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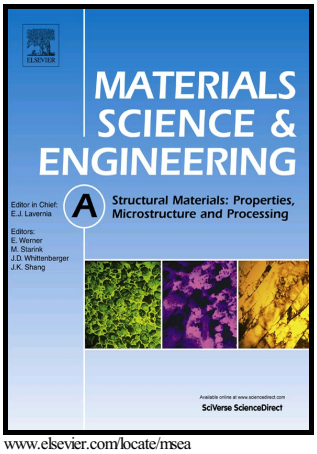

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ACCEPTED MANUSCRIPT

Increasing yield strength of medium Mn steel by engineering multiple strengthening defects

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Abstract

In general, medium Mn transformation-induced plasticity (TRIP) steels have a low yield strength due to soft ferrite matrix. Here we provide a strategy to improve the yield strength of medium Mn steels by coupling multiple strengthening defects in an austenite matrix. Such strengthening defects include V-precipitates, intra-granular ferrite, forest dislocations and nano-twins. Consequently, the present medium Mn steel has an ultra-high yield strength of 1350 MPa due to the collective contribution from these strengthening defects. Moreover, the present medium Mn steel demonstrates a good uniform elongation of 15%, which is ascribed to enhanced work hardening behavior due to the operation of both TRIP effect and twinning-induced plasticity (TWIP) effect.

Keywords: Medium Mn steel, TRIP, TWIP, Austenite, Precipitates

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