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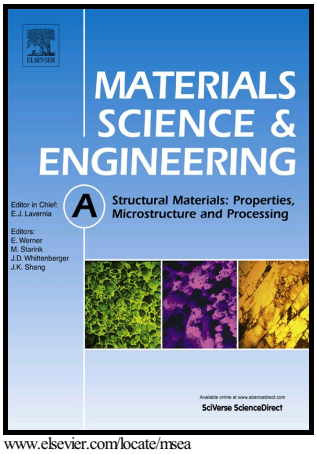

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The High Cycle Fatigue, Deformation and Fracture ofCompacted Graphite Iron:Influence of Temperature

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Abstract:

The microstructure, tensile strength, high-cycle fatiguepropertyand corresponding damage mechanisms of compacted graphite iron at room temperature (25 ^{o}C), 400^{o}C and 500^{o}C, were investigated. It is found that the fatigue strength increases at first and then decreases with the increase of the testingtemperature.At 25^{o}C,the fatigue crackmainlyinitiatesfrom graphite debonding and propagates along the graphiteclusters.At 400 ^{o}C,the fatigue crack initiationis influenced by oxidation; the fatigue strengthmay be improved by dynamic strain aging.At 500^{o}C, theoxidation becomes more serious andthe oxide layer accelerates the crack to propagate along the matrix. At the same time, the phenomenon of grain boundarysoftening, one of the reasons resulting in the reduction of fatigue strength,is found.Then, the model ofdamage mechanismwas proposedaccording to the propagation behavior of fatigue crack at high temperatures, and the quantitative relationship betweenthefatigue strength and the ratio of the interphase corrosion depth to the critical crack lengthwas established.This investigationmay enrich the fundamental understandingon the damage mechanism of compacted graphite iron.

Key words: Compacted graphite iron;Testing temperature; High-cycle fatigue property; Oxidation effect;Dynamic strain ageing.

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