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Sn-Zr (Tin-Zirconium)

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The Sn-Zr phase diagram in [Massalski2] was adopted from [1983Abr]. [2005Oka] modified this phase diagram by changing Sn_3Zr_5 from a line compound to a broad phase extending from Sn_4Zr_5 to Sn_3Zr_5 with a miscibility gap between them, based on the work of [1990Kwo]. Because Sn_4Zr_5 and Sn_3Zr_5 were reported to have closely related but different crystal structures [Massalski2], the existence of a continuous phase between them was questionable.

[1998Kor, 1998Sub], and [1999Dup] calculated the Sn-Zr phase diagram all by assuming Sn_3Zr_5 as a line compound, as proposed by [1983Abr]. Apparently, the result of [1990Kwo] was not taken into account in these calculations.

In order to clarify this questionable situation, [2008Per] reexamined this system by paying special attention to the Sn_4Zr_5-Sn_3Zr_5 region by using x-ray diffraction, electron

Table 1 Sn-Zr crystal structure data

Phase	Composition, at.% Zr	Pearson symbol	Space group	Strukturbericht designation	Prototype
(βSn)	0	*tI*4	$I4_1/amd$	*A*5	βSn
(αSn) (a)	0	*cF*8	$Fd\bar{3}m$	*A*4	C (diamond)
Sn_2Zr	33.3	*oF*24	*Fddd*	*C*54	$TiSi_2$
η	55.7-62.4	*hP*18	$P6_3/mcm$	...	Ti_5Ga_4
$SnZr_4$	79.5-81	*cP*8	$Pm\bar{3}n$	*A*15	Cr_3Si
(βZr)	82.9-100	*cI*2	$Im\bar{3}m$	*A*2	W
(αZr)	93.5-100	*hP*2	$P6_3/mmc$	*A*3	Mg

(a) Stable below 13 °C

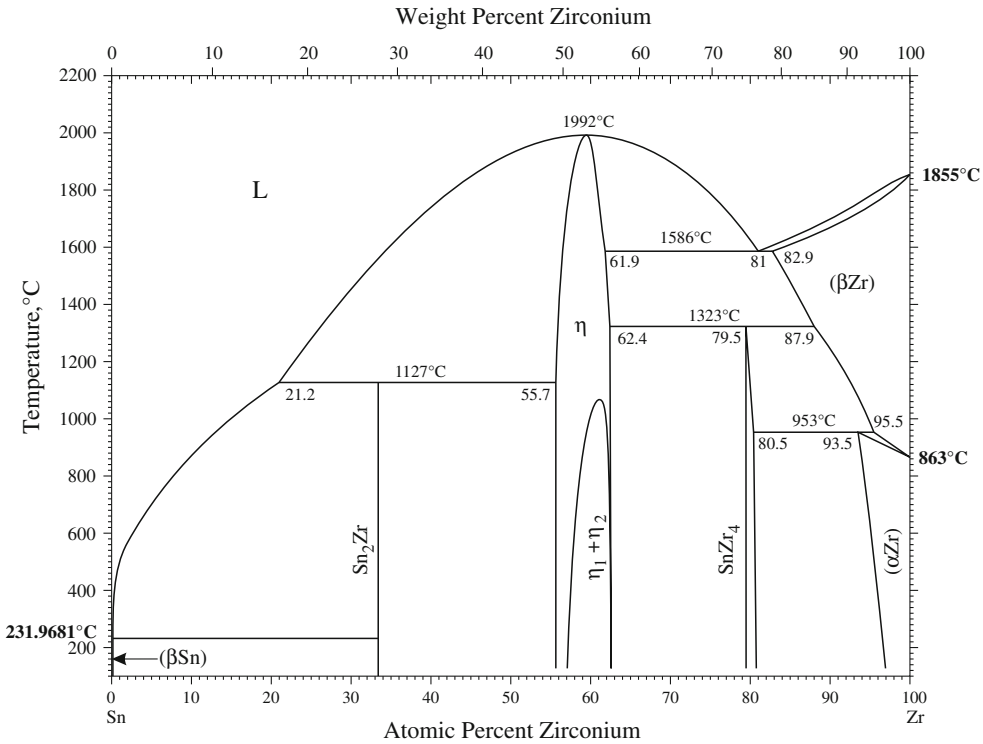

Fig. 1 Sn-Zr phase diagram

probe microanalysis, mass density, and calorimetry measurements. The result showed that the miscibility gap does exist in the solid phase, but the gap is not symmetric unlike the diagram shown by [1990Kwo]. Figure 1 shows the Sn-Zr phase diagram thermodynamically assessed by [2008Per].

Sn-Zr crystal structure data are given in Table 1.

References

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