Tensile flow behavior of fine-grained AZ31B magnesium alloy thin sheet at elevated temperatures

吳泓瑜,徐維謙
Mechanical Engineering
Engineering
ncuwu@chu.edu.tw

Abstract

The flow behavior and associated structural changes of commercial wrought AZ31B-O 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 ºC, with strain rates from 4×10-3 to 1×10-1 s-1. The results showed that dynamic recrystallization could occur during 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 ºC. Grain boundary sliding appeared to be the major deformation mechanism for testing at a temperature of 370 ºC and a strain rate of 4×10-3 s-1. The deformation mechanism at 370 ºC and strain rate of 110-1 s-1 could be due to a combination of grain boundary sliding and viscous glide mechanisms resulting from the bimodal grain size structure, which comprised large-grown grains and fine recrystallized grains.

Keyword：AZ31B-O Mg alloy; Dynamic recrystallization; Grain boundary sliding; Strain rate sensitivity