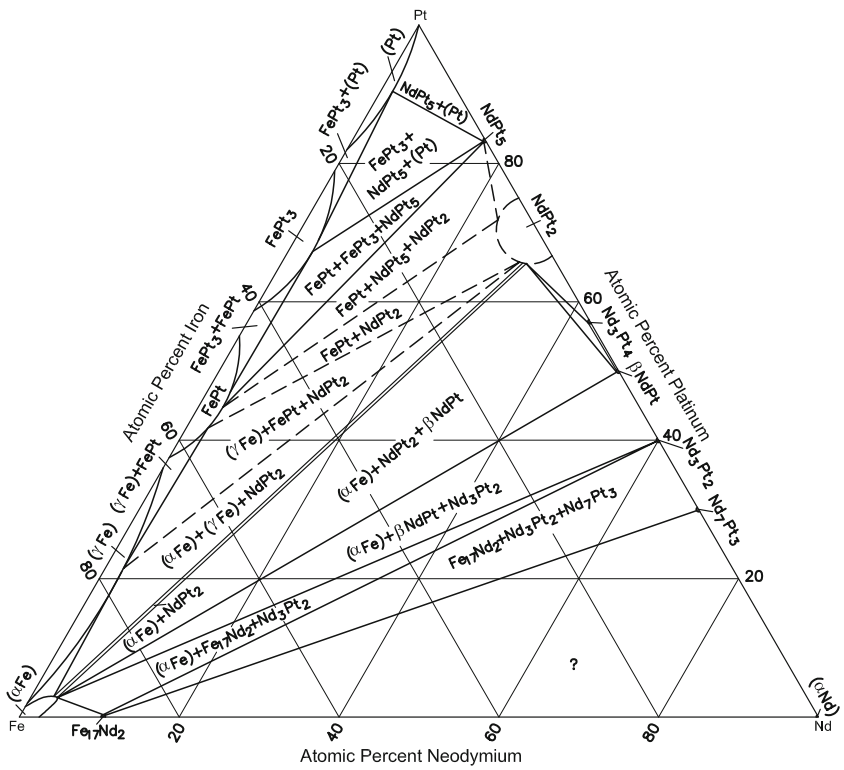

Fig. 1 Fe-Nd-Pt isothermal section at 900 °C [2006Che]. Narrow two-phase regions are omitted