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PII: S0921-5093(16)31302-8  
DOI: <http://dx.doi.org/10.1016/j.msea.2016.10.079>  
Reference: MSA34281

To appear in: *Materials Science & Engineering A*

Received date: 10 May 2016  
Accepted date: 21 October 2016

Cite this article as: Sunmi Shin, Minhyuk Kwon, Wontae Cho, In Shik Suh and B.C. De Cooman, The Effect of Grain Size on the Damping Capacity of Fe 1 7 w t % M n , *Materials Science & Engineering A* <http://dx.doi.org/10.1016/j.msea.2016.10.079>

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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  $\varepsilon$  martensite and lower density of  $\varepsilon$  variant boundaries and  $\varepsilon/\gamma$  phase boundaries. Dilatometry of the ultra-fine grained Fe-17wt%Mn steel revealed that the  $\varepsilon \leftrightarrow \gamma$  phase transformation was largely suppressed. The features of the damping spectra were related to the anti-ferromagnetic transition in the  $\gamma$  phase, the thermo-elastic  $\varepsilon \leftrightarrow \gamma$  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

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