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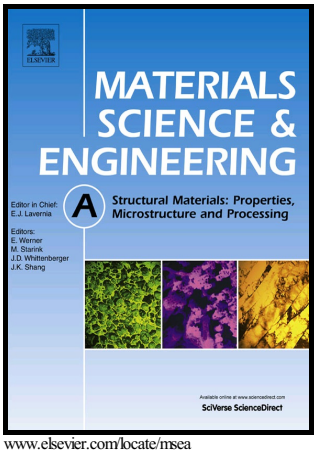

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Effect of microstructure evolution on anisotropic fracture behaviors of cold drawing pearlitic steels

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Abstract

The effect of microstructure evolution on the anisotropic fracture behaviors of cold drawing pearlitic steels was investigated by conducting an in situ tension test with scanning electron microscopy (SEM), transmission electron microscopy (TEM), and electro backscatter diffraction (EBSD). Results revealed three patterns of crack propagation in the pearlitic microstructure: shear cracking, cracking along the pearlite colony interface, and cracking with respect to pearlite phase boundary. The crack propagation mode is mainly determined by shear cracking as strain increases because of the successive microstructure evolution. After cold drawing is obtained from the strain of $\varepsilon = 0$ to $\varepsilon = 0.8$, the crack propagation path became deflected with the anisotropic fracture behavior. As the strain increases to 1.6, the degree of deflection decreases. Combined with the main function of shear cracking in crack propagation, the gradual formation of ferrite <110> texture causing the variation of grain

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