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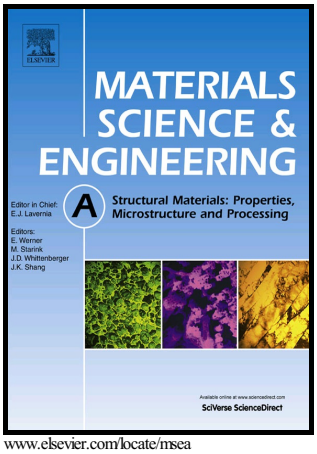

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Abstract:

Effects of SiC nanoparticles on the microstructural and textural evolutions of AZ31 matrix alloy during hot rolling were investigated. The addition of SiC nanoparticles can strongly inhibit the formation of shear bands, which are much more prevalent in matrix alloy sheets. Compared with pristine AZ31 alloy, the nanocomposite is characterized by a lamellar structure which is composed by the alternative a fine grain layer and a coarse grain layer. The lamellar structure was caused by the nanoparticle bands in as-rolled sheet. The fine grain layer was caused by the pinning effects of nanoparticles on recrystallized grain growth. Moreover, nanoparticles complicatedly altered the basal texture intensities of the matrix in the nanocomposite, instead of the reported simply weakening effect. For the mechanical strengths, the hot rolling leads to remarkable enhancement for both of nanocomposite and alloy sheets. However, the former ones always show superior value than the latter ones. Inhibited shear bands, nanoparticles bands and the associated lamellar structure do benefit the stronger mechanical properties in the nanocomposite sheets.

Key words:

magnesium matrix nanocomposite; hot rolling; shear bands; lamella structure; mechanical properties.