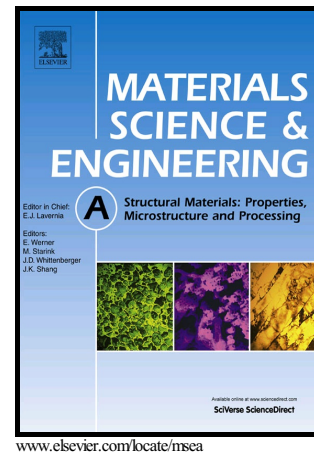


# Author's Accepted Manuscript

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PII: S0921-5093(17)31456-9  
DOI: <https://doi.org/10.1016/j.msea.2017.11.009>  
Reference: MSA35724

To appear in: *Materials Science & Engineering A*

Received date: 18 July 2017  
Revised date: 2 November 2017  
Accepted date: 3 November 2017

Cite this article as: Kunjan Kumar Anand, Bhupeshwar Mahato, Christian Haase, Ashok Kumar and Sandip Ghosh Chowdhury, Correlation of defect density with texture evolution during cold rolling of a Twinning-Induced Plasticity (TWIP) steel, *Materials Science & Engineering A*, <https://doi.org/10.1016/j.msea.2017.11.009>

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## Correlation of defect density with texture evolution during cold rolling of a Twinning-Induced Plasticity (TWIP) steel

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### ABSTRACT

TWIP steels have been cynosure owing to their great potential to be used in the automotive industry. In the present work, an austenitic Fe-22.5Mn-1.5Al-0.35C steel has been investigated for its cold deformation behavior. X-ray line profile analysis has been used to investigate the evolution of dislocation density, crystallite size, microstrain, twin and stacking fault probability during cold rolling. The steel has been cold rolled up to 80% thickness reduction and a high dislocation density of the order of  $10^{15} \text{m}^{-2}$  is estimated after high degrees of plastic deformation. The microstrain and crystallite size show tendencies to saturate towards higher degrees of deformation. Texture analysis reveals transformation of an initially formed Copper-type texture into a Brass-type texture after medium degrees of rolling reduction. The correlation between microstructural defects and texture evolution has been discussed.

**Keywords:** TWIP steel, X-ray Diffraction Line Profile analysis, cold deformation, twinning, texture

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