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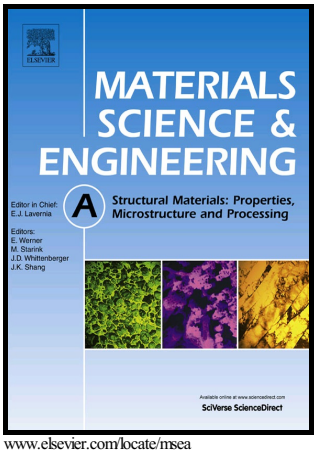

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Thermal and mechanical stability of retained austenite surrounded by martensite with different degrees of tempering

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Abstract

The mechanical and thermal stability of austenite in multiphase advanced high strength steels are influenced by the surrounding microstructure. The mechanisms underlying and the relations between thermal and mechanical stability are still dubious due to the difficulty of isolating other factors influencing austenite stability. In this work, martensite/austenite microstructures were created with the only significant difference being the degree of tempering of the martensite matrix. Hence, the effect of tempering in martensite is isolated from other factors influencing the stability of austenite. The thermal stability during heating of retained austenite was evaluated by monitoring phase fractions as a function of controlled temperature employing both dilatometry and magnetometry measurements. The mechanical stability was studied by performing interrupted tensile tests and determining the remaining austenite fraction at different levels of strain. The thermal stability of this remaining austenite after interrupted tests was studied by subsequent reheating of strained specimens. The results are evidence for the first time that thermal recovery of martensite during reheating assists austenite