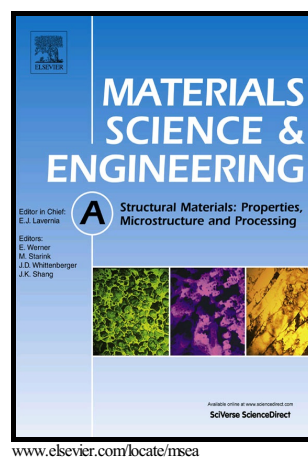


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Enhanced low-cycle fatigue and crack propagation resistance of an Al-Cu-Mg-Si forging alloy by non-isothermal aging

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Abstract

Low-cycle fatigue (LCF) and fatigue crack propagation (FCP) behavior of an Al-Cu-Mg-Si forging alloy with different non-isothermal aging (NIA) degrees were investigated. The main question addressed was about the interactions between precipitates and dislocations and their influences on LCF and FCP resistance. Strain-controlled LCF and ΔK -controlled FCP were tested. The characterization of precipitates and fractography were performed on TEM/HRTEM and SEM, respectively. The results showed that under cyclic loading, shearable precipitates were suffered from particle shearing mechanism associated with slip localization, resulting in cyclic softening behavior and low FCP rates; non-shearable precipitates were suffered from bypassing mechanism associated with homogeneous slip, resulting in cyclic hardening behavior and high FCP rates. The mixed precipitation characteristics

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