Anisotropic and tensile flow behaviors of Mg alloy AZ31B thin sheet in H24 condition at elevated temperatures

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Abstract

In this work, a series of experiments was performed to explore the effects of anisotropy, strain rate, and temperature on microstructure change and associated mechanical response of a rolled AZ31B-H24 Mg alloy sheet under tension. Tensile tests were carried out on specimens in the 0, 45, and 90° to the rolling direction, using initial strain rates in the range of 4×103 to 1×101 s1 at temperatures of 250 and 370 °C. Results showed that variations in flow behavior under tension could be related to the changes in microstructure resulting from applied tensile conditions. Resultant microstructures, such as degree of dynamic recrystallization, grain growth, and shape of the grain, were associated with temperature, strain rate, and tensile loading direction. The initial texture influenced the variations in changes in microstructure and mechanical properties upon testing in different directions. The specimens upon testing in the 45° to the rolling direction yielded higher m-value, lower strength, and greater elongation to failure under all test conditions.

Keyword：Anisotropy; AZ31B-H24 Mg alloy; dislocation creep; dynamic recrystallization; strain rate sensitivity