

Hot deformation characteristics of as-cast and homogenized AZ61 Mg alloys
under compression

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Abstract

The hot deformation behaviors of AZ61 Mg alloys were investigated using compression tests in temperature and strain rate ranges of 523-673 K and 1×10^{-3} s⁻¹, respectively. The specimens were deformed in the as-cast and homogenized states to evaluate differences in their responses to deformation. Optical microscopy analysis was performed to correlate microstructural changes to the flow behaviors. In comparison with homogenized specimens, the as-cast specimens exhibited a lower degree of dynamic recrystallization and/or smaller average grain size of the dynamically recrystallized grains under the same deformation conditions. These resulted in higher flow stresses in the as-cast specimens. The peak stress decreased with increasing deformation temperature and decreasing strain rate, which could be represented by a Zener-Hollomon parameter Z in the hyperbolic sine equation with the activation energy values of 181 and 151 kJ/mol for the as-cast and homogenized states, respectively. The higher activation energy observed in the as-cast state could be caused by the presence of the segregated Mg₁₇Al₁₂ intermetallic particles.

Keyword : Activation energy; AZ61 Mg alloy; Dynamic recrystallization;
Stress exponent