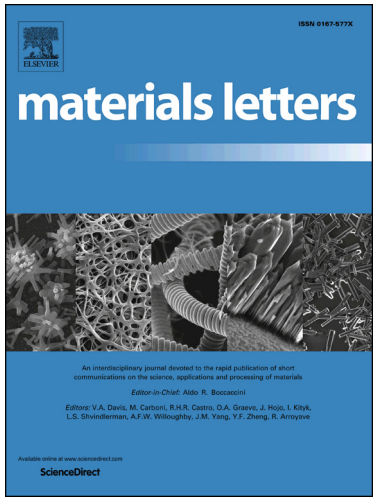

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Deformation-induced nontetragonality of martensite in carbon steels

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Abstract: With supersaturated carbon atoms ordering in the preferential octahedral sites of α-Fe lattice, the martensite formed in medium and high carbon steels exhibit a unique structural feature, tetragonality. In this letter, we reported anomalous nontetragonality of martensite in carbon steels by deforming quenched martensite, indicating that the disordering of interstitial carbon atoms in α-Fe lattice occurs under mechanical deformation. This order-disorder transition of interstitial carbon atoms in carbon steels provides solid experimental evidences of the prediction based on microscopic elasticity theory.

Keywords: Crystal structure; Phase transformation; Martensite; Tetragonality; Order-disorder transition; Metals and alloys.

1. Introduction