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ABSTRACTS

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granulated and was pressed into toroidal shapes, which were finally sintered at around 1090 in the atmosphere. Results obtained from those sintered cores are summarized in Fig. 1 and Fig. 2. We observed a decline in core loss with an increase in the quantity of MnO2 added (Fig. 1). This was attributed to a decline in coercive force with an increase in MnO2 additive (Fig. 2), which was assumed to reduce hysteresis loss. The likely reason behind the decrease of coercive force was a decline in the crystalline lattice distorsion due to the substitution of Mn4+ ions at the transition metal ion sites inside spinel crystals. Thus, we were able to develop low-loss NiZn ferrite materials of the top-level. Our future task is to develop even lower-loss NiZn ferrites through the optimization of manufacturing conditions.

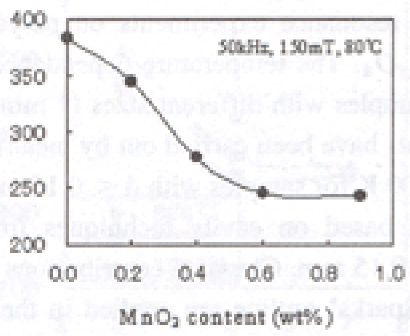

FIG. 1. MnO2 content dependence of core loss.

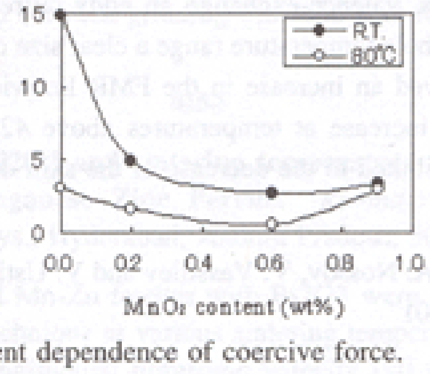

FIG. 2. MnO2 content dependence of coercive force.

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FH-07. Magnetic properties of NiZnCu ferrite powders and thin films prepared by a sol-gel method. *Woo Chul Kim*, Sam Jin Kim, and Chul Sung Kim (Kookmin Univ., Dep. of Phys., 861-1, Chongnung-dong, Sungbuk-gu, Seoul, 136-702, KR)

Ultrafine $Ni_{0.63}Zn_{0.17}Cu_{0.2}Fe_2O_4$ powders and thin films were fabricated by a sol-gel method and their magnetic and structural properties were investigated with thermogravitric and differential thermal analysis (TG-DTA), x-ray diffractometer (XRD), transmission electron microscope (TEM), Mössbauer spectrometer, atomic force microscopy (AFM), and vibrating sample magnetometer (VSM). TG-DTA measurements showed exothermic reaction peak at 306 °C with weight loss of 43 %. NiZnCu ferrite powders which were fired at and above 400 °C had only a single phase spinel structure and behaved ferrimagnetically. Powders annealed at 250 and 350 °C had a typical spinel structure and were simultaneously paramagnetic and ferrimagnetic in nature. The magnetic behavior of NiZnCu ferrite powders fired at and above 550 °C showed that an increase of the annealing temperature yielded a decrease of the coercivity and an increase of the saturation magnetization. The maximum coercivity and the saturation magnetization of NiZnCu ferrite powders were H_c= 160 Oe and M_s= 64 emu/g, respectively. NiZnCu ferrite thin films annealed at 550 and 650 °C had a single phase spinel strcture and there was no perpendicular to their magnetic properties for external fields applied parallel and perpendicular to their planes. The microstructure of thin films annealed at 550 and 650 °C consisted of spherical grains with 45 and 49 Å in surface roughness (rms).

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FH-08. MnZn Ferrite Core Losses Estimation in Magnetic Components at High Frequency. *Ermanno Cardelli*, Edward Della Torre, and Lorenzo Fiorucci (Univ. of Perugia, Industrial Eng., Via G. Duranti 1/A, Perugia, Italy, 06135, IT)

The use of Manganese-Zinc soft magnetic ferrites in transformers and inductors for power electronics and telecommunication applications is in continuous increase. In this case one of the most important tasks is the estimation of the core losses in function of the amplitude of the magnetic induction and of the frequency. Preliminary considerations show that in the range up to 400 kHz the eddy current losses and the dielectrics losses are a very small part of the total core losses, and in this field of frequencies Hysteresis losses are dominant. In this paper we use a Modified Scalar Preisach Model in order to predict the amount of the core losses of soft ferrites. The proposed modeling technique has the following main key-points: Stochastic independence between switching probabilities. This fact implies that the probability function can be expressed as a product of two single-value functions. A reversible part of the magnetization accounted for separately from the probability function Introduction of a product function in order to simulate the experimental behaviour of ''non-congruency'' of minor loops. Simple identification technique of the model parameters that utilizes only the saturation major loop and the virgin curve, or the series of the symmetric loops. Possibility to treat multi-frequency waveforms and d.c. components added to a.c. components. We have applied this modelling technique to commercial C-shape and M-shape MnZn Ferrite cores and we have also measured the losses, and we have obtained encouraging results. Typical computational times necessary for the modelling parameters identification is 10-200 seconds, using a 400 MHz Pentium III INTEL processor and a suitably code developed in MATLAB environment. The total computer time for the calculation of the core losses versus frequency for a given value of the magnetic induction is about 10 seconds. In the figure are reported the specific power losses in a.c. measured and calculated in function of the frequency and for two different peak values of the magnetic induction applied.

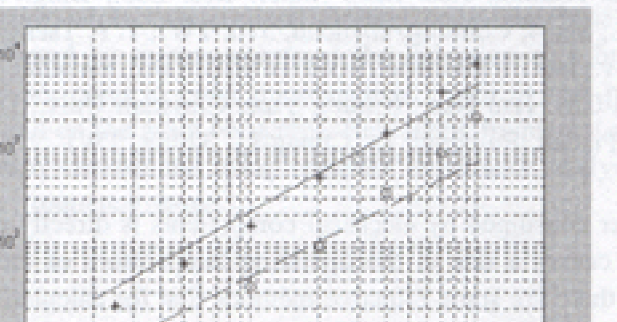

FIG. 1. Comparison between measured and predicted core losses

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FH-09. Grain size dependence of two permeability mechanisms of MnZn ferrites. *Tae Young Byun*, Kug Sun Hong (Seoul Natl. Univ., College of Mater. Sci. and Eng., Sillim-dong, San 56-1, Kwanak-ku, Seoul, Korea, 151-742, KR), Chang Kyung Kim (Hanyang Univ., Div. of Mater. Sci. and Eng., Seoul, Korea, 133-791, KR), and Soon Cheon Byeon (Ctr. for Mater. for Information Technol., Dept. of Phys. and Astron., The Univ. of Alabama, P.O. Box 870209, Tuscaloosa, AL, 35487-0209, US)

Polycrystalline manganese zinc ferrites ($Mn_{0.47}Zn_{0.47}Fe_{0.06}Fe_2O_4$) were synthesized with conventional mixed oxide method. Different grain sizes were obtained by sintering at different temperatures between 1273-1573K. The complex permeability of polycrystalline ferrites is typically calculated

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