MAGNETIC SHIELDING MATERIALS FOR ELECTRIC VEHICLES

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Abstract. In this paper, the classic low carbon steel used as structural part of the bottom part of the car is tested to additionally become operational part of the electric vehicles as the magnetic shielding material after magnetothermal annealing. The low carbon steels (LCS) were studied in their as-received form and after thermal annealing in 350oC for 1 hour in inert atmosphere with a consequent slow cooling for 24 hours, followed by magnetic annealing in 350oC for 1 hour in inert atmosphere under 0.1T field, followed by slow cooling for 24 hours under the presence of the applied field. A typical change in the differential magnetic permeability of LCS after the annealing process increased up to 200,000. In the meantime, hardness tests illustrated a negligible change (decrease) of mechanical stiffness. Apart from that, the magnetic anisotropy of welded samples has been determined by monitoring the permeability in different in-plane axes, since these steel sheets are to undergo a welding process during manufacturing. The study of the samples with TEM (JEOL operating at 220 kV) was done to monitor the disorder structures created in LCS before and after magneto-thermal treatment. Indeed, a remarkable decrease in dislocation density was observed, thus correlating the increase of permeability with the microstructure enhancement.

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