

Co-Ta (Cobalt-Tantalum)

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An incorrect Co-Ta phase diagram was shown in the first print of [Massalski2]. The diagram was corrected by [1991Oka], as shown in Fig. 1.

The Co-Ta phase diagram has not been determined experimentally with high accuracy, particularly on the Ta-rich side. Therefore, attempts have been made to determine the equilibrium diagram by thermodynamic assessments. Figures 2 and 3 show the results of such attempts made by [1999Liu] and [2002Har], respectively. Both models are based on essentially the same experimental phase boundary data as shown in Fig. 1. In the diagram of [2002Har] (Fig. 3), λ_3 and λ_1 in Fig. 1 are assumed to be line compounds Co_3Ta and $\text{Co}_{16}\text{Ta}_9$, respectively, for consistency with the Co-Nb system. However, crystal structures of these phases

(Table 1, from [1991Oka]) suggest that the stoichiometry is Co_2Ta . More detailed experimental phase boundary data are needed to confirm the calculated phase diagrams.

References

- 1991Oka:** H. Okamoto, Co-Ta (Cobalt-Tantalum), *Binary Alloy Phase Diagram Update Service*, H. Okamoto, Ed., ASM International, 1991
- 1999Liu:** Z.K. Liu and Y.A. Chang, Thermodynamic Assessment of the Co-Ta System, *Calphad*, Vol 23 (No. 3-4), 1999, p 339-356
- 2002Har:** K.C. Hari Kumar, T. Van Rompaey, and P. Wollants, Thermodynamic Calculation of the Phase Diagram of the Co-Nb-Ta System, *Z. Metallkde.*, Vol 93 (No. 11), 2002, p 1146-1153

Table 1 Co-Ta crystal structure data

Phase	Composition, at.% Ta	Pearson symbol	Space group	Strukturbericht designation	Prototype
(αCo)	0-4	<i>cF4</i>	$Fm\bar{3}m$	A1	Cu
(ϵCo)	0-?	<i>hP2</i>	$P6_3/mmc$	A3	Mg
Co_7Ta_2	22.2
λ_3	27.5-29	<i>hP24</i>	$P6_3/mmc$	C36	MgNi_2
λ_2	29.9-36	<i>cF24</i>	$Fd\bar{3}m$	C15	Cu_2Mg
λ_1	37	<i>hP12</i>	$P6_3/mmc$	C14	MgZn_2
Co_6Ta_7	44-56	<i>hR13</i>	$R\bar{3}m$	$D8_5$	Fe_7W_6
CoTa_2	66.7	<i>tI12</i>	$I4/mcm$	C16	Al_2Cu
(Ta)	80-100	<i>cI2</i>	$Im\bar{3}m$	A2	W

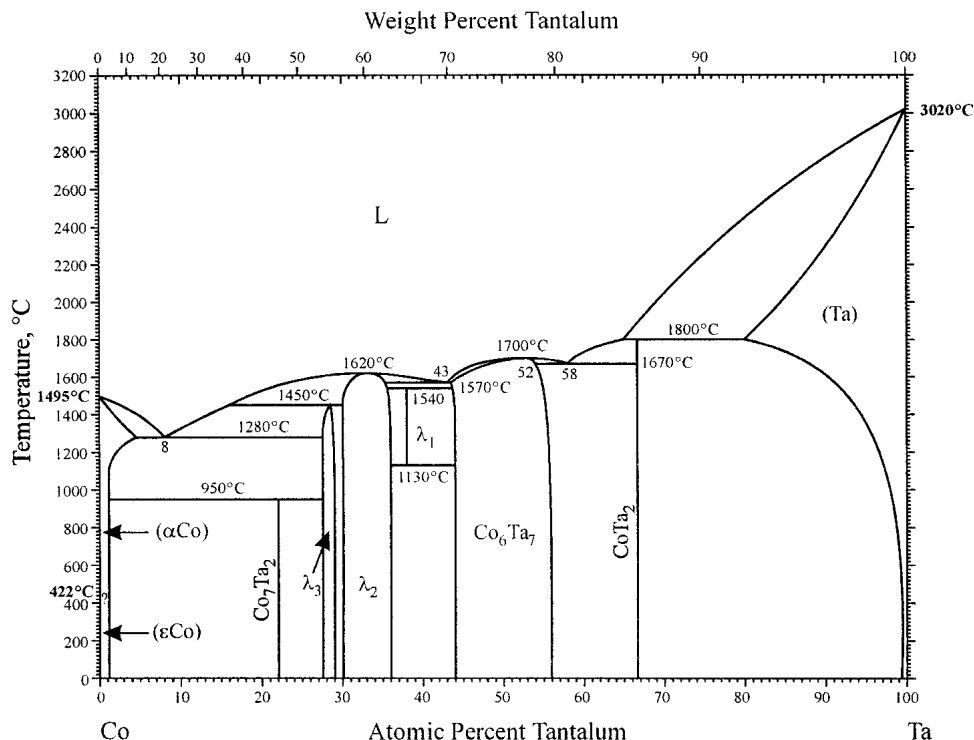


Fig. 1 Co-Ta phase diagram from [1991Oka]

Section III: Supplemental Literature Review

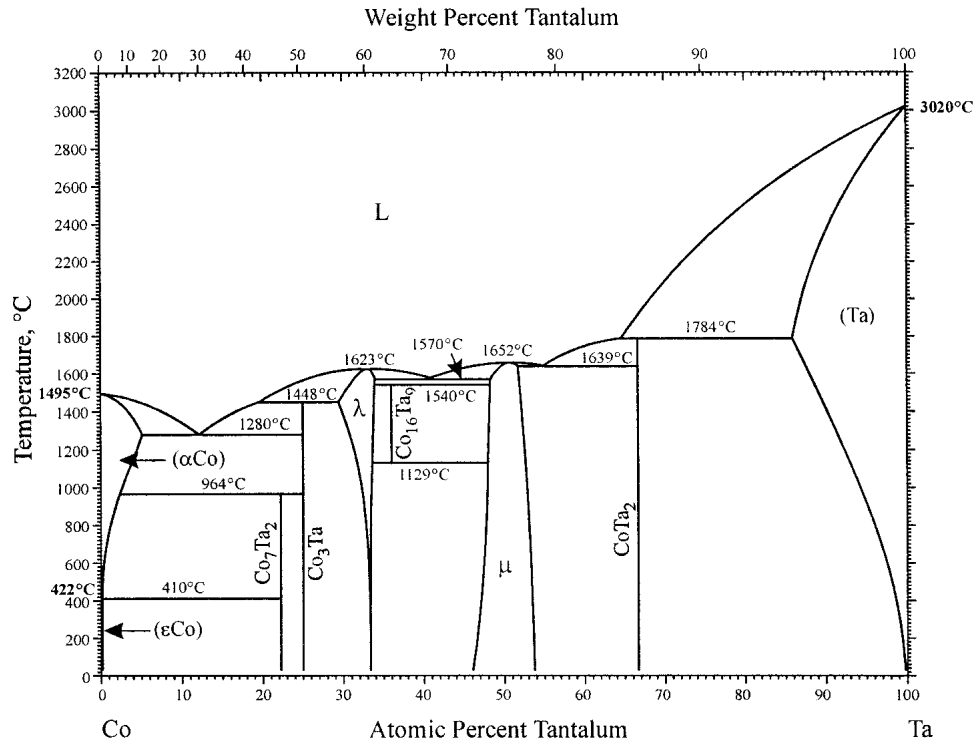


Fig. 2 Co-Ta phase diagram from [1999Liu]

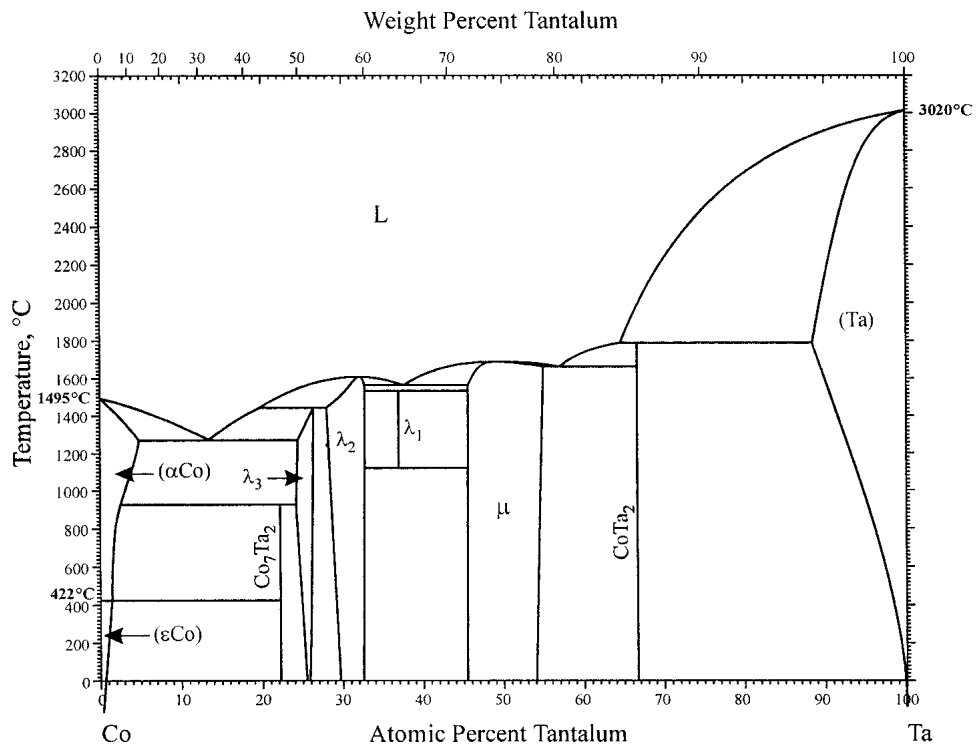


Fig. 3 Co-Ta phase diagram from [2002Har]