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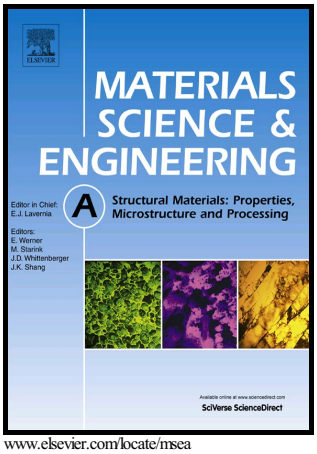

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Temperature-dependent plastic deformation mechanisms of a Cu/steel transforming nanolamellar composite

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Abstract

Metallic nanolamellar composites possess unusually high strength owing to the high density interfaces that impede dislocation nucleation and migration. Meanwhile most nanolamellar composites show limited ductility in tension due to the lack of effective deformation mechanisms. Martensitic transformation, once multiplied with dislocations, can improve the work hardening efficiently during plastic deformation, leading to enhanced ductility. It is thereby of interest to investigate the mechanical behavior of nanolamellar composites that contain martensitic constituents. We here report on the temperature-dependent deformation mechanisms of a nanolamellar Cu/carbon-steel composite wire with a high volume fraction of retained austenite. Tensile tests at various temperatures reveal that the mechanical behavior of the