INTERNATIONAL CONFERENCE ON MAGNETISM 2000

Incorporating

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ABSTRACTS

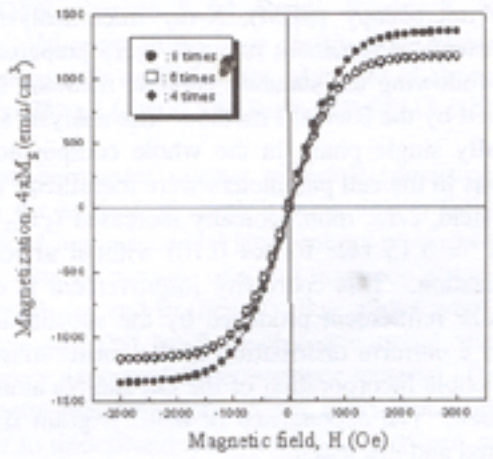

FIG. 1. Hysteresis loops as a function of printing times $Y_{2.8}Ca_{0.2}Fe_{4.8}Zr_{0.2}O_{12}$ thick film sintered at 1300^oC for 2hrs in air.

4Q-11. MAGNETIC PROPERTIES OF NiCuZn FERRITES WITH ADDITION OF TUNGSTEN TRIOXIDE. Kwang-Soo Park, Joong-Hee Nam, Jae-Hee Oh (Inha University, Department of Ceramic Engineering, 253 Yonghyun-Dong Nam-Ku, Inchon, 402-751, South Korea)

The NiCuZn ferrite materials have been widely used as materials for multilayer chip inductor. The effect of WO_3 addition on microstructure and magnetic properties of NiCuZn ferrites, $(Ni_xCu_{0.2}Zn_{0.8-x}O)_{1.02}(Fe_2O_3)_{0.98}$, was investigated using microstructural characterization and electrical measurement. In application as a chip inductor, the reduction of magnetic loss at high frequency ranges is crucial to get a good performance for electronic components. In order to improve the electrical and magnetic properties of NiCuZn ferrites. WO_3 was added up to 1.0 wt.% and its bulk density, initial permeability μ_i and saturation magnetization were measured. When the content of WO_3 was 0.4 wt.%, the high performance of NiCuZn ferrite was obtained as a maximum value in these compositions. The Q-factor in terms of loss characterization of NiCuZn ferrites increased with the larger amount of WO_3. The μ_iQ measured at 1 MHz also showed the higher value in WO_3-added NiCuZn ferrites than WO_3-free composition. The permeability of ferrimagnetic materials, such as ferrites that exhibit Snock's limit, can be affect by composition and processing. The real part of permeability decreases with the frequency and the imaginary part represents a broad peak, which is related to the relaxation phenomena. As the frequency of rf excitation increases, the materials reaches a point beyond which the spins cannot fully respond to the excitation. In characterization of frequency dependence of spinel ferrite materials, the dispersion due to relaxation can be observed at some frequency range and also related with the ferrite composition and its initial permeability. Therefore, this study is mainly described to determine the microstructures and variation of complex permeability with frequency for low-loss WO_3-added NiCuZn ferrites. From the result of XPS analysis for WO_3-added NiCuZn ferrites, it is found that the tungsten ions with different electronic valences as W^{4+}/W^{6+} may be coexisted and provided the oxygen vacancies as a materials transportation path by electron transition of chemical state in a small amount of WO_3. With increasing of WO_3 content the demagnetizing field can be formed due to the polarization by addition of WO_3 and resulted in the magnetic loss increased. The saturation magnetization can also be reduced by substitution of tungsten ions with strong preference of tetrahedral site by ferric ion. The relaxation time(τ) and anisotropy field(H_A) were calculated from the complex permeability to ensure the loss phenomena of NiCuZn ferrites with WO_3 addition as shown in Fig. 1. As much of WO_3 content over 0.6 wt.%, the magnetic loss of WO_3-added NiCuZn ferrite was reduced with frequency.

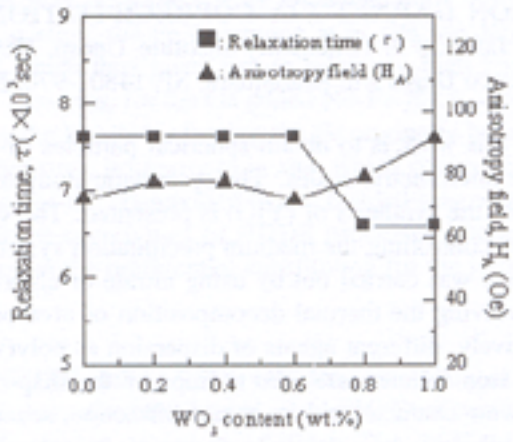

FIG. 1. Relaxation time and anisotropy field of NiCuZn ferrites.

4Q-12. GROWTH OF ULTRAFINE NiZnCu FERRITE AND MAGNETIC PROPERTIES BY A SOL-GEL METHOD. Woo Chul Kim, Sam Jin Kim, Chul Sung Kim (Kookmin University, Dep. of Physics, 861-1 Chongnung-dong, Sungbuk-gu, Seoul, 136-702, South Korea) and Seung Wha Lee (Chungbuk University, Dep. of Physics, San 48, Gaesin-dong Heungduk-gu, Cheongju, Chungbuk, 361-173, South Korea)

Ultrafine $Ni_{0.65}Zn_{0.35}Cu_{0.1}Fe_{1.9}O_4$ particles are fabricated by a sol-gel method. Magnetic and structural properties of powders are investicated with x-ray diffraction, vibrating sample magnetometer, and Mössbauer spectroscopy. NiZnCu ferrite powders which were fired at and above 823 K have only a single-phase spinel structure and behave ferrimagnetically. Powders annealed at 623 and 723 K have a typical spinel structure and are simultaneously paramagnetic and ferrimagnetic in nature. The formation of nanocrystallized particles is confirmed when NiZnCu ferrite is annealed at 523 K. In addition, the transition from the paramagnetic to the ferrimagnetic state is observed in samples fired at 523 K as the measuring temperature decreases from the room temperature to 12 K. The magnetic behavior of NiZnCu ferrite powders fired at and above 923 K shows that an increase of the annealing temperature yields a decrease of the coercivity and an increase of the saturation magnetization. The maximum coercivity and the saturation magnetization of NiZnCu ferrite powders are 88 Oe and 73 emu/g, respectively.

4Q-13. ELASTIC PROPERTIES OF LITHIUM FERRITES WITH ($Mg^{2+}Ti^{4+}$) AND (Mg^{2+} Ge^{4+}) SUBSTITUTIONS. Nitendar Kumar, Pran Kishan (Solid State Physics Laboratory, Electro Ceramics, Lucknow Road, Delhi, DL, 110054, India) and Y Purushothum, P Venugopal Reddy (Osmania University, Physics, Hyderabad, AP, 500007-, India) and Z H Zaidi (Rohilkhand University, Bareily, UP, 243001, India)

Materials belonging to lithium ferrite and magnesium ferrite families are extensively used in the microwave latching devices because of their inherent rectangular hysteresis loop and low loss characteristics. The present work is intended to investigate the elastic behaviour of two series based on lithium ferrite, wherein a simultaneous substitution of varying concentration of Mg & Ge and Mg & Ti have been made in the basic formula unit. The series are designated as LMG and LMT and the compositional formula chosen for the study is $Li_{0.5}Mg_xA_xMn_{0.1}Fe_{2.4-2x}O_4$, where A represents Ge^{4+} and Ti^{4+} for respective series. The value of x varies from 0 to 0.5 ions/FU in steps of 0.1. Single phase formation of the materials were confirmed by the XRD examination. The observed lattice constant values of the spinel structure are found to decrease with the substitution level x for LMG series, while it reverses its course for the LMT series. The elastic modulii, the average sound velocity (V_m) and the acoustic Debye temperature (D_t) have been determined for both sets of ferrite samples by using the composite oscillator technique. The main feature observed is the opposite nature of the variation of elastic constants, V_m and D_t; the values increasing in LMG and decreasing in LMT with x. Attempt has been made to understand the observed behaviour on the basis of lattice parameters, site occupancy of the metallic ions in the crystal lattice and the accompanying microstructural developments.