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Er-Fe-Ti (Erbium-Iron-Titanium)

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Recently, [2007Kot] determined a partial isothermal section at 700 °C for Fe-rich alloys of this system, which depicts a ternary compound $Er(Fe,Ti)_{12}$.

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). The Er-Ti phase diagram is of the simple eutectic type, with no intermediate phases. There are two intermediate phases in Fe-Ti system: Fe_2Ti ($C14$, $MgZn_2$-type hexagonal) and FeTi ($B2$, CsCl-type cubic). See [Massalski2] for the above phase diagrams.

Ternary Isothermal Section

With starting metals of 99.9% Er, 99.99% Fe, and 99.99% Ti, [2007Kot] arc-melted alloys under an Ar atm. The samples were annealed at 700 °C for 600 h. The phase equilibria were studied with x-ray powder diffraction. The partial isothermal section constructed by [2007Kot] at 700 °C for the Fe-rich region is shown in Fig. 1. The ternary compound $ErFe_{12-x}Ti_x$ ($0.7 \le x \le 1.1$; $D2_b$, $ThMn_{12}$-type tetragonal, a = 0.84691-0.84812 nm and c = 0.47784-0.47853 nm) is denoted τ here. The binary compound Fe_2Er dissolves up to ~4 at.% Ti.

Reference

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

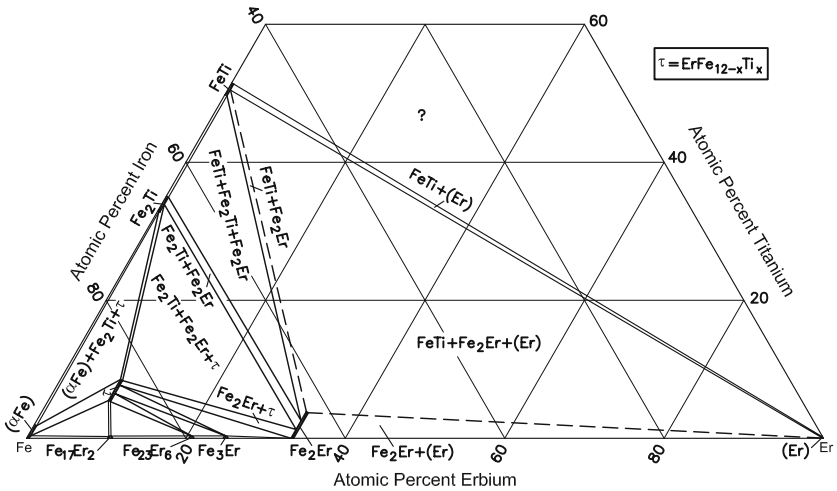

Fig. 1 Er-Fe-Ti partial isothermal section at 700 °C [2007Kot]