

# Fe-Te-Tl (Iron-Tellurium-Thallium)

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A partial pseudobinary section along the FeTe-TlTe join of this ternary system was reported by [1996Dzh].

## Binary Systems

The Fe-Te phase diagram [1993Oka] contains a number of intermediate phases: (1) the rhombohedral high temperature phase  $\beta'$  (46.5-48.5 at.% Te); (2) its low temperature form  $\beta$  of tetragonal symmetry; (3)  $\gamma$  of unknown structure (54.2 at.% Te); (4)  $\text{Cr}_3\text{Se}_4$  type monoclinic  $\delta$  (54-59 at.% Te); (5) NiAs type hexagonal  $\delta'$ , (59.3-64.5 at.% Te); and (6)  $\text{FeSb}_2$  type orthorhombic  $\text{FeTe}_2$  ( $\epsilon$ ). The Fe-Tl phase diagram is not known. Fe and Tl do not measurably react with each other. The Te-Tl phase diagram [Massalski2] has four intermediate phases:  $\text{Tl}_2\text{Te}$ ,  $\text{Tl}_5\text{Te}_3$ , TlTe and  $\text{Tl}_2\text{Te}_3$ . For structural data, see [Pearson3].

## The FeTe-TlTe Pseudobinary Section

Using high purity elements, [1996Dzh] prepared alloy compositions in the range of FeTe- $\text{FeTlTe}_2$ . The phase equi-

libria were studied by differential thermal analysis and x-ray diffraction. The partial diagram along the FeTe-TlTe section determined by [1996Dzh] is redrawn in Fig. 1. The phase indicated to be FeTe by [1996Dzh] is presumably the  $\beta$  phase of [1993Oka]. As this phase forms peritectoidally at 844 °C [1993Oka], the phase boundaries near the FeTe end are not shown in Fig. 1. FeTe and  $\text{FeTlTe}_2$  form a eutectic at 41 mol% TlTe and at 540 °C. The ternary compound  $\text{FeTlTe}_2$  forms congruently from the melt at 580 °C. It has monoclinic symmetry (space group  $C2/m$ ) with the lattice parameters:  $a = 1.184$  nm,  $b = 0.543$  nm,  $c = 0.696$  nm and  $\beta = 117.87^\circ$  [1996Dzh].

## References

- 1993Oka:** H. Okamoto and L.E. Tanner: "Fe-Te (Iron-Tellurium)" in *Phase Diagrams of Binary Iron Alloys*, ed., H. Okamoto, ASM International, Materials Park, OH, 1993, pp. 405-09.
- 1996Dzh:** A.N. Dzhabbarly, E.M. Kerimova, F.M. Seidov, and A.K. Zamanova: "Interaction of TlTe With FeTe and Physical Properties of  $\text{TlFeTe}_2$ ," *Neorg. Mater.*, 1996, 32(1), pp. 118-19 (in Russian); TR: *Inorg. Mater.*, 1996, 32(1), pp. 105-06.

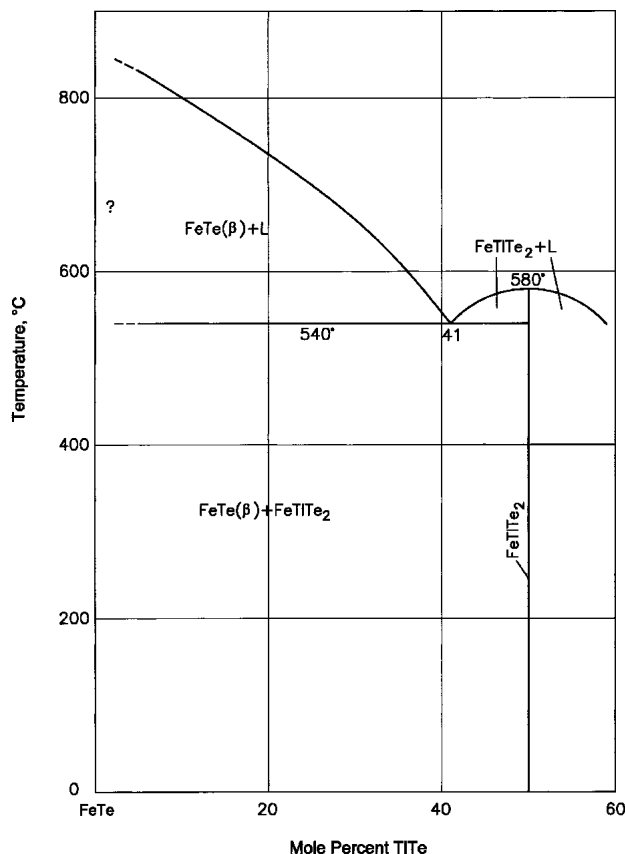


Fig. 1 Fe-Te-Tl partial pseudobinary section along the FeTl-TlTe join [1996Dzh]