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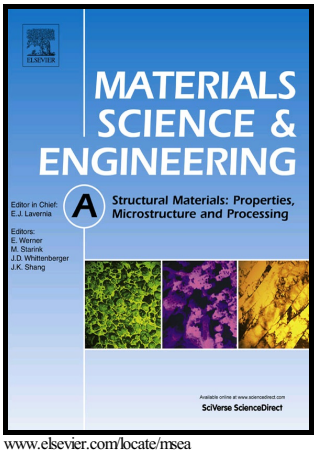

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The Effect of Grain Size on the Damping Capacity of Fe-17wt%Mn

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Abstract

The grain size dependence of the damping capacity of Fe-17wt%Mn steel was investigated. A high damping capacity was measured in the ultra-fine grained steel, despite its lower volume fraction of ε martensite and lower density of ε variant boundaries and ε/γ phase boundaries. Dilatometry of the ultra-fine grained Fe-17wt%Mn steel revealed that the ε↔γ phase transformation was largely suppressed. The features of the damping spectra were related to the anti-ferromagnetic transition in the γ phase, the thermo-elastic ε↔γ phase transformation and the motion of grain boundaries in the ultra-fine grained microstructure. The damping spectrum of the ultra-fine grained Fe-17wt%Mn steel was dominated by grain boundary damping effects.

Keywords: Fe-Mn alloy, epsilon martensite, damping, internal friction, thermal cycling