

Pt-Ti (Platinum-Titanium)

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The Pt-Ti phase diagram in [Massalski2] was redrawn from [1982Mur]. Due to insufficient phase boundary data and inconsistency among them, the phase diagram was speculative. The intermediate phases shown were Pt₈Ti,

γ(Pt₃Ti), Pt₃-Ti, Pt₅Ti₃, αPtTi/βPtTi (martensitic), and PtTi₃. [1982Mur] attempted thermodynamic modeling of this system. However, only three intermediate phases (γ, PtTi, and PtTi₃) were taken into account by eliminating all

Table 1 Pt-Ti crystal structure data

Phase	Composition, at.% Ti	Pearson symbol	Space group	Strukturbericht designation	Prototype
(Pt)	0-11	<i>cF4</i>	<i>Fm$\bar{3}m$</i>	<i>A1</i>	Cu
Pt ₈ Ti	11.1	<i>tI10</i>	<i>I4/m</i>	<i>D1_a</i>	MoNi ₄
γ	20-25	<i>cP4</i>	<i>Pm$\bar{3}m$</i>	<i>L1₂</i>	AuCu ₃
Pt ₃ -Ti (a)	27	<i>hP16</i>	<i>P6₃/mmc</i>	<i>D0₂₄</i>	Ni ₃ Ti
Pt ₅ Ti ₃ (a)	37.5	<i>oI32</i>	<i>Ibam</i>
βPtTi	44-52	<i>cP2</i>	<i>Pm$\bar{3}m$</i>	<i>B2</i>	CsCl
αPtTi	48-50.5	<i>oP4</i>	<i>Pmma</i>	<i>B19</i>	AuCd
Pt ₃ Ti ₄	57.1
PtTi ₃	73.5-78.5	<i>cP8</i>	<i>Pm$\bar{3}n$</i>	<i>A15</i>	Cr ₃ Si
(βTi)	92-100	<i>cI2</i>	<i>Im$\bar{3}m$</i>	<i>A2</i>	W
(αTi)	98-100	<i>hP2</i>	<i>P6₃/mmc</i>	<i>A3</i>	Mg

(a) Not shown in Fig. 1

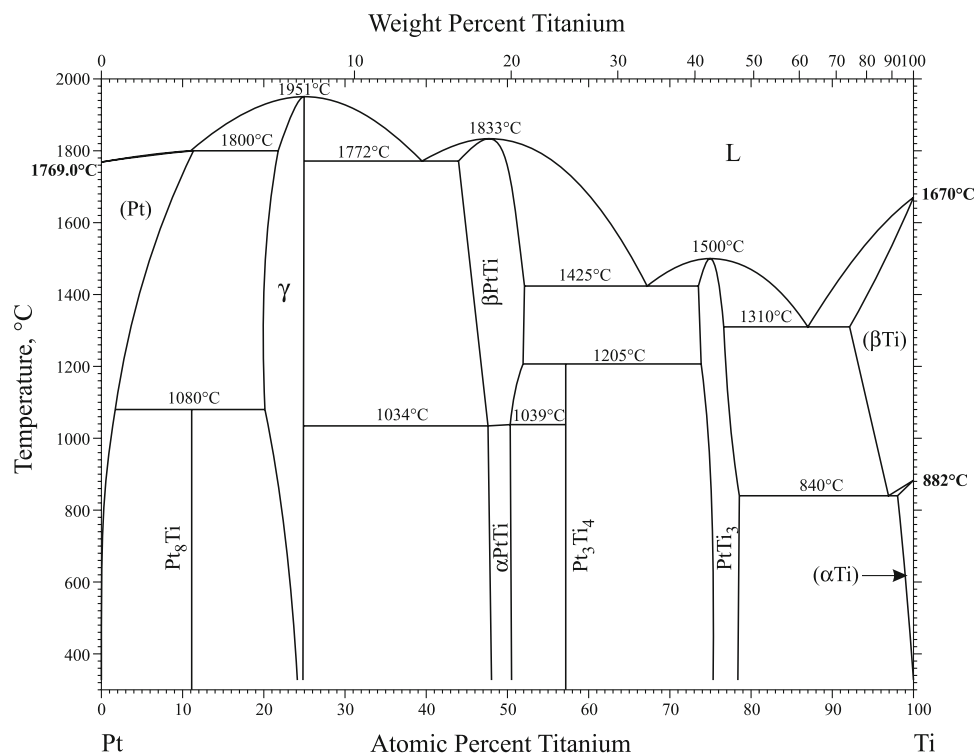


Fig. 1 Pt-Ti phase diagram

Section III: Supplemental Literature Review

phases with unknown relationships to other phases. Therefore, the agreement between the experimental and calculated phase diagrams was not good.

The phase diagram of [1982Mur] was modified slightly by [2004Big] by adding the Pt_3Ti_4 phase, which forms at 1205 °C from $\beta PtTi$ and $PtTi_3$ by a peritectoid reaction.

[2008Li] calculated the Pt-Ti phase diagram by using the information given in [1982Mur] and [2004Big]. The phases Pt_3Ti and Pt_5Ti_3 were not adopted in the thermodynamic model, as in [1982Mur]. The result is shown in Fig. 1. Further corroboration is needed for this phase diagram because experimental phase boundary data are scarce.

Table 1 shows Pt-Ti crystal structure data. According to [2007Vil], Pt_3Ti has the Ni_3Ti -type structure and there is no

report on the $AuCu_3$ -type structure. Further clarification is needed.

References

- 1982Mur:** J.L. Murray, The Pt-Ti (Platinum-Titanium) System, *Bull. Alloy Phase Diagrams*, 1982, **3**(3), p 329-335
- 2004Big:** T. Biggs, L.A. Cornish, M.J. Witcomb, and M.B. Cortie, Revised Phase Diagram for the Pt-Ti System from 30 to 60 at.% Platinum, *J. Alloys Compd.*, 2004, **375**, p 120-127
- 2007Vil:** P. Villars and K. Cenzual, "Pearson's Crystal Data", CD ROM, ASM International, OH, 2007
- 2008Li:** M. Li, W. Han, and C. Li, Thermodynamic Assessment of the Pt-Ti System, *J. Alloys Compd.*, 2008, **461**, p 189-194