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# Fe-Ti-Zr (Iron-Titanium-Zirconium)

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The previous review of this system by [1992Rag] was limited to a peritectic type of pseudobinary section between $Fe_2Ti$ and $Fe_2Zr$. Recently, [2007Zho] determined a tentative isothermal section at 900 °C for this system.

## Binary Systems

There are two intermediate phases in the Fe-Ti system: $Fe_2Ti$ (*C*14, $MgZn_2$-type hexagonal) and FeTi (*B*2, CsCl-type cubic). According to the Fe-Zr phase diagram proposed by [2002Ste], the intermediate phases in the system are: hexagonal $Fe_2Zr$ (26.5-27.0 at.% Zr; *C*36, $MgNi_2$-type hexagonal, stable between 1345 and 1240 °C), cubic $Fe_2Zr$ (27.5-34.4 at.% Zr; *C*15, $MgCu_2$-type cubic, stable from 1673 °C to room temperature), $FeZr_2$ (*C*16, $CuAl_2$-type tetragonal, stable between 951 and 780 °C), and $FeZr_3$ ($E1_a$-type orthorhombic, stable below 851 °C). The authors concluded that $Fe_{23}Zr_6$ (or $Fe_3Zr$) is not an equilibrium phase. The Ti-Zr phase diagram [Massalski2] shows that βTi-βZr and αTi-αZr pairs form continuous solid solutions.

## Ternary Isothermal Section

With starting metals of 99.9% Fe, 99.5% Ti, and 99.9% Zr, [2007Zho] prepared diffusion triples, which were annealed at 900 °C for 1440 h and quenched in water. The phase equilibria were studied with electron probe microanalysis and the compositions of the coexisting phases were listed. No structural analysis was done. The tentative isothermal section at 900 °C constructed by [2007Zho] is redrawn in Fig. 1 to agree with the accepted binary data. The solubility of Zr in $Fe_2Ti$ and FeTi is 8.1 and 7.2 at.% respectively. The solubility of Ti in $Fe_2Zr$ (cubic) and $FeZr_2$ is 11.3 and 26.9 at.%, respectively. No ternary compounds were found.

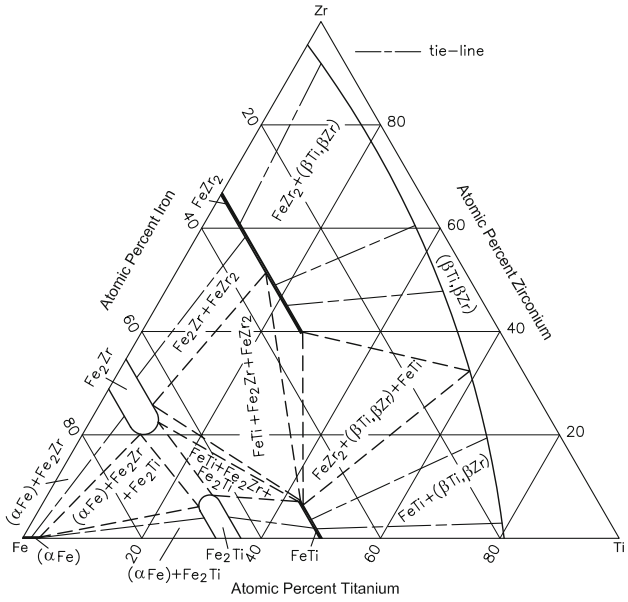


**Fig. 1** Fe-Ti-Zr tentative isothermal section at 900 °C [2007Zho]

## References

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