

Al-Mg-Sc-Ti-Zr (Aluminum-Magnesium-Scandium-Titanium-Zirconium)

V. Raghavan

A vertical section for this five-component system was determined by [1996Che] at 0.3Sc-0.15Ti-0.15Zr (mass%).

Lower Order Systems

The Al-Mg phase diagram has the following intermediate phases: Mg_2Al_3 (cubic, labeled β), R or ϵ (rhombohedral), and $Mg_{17}Al_{12}$ ($A12$, α Mn-type cubic, denoted γ). The Al-Sc phase diagram depicts the following intermediate compounds: $ScAl_3$ ($L1_2$, AuCu₃-type cubic), $ScAl_2$ ($C15$, $MgCu_2$ -type cubic), $ScAl$ ($B2$, CsCl-type cubic), and Sc_2Al ($B8_2$, Ni₂In-type hexagonal). The intermediate phases in the Al-Ti system are: Ti_3Al ($D0_{19}$, Ni₃Sn-type hexagonal, denoted α_2), $TiAl$ ($L1_0$, AuCu-type tetragonal, denoted γ), $TiAl_2$ (HfGa₂-type tetragonal), $TiAl_3$ (HT) ($D0_{22}$ -type tetragonal), and $TiAl_3$ (LT) (tetragonal). There are a number of intermediate phases in the Al-Zr system. The only phase of interest in the results on Al-rich alloys reviewed here is $ZrAl_3$ ($D0_{23}$ -type tetragonal).

Updates of the Al-Mg-Sc and Al-Mg-Sc-Zr systems were presented by [2007Rag] and [2008Rag], respectively. Only binary compounds appear at the Al-rich corner in the reviewed phase equilibria of these systems.

Quaternary Vertical Section

The experimental details used by [1996Che] are not given in their paper. The vertical section constructed by them at constant content of 0.3Sc-0.15Ti-0.15Zr (mass%) is redrawn in Fig. 1. Only binary compounds are present. On solidification, near the Al corner, the four-phase equilibrium of $(Al) + Mg_2Al_3 + ScAl_3 + (Ti,Zr)Al_3$ is seen.

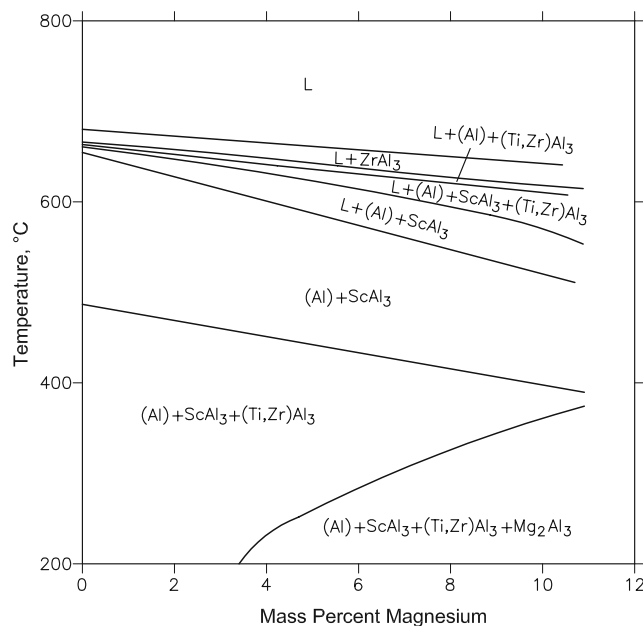


Fig. 1 Al-Mg-Sc-Ti-Zr vertical section at 0.3Sc-0.15Ti-0.15Zr (mass%) [1996Che]

References

- 1996Che:** V.V. Cherkasov, P.P. Pobezhimov, L.P. Nefedova, E.V. Belov, and G.M. Kuznetsov, Special Features of the Structure Formation and Properties of Castable Al-Mg Alloys Alloyed with Scandium, *Metallovedenie Term. Obrab. Metallov*, 1996, (6), p 30-32, in Russian; TR: *Metal Sci. Heat Treatment*, 1996, (5-6), p 268-270
- 2007Rag:** V. Raghavan, Al-Mg-Sc (Aluminum-Magnesium-Scandium), *J. Phase Equilib. Diffus.*, 2007, **28**(5), p 471-472
- 2008Rag:** V. Raghavan, Al-Mg-Sc-Zr (Aluminum-Magnesium-Scandium-Zirconium), *J. Phase Equilib. Diffus.*, 2008, **29**(2), p 192-193