JPEDAV (2005) 26:290-291
DOI: 10.1361/15477030523580
1547-7037/$19.00 ©ASM International

Ge-Yb (Germanium-Ytterbium)

H. Okamoto

The Ge-Yb phase diagram in [Massalski2] was redrawn from [1983Ere]. The existence of dimorphic $Ge_{5-x}Yb_3$ and $Ge_{10}Yb_{11}$ was reported. A unique feature of this phase diagram was the existence of a large liquid miscibility gap extending from 45 to 90 at.% Yb.

In comparison with other Ge-trivalent rare earth systems, it is expected that other compounds exist, and the existence of the liquid miscibility gap is unlikely. Therefore, [2003Pan] reinvestigated the Ge-Yb system using differential thermal analysis (DTA), x-ray diffraction, optical microscopy, and electron probe microanalysis (EPMA). The result is shown in Fig. 1. Four more intermediate compounds were discovered and the existence of the earlier reported miscibility gap was refuted. The diagram is very different from [1983Ere]. The diagram of [2003Pan] is believed to be better due to consistency with diagrams of other Ge-rare earth systems.

Table 1 shows Ge-Yb crystal structure data.

References

1983Ere: V.N. Eremenko, K.A. Meleshevich, and Yu.I. Buyanov, Phase Diagram of the Ytterbium-Germanium System, *Dop. Akad. Nauk Ukr. RSR A,* Vol 3, 1983, p 83-88 (in Russian)

2003Pan: M. Pane and A. Parenzona, The Phase Diagram of the Yb-Ge System, *J. Alloys Compd.,* Vol 360, 2003, p 151-161

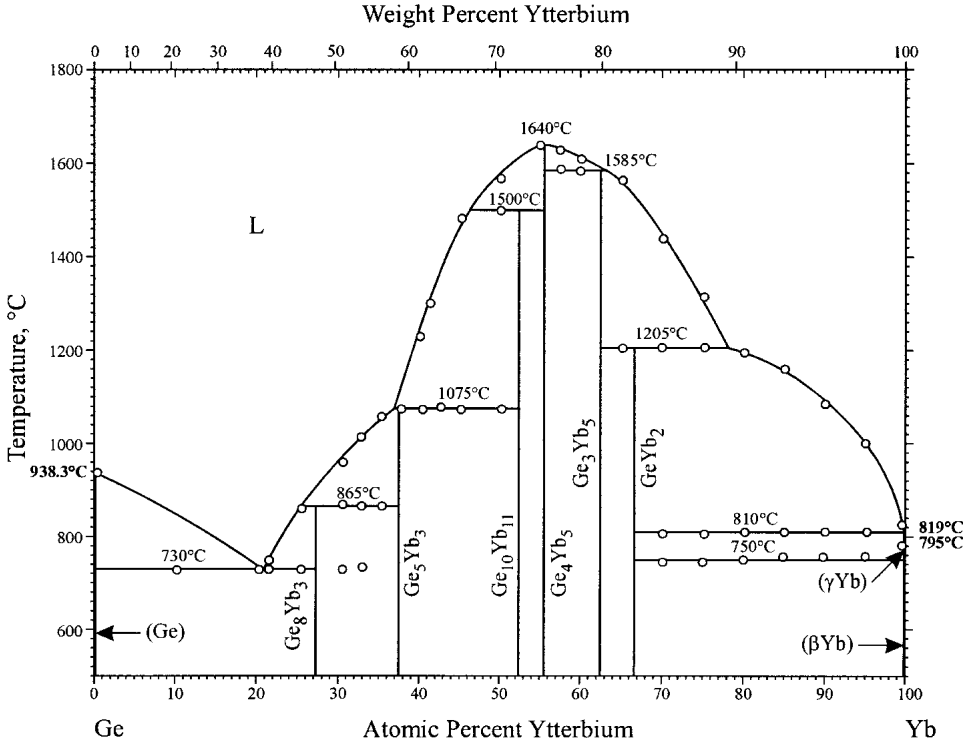

Fig. 1 Ge-Yb phase diagram

Table 1 Ge-Yb crystal structure data

Phase	Composition, at.% Yb	Pearson symbol	Space group	Strukturbericht designation	Prototype
(Ge)	0	*cF*8	$Fd\bar{3}m$	*A*4	C (diamond)
Ge_8Yb_3	27.3	*aP*22	$P\bar{1}$	…	…
Ge_5Yb_3	37.5	*hP*8	*P*62*m*	…	Th_3Pd_5
$Ge_{10}Yb_{11}$	52.4	*tI*84	*I*4/*mmm*	…	$Ho_{11}Ge_{10}$
Ge_4Yb_5	55.6	*oP*36	*Pnma*	…	Ge_4Sm_5
Ge_3Yb_5	62.5	*hP*16	$P6_3/mcm$	$D8_8$	Mn_5Si_3
$GeYb_2$	66.7	*oP*12	*Pnma*	*C*23	Co_2Si
(γYb)	100	*c*2	$Im\bar{3}m$	*A*2	W
(βYb)	100	*cF*4	$Fm\bar{3}m$	*A*1	Cu
(αYb)	100	*hP*2	$P6_3/mmc$	*A*3	Mg