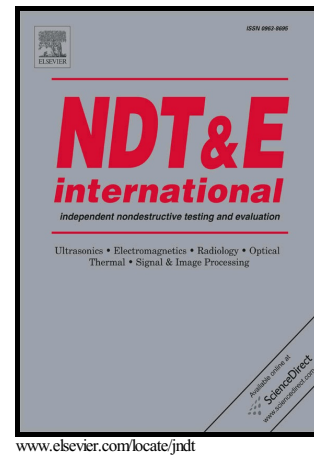


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Using Magnetic Properties

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A study of Microstructural Analysis for Nondestructive Evaluation of Thermal Annealing Using Magnetic Properties

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Abstract

Two kinds of thermally aged Fe-Cu alloys with different Cu proportions 0.05% and 0.45% were prepared and its magnetic properties were investigated to apply magnetic nondestructive testing techniques for the assessment of irradiation embrittlement of materials. Initially, the alloy is 10% cold rolled and then isothermally aged at 500°C and 400°C with different aging time up to 1000hrs in order to create Cu-precipitates in Fe metal matrix. The hysteresis loop (HL), Barkhausen noise (BN) and Magnetic Adaptive Testing (MAT) parameter were measured for magnetic properties studies and mechanical properties were investigated by Vickers hardness. The HL, BN were decreased and MAT parameter was increased by thermal aging. The changes of these parameters were explained by copper rich precipitations (CRPs) formation, interaction with domain walls and dislocation movement pinned by CRPs. it was confirmed by TEM and EDX analysis.

Keywords: : Fe-Cu alloy, Magnetic Properties, Magnetic Adaptive Testing, Micro Hardness, Thermal Aging, TEM and EDX.

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