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Ta-V (Tantalum-Vanadium)

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The Ta-V phase diagram in [Massalski2] was redrawn from the [1983Smi] assessment (dashed line in Fig. 1). One intermediate compound TaV_2 exists in this system. This compound may have a high-temperature polymorph, according to [1972Sav].

[2004Dan] calculated the Ta-V phase diagram (shown with solid lines in Fig. 1) by thermodynamic assessment, assuming there is no polymorphic transition in TaV_2. Although both [1983Smi] and [2004Dan] are based on essentially the same phase boundary data, they appear substantially different. This is because [1983Smi] depended more on the phase boundary data whereas [2004Dan] calculated the phase diagram for thermodynamic consistency.

In addition, [2004Dan] proposed the Ta-V phase diagram by thermodynamic calculation including the polymorphic transformation in the TaV_2 phase. The phase diagram is shown in Fig. 2. In comparison with Fig. 1, the width of the TaV_2 phases is broader because only the [1972Sav] data were used for the basis of the thermodynamic modeling in Fig. 2.

Table 1 shows Ta-V crystal structure data for Fig. 2.

References

1972Sav: E.M. Savitskii and J.V. Efimov, Superconducting Metallic Compounds and Their Alloys, *Monatsh. Chem.,* Vol 103, 1972, p 270-287 (in German)

1983Smi: J.F. Smith and O.N. Carlson, The Ta-V (Tantalum-Vanadium) System, *Bull. Alloy Phase Diagrams,* Vol 4 (No 3), 1983, p 284-289

2004Dan: C.A. Danon and C. Servant, A Thermodynamic Evaluation of the Ta-V System, *J. Alloys Compd.,* Vol 366, 2004, p 191-200

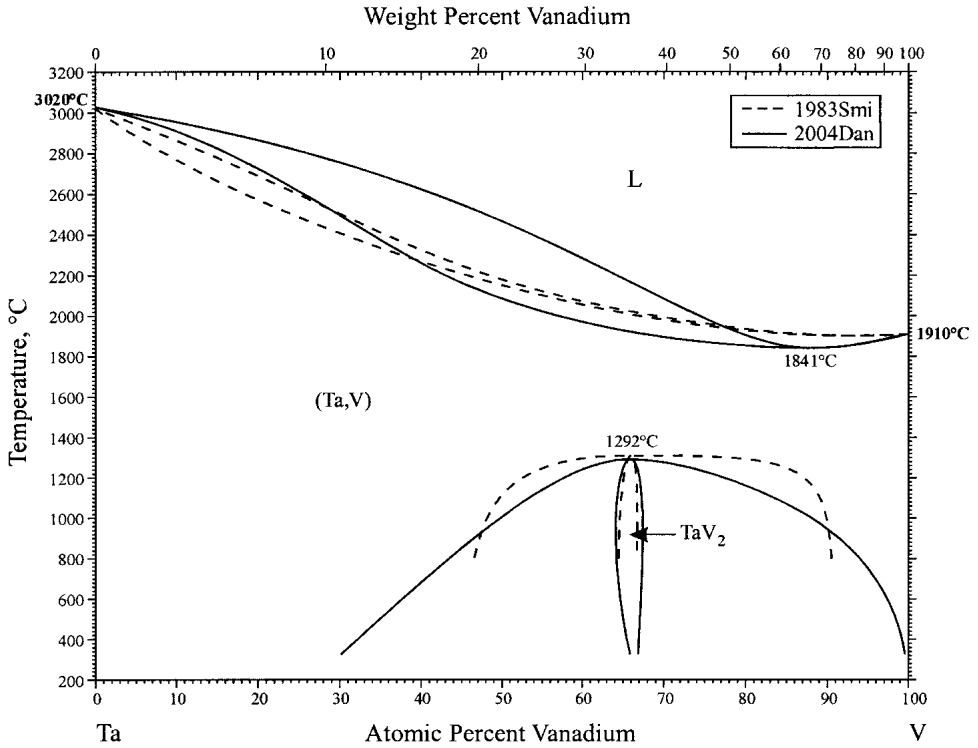

Fig. 1 Ta-V phase diagram with no polymorphs for TaV_2

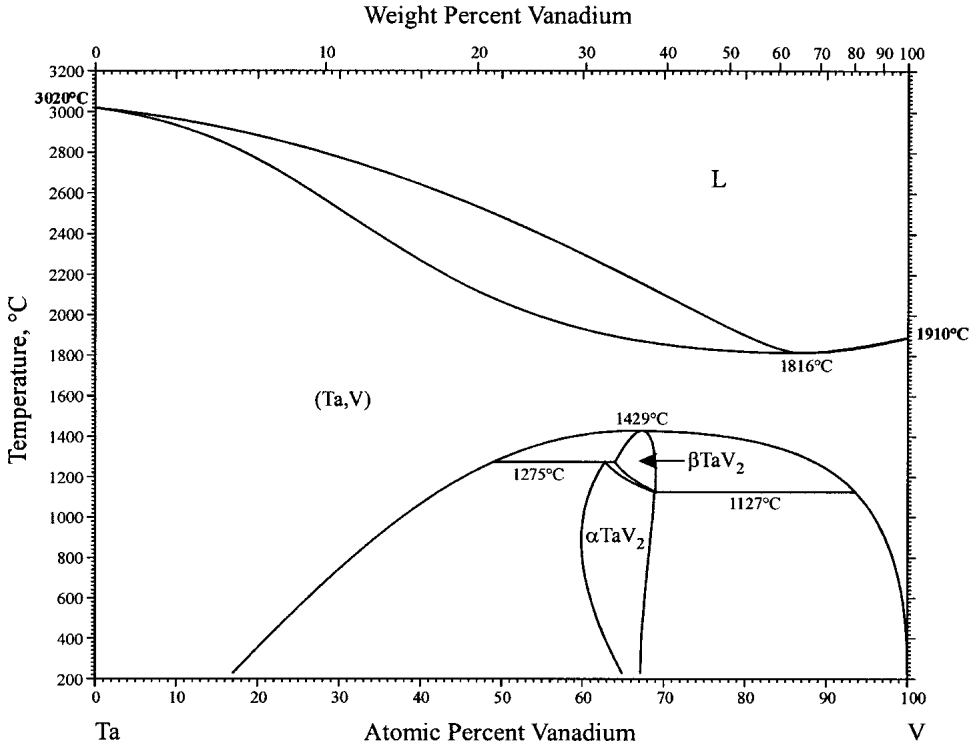

Fig. 2 Ta-V phase diagram with polymorphs for TaV_2

Table 1 Ta-V crystal structure data

Phase	Composition(a), at.% V	Pearson symbol	Space group	Strukturbericht designation	Prototype
(Ta, V)	0–100	*cI*2	$Im\bar{3}m$	*A*2	W
βTaV_2	64–69	*hP*12	$P6_3/mmc$	*C*14	$MgZn_2$
αTaV_2	60–69	*cF*24	$Fd\bar{3}m$	*C*15	Cu_2Mg

(a) For Fig. 2