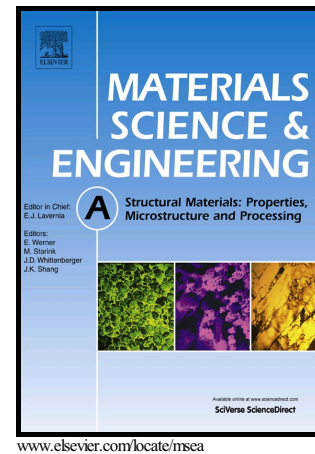


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A Study of Low Cycle Fatigue Life and its correlation with Microstructural Parameters in IN713C Nickel Based Superalloy

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**A Study of Low Cycle Fatigue Life and its correlation with Microstructural Parameters in
IN713C Nickel Based Superalloy**

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Abstract

Up to date, IN713C Nickel-based superalloy has been continued to be the best alloy candidate for turbocharger wheel applications due to its adequate fatigue property and resistance to degradation under harsh operating environments. Throughout this study, three different batches of as-cast IN713C nickel based superalloys with different microstructures including columnar, equiaxed and transition microstructures were investigated. Strain control Low Cycle fatigue (LCF) tests were conducted for the three different microstructures, achieving fatigue life between 100 and runout at 100,000 cycles, depending on the testing parameters. The fracture mechanics and failure mechanism were correlated to the alloy's microstructure, texture and chemical composition under various LCF conditions using optical microscopy, SEM, EDX and EBSD. In the current study an exact correlation between alloy's microstructure/microtexture and LCF endurance is established. The results showed that equiaxed microstructure has a superior fatigue life than the transition microstructure by 10% and columnar microstructure by > 200% at a given

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