Ir-Sc (Iridium-Scandium)

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Though the existence of four intermediate compounds (Ir_2Sc , IrSc , $\text{Ir}_4\text{Sc}_{11}$, $\text{Ir}_7\text{Sc}_{44}$) had been reported, the phase relationships in the Ir-Sc phase diagram were undefined in [Massalski2].

Figure 1 shows the Ir-Sc phase diagram determined by [94Yer] and based on microprobe, thermal, and x-ray analyses. Seven intermediate compounds were reported (Table 1). Claimed accuracy is 1 at.% and $\pm 10^\circ\text{C}$.

However, in view of the guidelines on the consistency of phase diagrams [93Oka], the following aspects of Fig. 1 may have to be reexamined.

- The initial opening angle of the L + (Ir) two-phase field is too narrow.
- The width of the L + Ir_3Sc two-phase field should become narrower as the temperature becomes higher.
- The liquidus of $\text{Ir}_{13}\text{Sc}_{57}$ is too asymmetric.

- The initial opening angle of the L + (βSc) two-phase field is too narrow.
- The initial opening angle of the (βSc) + (αSc) two-phase field is too narrow.

Cited References

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Table 1 Ir-Sc Crystal Structure Data

Phase	Composition, at. % Sc	Pearson symbol	Space group	Strukturbericht designation	Prototype	Reference
(Ir).....	0 to 10	<i>cF4</i>	$Fm\bar{3}m$	A1	Cu	...
Ir_3Sc	15 to 23	<i>cP4</i>	$Pm\bar{3}m$	L12	AuCu_3	[94Yer]
Ir_2Sc	31 to 35	<i>cF24</i>	$Fd\bar{3}m$	C15	Cu_2Mg	[59Com]
IrSc	49 to 56	<i>cP2</i>	$Pm\bar{3}m$	B2	CsCl	[62Ald]
IrSc_2	66 to 69	<i>cF96</i>	$Fd\bar{3}m$	...	Ti_2Ni	[94Yer]
$\text{Ir}_4\text{Sc}_{11}$	73.3	<i>cF120</i>	$Fm\bar{3}m$	...	$\text{Os}_4\text{Zr}_{11}$	[80Cha1]
$\text{Ir}_{13}\text{Sc}_{57}$	80 to 83	<i>cP140</i>	$Pm\bar{3}$	...	$\text{Sc}_{57}\text{Rh}_{13}$	[85Cen]
$\text{Ir}_7\text{Sc}_{44}$	86.3	<i>cF408</i>	$F\bar{4}3m$	...	$\text{Mg}_{44}\text{Rh}_7$	[80Cha2]
(βSc).....	97 to 100	<i>cI2</i>	$Im\bar{3}m$	A2	W	...
(αSc).....	99 to 100	<i>hP2</i>	$P6_3/mmc$	A3	Mg	...

Fig. 1 Ir-Sc phase diagram.