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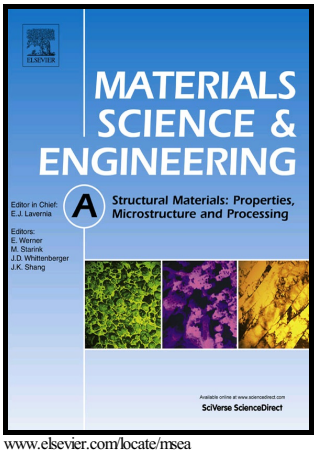

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Influence of Original Austenite Grain Size on Tensile Properties of a High-manganese Transformation-induced Plasticity (TRIP) Steel

Xing Li [a], Liqing Chen [a,] *, Yang Zhao [b], Xiaoyun Yuan [a] and Raja Devesh Kumar Misra [c]

a) State Key Laboratory of Rolling and Automation, Northeastern University, Shenyang 110819, PR China

b) School of Materials Science and Engineering, Northeastern University, Shenyang 110819, PR China

c) Laboratory of Excellence in Advanced Steel Research, Department of Metallurgical, Materials and Biomedical Engineering, University of Texas at El Paso, El Paso, TX 79912, USA

* Corresponding author. Tel.: 86-24-83681819, Fax: 86-24-23906472

E-mail address: lqchen@mail.neu.edu.cn

Abstract

Original austenitic grain size and stacking fault energy (SFE) of a high-Mn transformation-induced plasticity (TRIP) steel was varied by annealing at different temperatures. The microstructural evolution during cooling and tensile deformation were investigated to explain the work hardening behavior. The study suggested that the amount of ε-martensite was increased with annealing temperature. When SFE was greater than 13.3 mJ/m^2, twin may form in austenite on cooling; and ε-martensite cannot be thermally induced in austenite once its SFE was higher than 20.6 mJ/m^2. Work hardening behavior of the steel annealed at different temperatures could be divided into two stages using Hollomon analysis. The grain refinement strengthening and deformation induced $\gamma \rightarrow \varepsilon$ transformation rendered 800 °C annealed sample to have the largest work hardening exponent in Stage-I, in this case