

Flow Behavior of AZ31B-0 Mg Alloy Sheet under Tension at Elevated Temperatures

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Abstract

The flow behavior and associated structural changes of commercial wrought AZ31B-0 alloy sheet deformed in tension were analyzed in this work. Tensile tests were conducted on a sheet with a thickness of 0.6 mm and an initial average grain size of 5.7 μm at temperatures of 250 and 370 $^{\circ}\text{C}$, with strain rates from 4×10^{-3} to 1×10^{-1} s^{-1} . The results showed that dynamic recrystallization could occur during the hot deformation of AZ31B alloy even with an original fine-grained structure due to its low stacking fault energy. Dynamic recrystallization was predominant at a lower temperature of 250 $^{\circ}\text{C}$. Grain boundary sliding appeared to be the major deformation mechanism for testing at a temperature of 370 $^{\circ}\text{C}$ and a strain rate of 4×10^{-3} s^{-1} . The deformation mechanism at 370 $^{\circ}\text{C}$ and strain rate of 1×10^{-1} s^{-1} could be due to the combination of grain boundary sliding and viscous glide mechanisms resulting from the bimodal grain size structure, which comprises large-grown grains and fine recrystallized grains.

Keyword : AZ31B-0 Mg alloy, dynamic recrystallization, grain boundary sliding, strain rate sensitivity