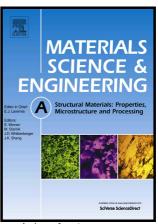
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#### **ACCEPTED MANUSCRIPT**

# Martensite transformation behavior and mechanical properties of cold-rolled metastable Cr-Mn-Ni-N austenitic stainless steels

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#### Abstract

In order to understand the mechanism of substitution for nickel with manganese in metastable austenitic stainless steels 14Cr10Mn and 16Cr6Mn, the transformation behavior of  $\epsilon$ - and  $\alpha$ '-martensite and the corresponding mechanical properties were investigated in this study. The microstructures and tensile and hardness properties of the cold-rolled steels under different rolling reductions at ambient temperature were measured using X-ray diffraction (XRD), scanning electron microscope (SEM) together with an electron back scatter diffraction (EBSD) and transmission electron microscope (TEM). The results show that  $\alpha$ '-martensite is not easy to be transformed from austenite, and the martensite transformation  $\gamma \to \epsilon \to \alpha$ ' in 14Cr10Mn and 16Cr6Mn metastable stainless steels is found during cold rolling. The results also reveal that  $\epsilon$ -martensite acts as an hardness reinforcing phase, and high total martensite volume fraction and ratio of  $\epsilon$ - and  $\alpha$ '-martensite content are helpful to achieve higher tensile strength

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