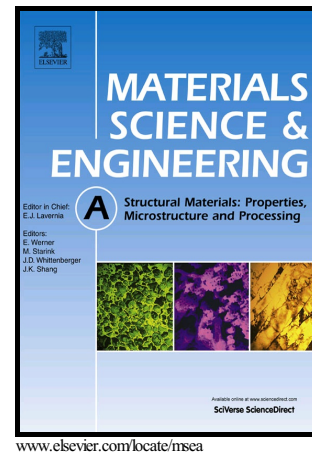


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Achievement of high yield strength and strain hardening rate by forming fine ferrite and dislocation substructures in duplex lightweight steel

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Abstract

Lightweight steels containing a considerable content of Al show high specific strength and ductility, but there are some drawbacks such as low yield strength and stringer-type bands formed along the rolling direction. Here we design new duplex lightweight steel in order to complement the drawbacks, and achieve ultra-high yield strength (865 MPa), good ductility (41%). Submicron ferrite mainly affects high yield-to-tensile ratio, and high strain hardening is attributed to Lomer-Cottrell lock and planar slip, and cell structure by further deformation in austenite. These results are expected to provide a desirable possibility for applications to reinforcement components requiring high yield-to-tensile ratio.

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