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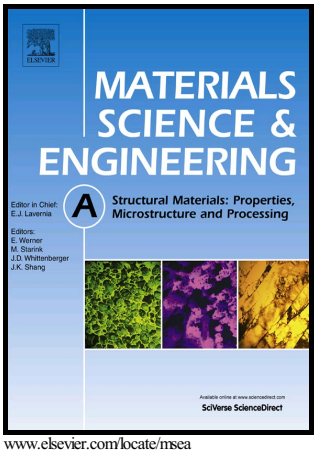

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Effects of aging temperature on microstructure, tensile and creep properties of ring rolled AZ80-Ag alloy

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Abstract

In this study, aging behavior, tensile property and creep performance of the ring rolled AZ80-Ag magnesium alloy at different aging temperatures were systematically investigated. Results show that the microstructure is mainly occupied by discontinuous precipitation (DP) and continuous precipitation (CP) of β-$Mg_{17}Al_{12}$ after T6 treatment. The peak aging at low temperature (175 ^{o}C) results in a larger volume fraction of β precipitation and a lower CP/DP ratio than peak aging at high temperature (250 ^{o}C). With raising aging temperature, the tensile strength at ambient temperature reveals a descending tendency, whereas the creep resistance at 120-175 ^{o}C under 70-90 MPa exhibits an enhancement. Based on the analysis of creep stress exponent and activation energy values, the dominant creep mechanism of both aged specimens is dislocation creep controlled by competing lattice diffusion and pipe diffusion. Basal <a> and non-basal <c + a> dislocations can be activated in the creep deformation.

Keywords: Magnesium alloy; Aging behavior; Creep performance; Dislocation

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