

Accepted Manuscript

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PII: S0142-1123(18)30270-6
DOI: <https://doi.org/10.1016/j.ijfatigue.2018.06.035>
Reference: JIJF 4739

To appear in: *International Journal of Fatigue*

Received Date: 19 January 2018
Revised Date: 19 June 2018
Accepted Date: 23 June 2018

Please cite this article as: Li, S., Yang, X., Qi, H., Song, J., Shi, D., Low-temperature hot corrosion effects on the low-cycle fatigue lifetime and cracking behaviors of a powder metallurgy Ni-based superalloy, *International Journal of Fatigue* (2018), doi: <https://doi.org/10.1016/j.ijfatigue.2018.06.035>

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Low-temperature hot corrosion effects on the low-cycle fatigue lifetime and cracking behaviors of a powder metallurgy Ni-based superalloy

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Abstract: In this paper, low-cycle fatigue (LCF) experiments were conducted to analyze the influence of low-temperature hot corrosion on the LCF behavior of the powder metallurgy Ni-based superalloy FGH96 at 700 °C. The LCF lifetime of the salt-coated samples was drastically lower than that of bare samples. The low-temperature hot corrosion would change the crack initiation mode (from subsurface defects to corrosion pits) and early propagation modes (from transgranular to intergranular). Moreover, the degradation mechanism of hot corrosion in the LCF lifetime was connected with early crack initiation resulting both from the deteriorated surface because of corrosion pits and the accelerated fatigue crack propagation due to weakened grain boundaries.

Keywords: Corrosion fatigue; failure analysis; fatigue behavior; fracture; crack initiation.

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