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Er-Fe-V (Erbium-Iron-Vanadium)

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Recently, [2007Kot] determined a partial isothermal section at 800 °C for Fe-rich alloys of this system, which depicts a ternary compound $Er(Fe,V)_{12}$.

Binary Systems

There are four line compounds in the Fe-Er system: $Fe_{17}Er_2$ ($Ni_{17}Th_2$-type hexagonal), $Fe_{23}Er_6$ ($D8_a$, $Mn_{23}Th_6$-type cubic), Fe_3Er (Ni_3Pu-type rhombohedral), and Fe_2Er ($C15$, $MgCu_2$-type cubic) [Massalski2]. The Er-V phase diagram depicts a liquid miscibility gap, a monotectic reaction at 1870 °C, and a eutectic reaction near the Er-end at 1480 °C [Massalski2]. The Fe-V phase diagram [1984Smi] depicts one intermediate phase σ (31-66 at.% V; $D8_b$, σCrFe-type tetragonal).

Ternary Isothermal Section

With starting metals of 99.9% Er, 99.99% Fe and 99.99% V, [2007Kot] arc-melted alloys under Ar atm. The samples were annealed at 800 °C for 500 h. The phase equilibria were studied with x-ray powder diffraction. The isothermal section constructed by [2007Kot] at 800 °C is shown in Fig. 1. The ternary compound $ErFe_{12-x}V_x$ ($1.6 \le x \le 2.3$, $D2_b$, $ThMn_{12}$-type tetragonal, a = 0.84624-0.84660 nm and c = 0.47624-0.47648 nm) is denoted τ here. The binary compound $Fe_{17}Er_2$ and Fe_2Er dissolve up to ~3 and ~8 at.% V respectively.

References

1984Smi: J.F. Smith, The Fe-V (Iron-Vanadium) System, *Bull. Alloy Phase Diagrams*, 1984, **5**(2), p 184-194

2007Kot: B. Kotur, O. Myakush, and I. Zavaliy, The Er-{Fe,Co}-{Ti,V} Systems and Hydrogenation Properties of the $ErFe_{2-x}M_x$ (M = Ti, V, Cr, Mn, Co, Ni, Cu, Mo) Alloys, *J. Alloys Compd.*, 2007, **442**, p 17-21

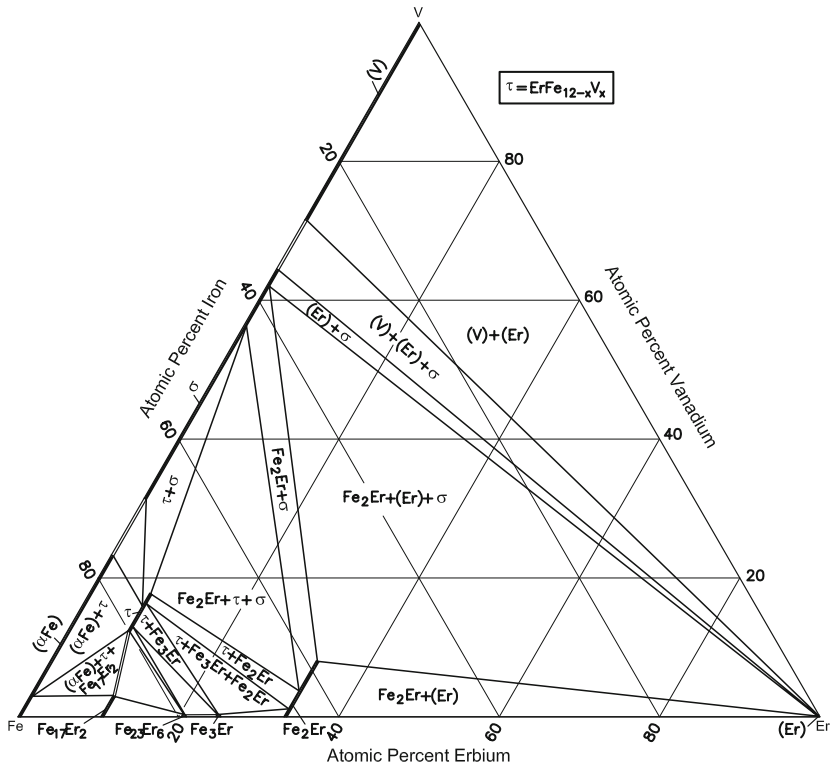

Fig. 1 Er-Fe-V partial isothermal section at 800 °C [2007Kot]