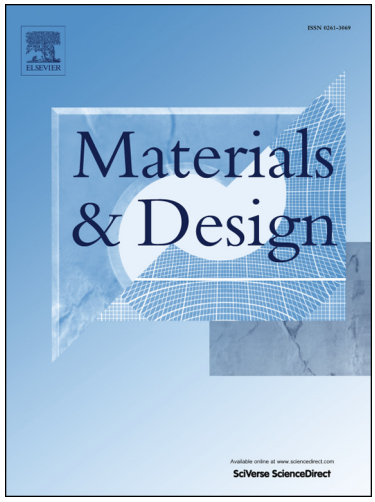

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Strain-Controlled Low Cycle Fatigue Properties of a Rare-Earth Containing ZEK100 Magnesium Alloy

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Abstract

Low rare-earth (RE) containing magnesium alloys are being considered for the lightweight automotive applications to reduce fuel consumption and emissions. Design of magnesium components requires strain-controlled low-cycle fatigue (LCF) behavior. This study was aimed to evaluate the cyclic deformation characteristics and LCF life of a low (0.2 wt.%) Nd-containing ZEK100-O alloy. The alloy contained equiaxed grains along with some $Mg_{12}Nd$ particles, and exhibited a relatively weaker basal texture. While slight cyclic softening occurred at high strain amplitudes, cyclic stabilization remained at lower strain amplitudes. Fatigue life of ZEK100 alloy was longer than that of the extruded RE-free AZ31 and AM30 alloys, due to a fairly good combination of strength with ductility. The asymmetry and skewness of hysteresis loops, which were characterized by eccentricity, angle deviation, and relative slope change, respectively, were effectively improved relative to the extruded RE-free alloys, arising from less extensive twinning

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