

Fe-Ge (Iron-Germanium)

H. Okamoto

The Fe-Ge phase diagram in [Massalski2] was adopted from [1993Kat].

[2000Ger] found a new equilibrium phase Fe_2Ge_3 by mechanical alloying. Its peritectoid formation temperature of 580 °C was observed by DTA on heating only. Figure 1 shows the Fe-Ge phase diagram of [1993Kat] with the additional Fe_2Ge_3 phase as reported by [2000Ger].

Table 1 shows Fe-Ge crystal structure data with the new information for the Fe_2Ge_3 phase.

Table 1 Fe-Ge crystal structure data

Phase	Composition, at.% Ge	Pearson symbol	Space group	Strukturbericht designation	Prototype
(α Fe)	0-17.5	<i>cI2</i>	<i>Im</i> $\bar{3}m$	<i>A2</i>	W
(γ Fe)	0-3.4	<i>cF4</i>	<i>Fm</i> $\bar{3}m$	<i>A1</i>	Cu
α_2	10-22	<i>cP2</i>	<i>Pm</i> $\bar{3}m$	<i>B2</i>	CsCl
α_1	15.2-21.5	<i>cF16</i>	<i>Fm</i> $\bar{3}m$	<i>D0₃</i>	BiF_3
ϵ	23.7-25.7	<i>hP8</i>	<i>P6₃/mmc</i>	<i>D0₁₉</i>	Ni_3Sn
ϵ'	23.7-25.7	<i>cP4</i>	<i>Pm</i> $\bar{3}m$	<i>L1₂</i>	AuCu_3
β	33.5-41	<i>hP4</i>	<i>P6₃/mmc</i>	<i>B8₁</i>	NiAs
η	40.8-43.5	<i>hP6</i>	<i>P6₃/mmc</i>	<i>B8₂</i>	Ni_2In
Fe_6Ge_5	45.5	...	<i>C2/m</i>
FeGe	50	<i>mC16</i>	<i>C2/m</i>	...	CoGe
		<i>hP6</i>	<i>P6/mmm</i>	<i>B35</i>	CoSn
		<i>cP8</i>	<i>P2₁3</i>	<i>B20</i>	FeSi
Fe_2Ge_3	60	<i>tP20</i>	<i>P</i> $\bar{4}c2$...	Ru_2Sn_3
FeGe_2	66.7	<i>tI12</i>	<i>I4/mcm</i>	<i>C16</i>	Al_2Cu
(Ge)	100	<i>cF8</i>	<i>Fd</i> $\bar{3}m$	<i>A4</i>	C (diamond)

References

1993Kat: E. Kato and S. Nunoue, Fe-Ge (Iron-Germanium), *Phase Diagrams of Binary Iron Alloys*, H. Okamoto, Ed., ASM International, Materials Park, OH, 1993, p 156-160

2000Ger: K.B. Gerasimov and S.V. Pavlov, New Equilibrium Phase in the Fe-Ge System, Obtained by Mechanical Alloying, *Intermetallics*, 2000, **8**, p 451-452

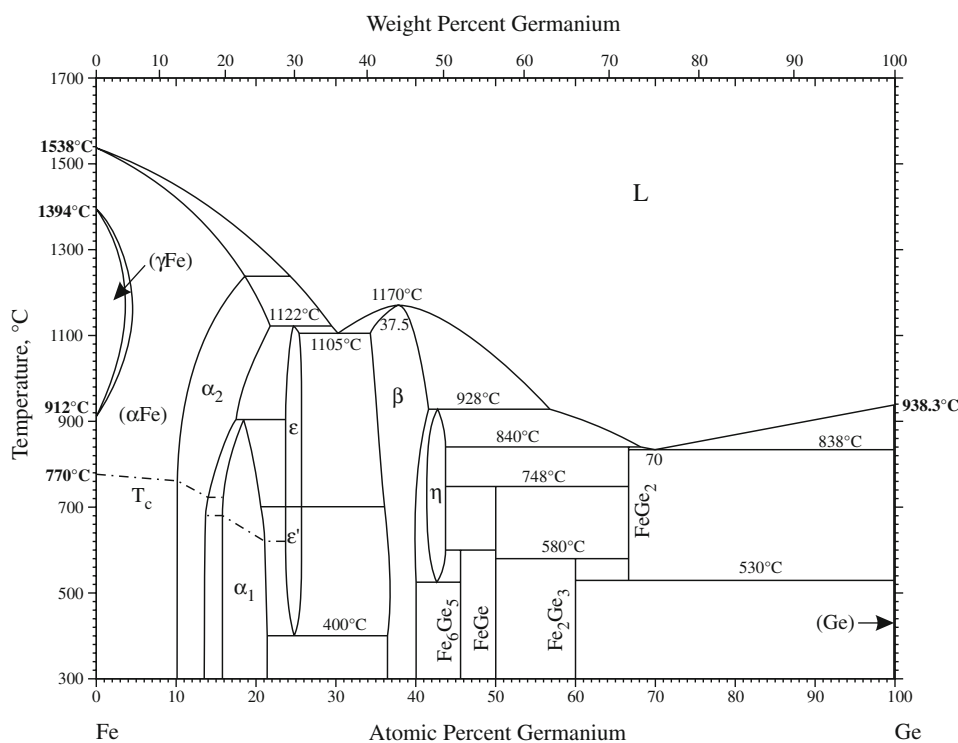


Fig. 1 Fe-Ge phase diagram