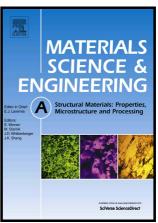
## Author's Accepted Manuscript

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Evolution of crystallographic orientation during thermomechanical

fatigue of heat-resistant stainless steel

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**Abstract** 

We present the evolution of crystallographic orientation and microstructure during

thermomechanical fatigue (TMF) of heat-resistant cast austenitic stainless steel at peak

temperatures reaching 950 °C using the electron backscatter diffraction (EBSD) method. Higher

restraints or peak temperatures induced larger crystal misorientation by geometrically necessary

dislocations (GNDs), forming dislocation walls or subgrains in the grains. Networked carbide

clusters in the microstructure locally amplified the misorientation in the adjacent matrix and

initiated fatigue cracks. The mean value of cumulative misorientations over a specific distance in

the matrix was linearly proportional to the cyclic plastic strain.

**Keywords:** Electron backscattering diffraction (EBSD); Austenitic steel; Fatigue; Misorientation;

Dislocation structure; Plastic strain

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