
Microstructure and texture control in few steels processed by severe cold rolling and annealing

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Abstract

Nano/microstructure and mechanical properties have been studied applying various severe plastic deformation (SPD) methods (1). Conventional cold rolling applying moderate deformation followed by annealing is a well established industrial method for processing metals and alloys. However, the microstructure, crystallographic texture and mechanical properties of severely cold rolled (SCR) followed by annealing is less reported specially in steels. Therefore, in the current work SCR and annealing was applied to study and control the microstructure, texture and grain size with the aim to develop fine grained high strength formable Steel. Few industrially produced steels were hot and cold rolled and subsequently annealed. FEGSEM, TEM, EBSD, X-Ray diffraction and mechanical characterization was performed to study the microstructure, texture and properties. The results indicate formation of ultra fine lamellar bands and strengthening of deformation texture after severe cold rolling. The α fibre texture was stronger in the early stage of annealing, where ultra fine grains (UFGs) were evident in the microstructure, however, with annealing gradually replaced by non uniform γ fibre texture and mixture of fine and coarse grains. Homogeneous microstructure and texture was achieved through proper control of deformation and processing cycle.

Keywords: Steels, cold rolling, annealing, microstructure, texture

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