

# Fe-Pr-Pt (Iron-Praseodymium-Platinum)

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An isothermal section at 900 °C for this ternary system determined by [2005Ren] was reviewed by [2006Rag]. Recently, [2006Gu] extended this work to an isothermal section at 500 °C.

## Binary Systems

The Fe-Pr phase diagram depicts only one stable compound  $\text{Fe}_{17}\text{Pr}_2$  ( $\text{Th}_2\text{Zn}_{17}$ -type rhombohedral). In the Fe-Pt system [Massalski2], the three ordered structures  $\text{Fe}_3\text{Pt}$  ( $L1_2$ ,  $\text{AuCu}_3$ -type cubic),  $\text{FePt}$  ( $L1_0$ ,  $\text{AuCu}$ -type tetragonal), and  $\text{FePt}_3$  ( $\text{AuCu}_3$ -type cubic) are stable at 500 °C. The Pr-Pt phase diagram [Massalski2] depicts the following intermediate phases:  $\text{PrPt}_5$  ( $D2_d$ ,  $\text{CaCu}_5$ -type hexagonal),  $\text{PrPt}_2$  (66.7-75 at.% Pt;  $C15$ ,  $\text{MgCu}_2$ -type cubic),  $\text{Pr}_3\text{Pt}_4$  ( $\text{Pd}_4\text{Pu}_3$ -type rhombohedral),  $\alpha\text{PrPt}$  ( $B27$ ,  $\text{FeB}$ -type orthorhombic),  $\beta\text{PrPt}$  ( $B_f$ ,  $\text{CrB}$ -type orthorhombic),  $\text{Pr}_3\text{Pt}_2$  ( $\text{Er}_3\text{Ni}_2$ -type rhombohedral), and  $\text{Pr}_7\text{Pt}_3$  ( $D10_2$ ,  $\text{Fe}_3\text{Th}_7$ -type hexagonal).

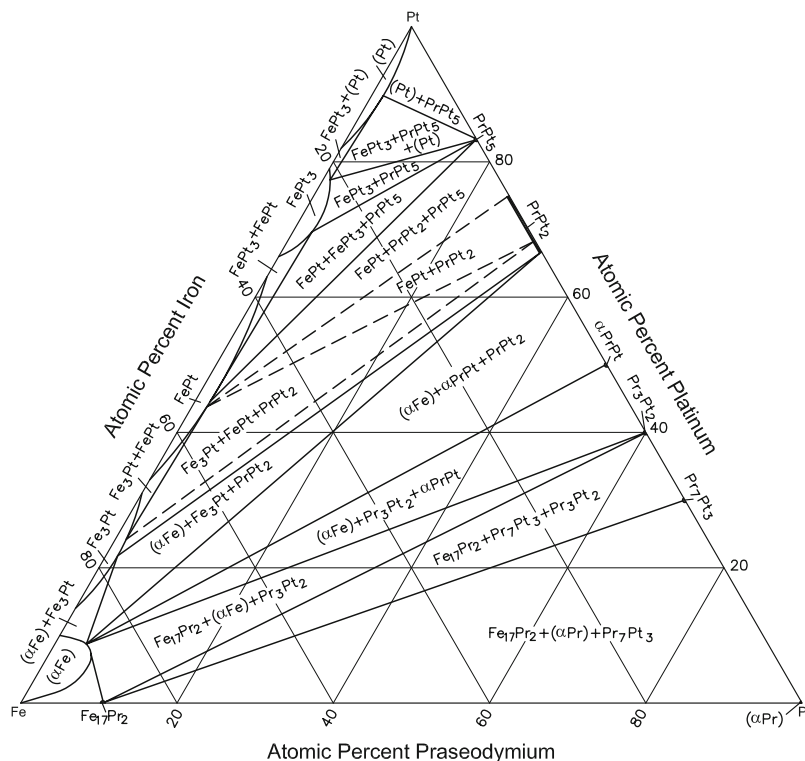
## Ternary Isothermal Section

With starting metals of >99.9% purity, [2006Gu] arc-melted under Ar atm 65 samples. The final anneal was at

500 °C for 28-30 days, followed by water quenching. The phase equilibria were studied with x-ray powder diffraction, scanning electron microscopy, and energy dispersion spectroscopy. The isothermal section at 500 °C constructed by [2006Gu] is shown in Fig. 1. The solubility of Pr in ( $\alpha\text{Fe}$ ),  $\text{Fe}_3\text{Pt}$ ,  $\text{FePt}$ ,  $\text{FePt}_3$ , and (Pt) was up to 6, 1.5, 2, 2.5, and 1.5 at.% respectively. No ternary compound was found. The binary phase  $\text{Pr}_3\text{Pt}_4$  was not found. The phase distribution is similar to that at 900 °C [2005Ren].

## References

- 2005Ren:** J. Ren, Z. Gu, G. Cheng, and H. Zhou, Solid State Phase Equilibria in the Fe-Pt-Pr System at 1173 K, *J. Alloys Compd.*, 2005, **394**, p 211-214
- 2006Gu:** Z.F. Gu, G. Gheng, J. Ren, Z.M. Wang, and H.Y. Zhou, Phase Relationship in the Fe-Pt-Pr Ternary System at 500 °C, *J. Mater. Sci.*, 2006, **41**, p 4303-4306
- 2006Rag:** V. Raghavan, Fe-Pr-Pt (Iron-Praseodymium-Platinum), *J. Phase Equilib. Diffus.*, 2006, **27**(3), p 297



**Fig. 1** Fe-Pr-Pt isothermal section at 500 °C [2006Gu]. Narrow two-phase regions are omitted