

La-Pt (Lanthanum-Platinum)

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The La-Pt phase diagram in [Massalski2] was redrawn from [Moffatt]. The liquidus boundaries were speculative.

Figure 1 shows the La-Pt phase diagram proposed by [2006Rei] based on experimental measurements (DTA, EMF) and thermodynamic calculations. A new phase was found by observing the change in the composition dependence of the activity isotherms.

The following points of this phase diagram must be confirmed for their unlikely (but not impossible) features.

Shape of the LaPt_2 phase field: Because the LaPt_2 phase field widens at lower temperatures, the $\text{LaPt}_2 + \text{La}_2\text{Pt}_7$ two-phase field becomes increasingly wider at high temperatures. This is unlikely according to [1993Oka].

Shape of the LaPt_5 liquidus: The change in the curvature of the LaPt_5 liquids boundary is not smooth. This is unlikely according to [1991Oka]. (This problem is shown less conspicuously in Fig. 1 than in the original form.)

Table 1 shows La-Pt crystal structure data.

Table 1 La-Pt crystal structure data

Phase	Composition, at.% Pt	Pearson symbol	Space group	Strukturbericht designation	Prototype
(γ La)	0	<i>cI2</i>	<i>Im</i> $\bar{3}m$	<i>A2</i>	W
(β La)	0	<i>cF4</i>	<i>Fm</i> $\bar{3}m$	<i>A1</i>	Cu
(α La) (a)	0	<i>hP4</i>	<i>P6</i> $_3$ / <i>mmc</i>	<i>A3'</i>	α La
La_7Pt_3	30	<i>hP20</i>	<i>P6</i> $_3$ / <i>mc</i>	<i>D10</i> $_2$	Fe_3Th_7
La_3Pt_2	40	<i>hR15</i>	<i>R</i> $\bar{3}$
LaPt	50	<i>oC8</i>	<i>Cmcm</i>	<i>B_f</i>	CrB
La_3Pt_4	57.1	<i>hR14</i>	<i>R</i> $\bar{3}$
LaPt_2	66.7 to 72	<i>cF24</i>	<i>Fd</i> $\bar{3}m$	<i>C15</i>	Cu_2Mg
La_2Pt_7	77.8
LaPt_5	83.3	<i>hP6</i>	<i>P6</i> / <i>mmm</i>	<i>D2</i> $_d$	CaCu_5
(Pt)	100	<i>cF4</i>	<i>Fm</i> $\bar{3}m$	<i>A1</i>	Cu

(a) Not shown

References

1991Oka: H. Okamoto and T.B. Massalski, Thermodynamically Improbable Phase Diagrams, *J. Phase Equilibria*, 1991, **12**(2), p 148-168

1993Oka: H. Okamoto and T.B. Massalski, Guidelines for Binary Phase Diagram Assessment, *J. Phase Equilibria*, 1993, **14**(3), p 316-335

2006Rei: S. Reimann and H.J. Schaller, Constitution and Thermodynamics of Pt-La Alloys, *J. Alloys Compd.*, 2006, **419**, p 133-139

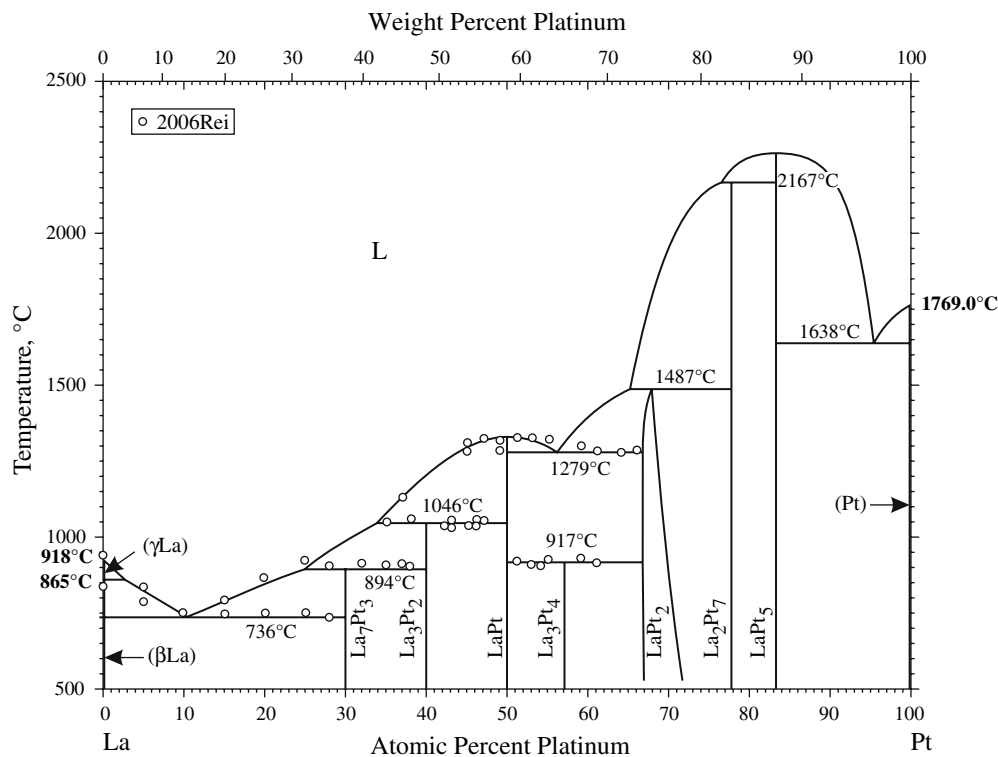


Fig. 1 La-Pt phase diagram