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WED-SP-P11

Heat treatment effect of Z-type hexaferrite for RF device application

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Heat treatment effect of Z-type hexaferrite for RF device application

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Z-type Hexaferrite($Ba_{1.5}Sr_{1.5}Co_2Fe_{24}O_{41}$; Co_2Z) with the value of impedance close to that of air and low magnetic loss (tan δ) at high-frequency has been considered as a suitable material for radio frequency devices[1]. The magnetic properties such as permeability of Co_2Z depend on the specific synthesis process [2]. The Co_2Z samples studied here were prepared by simple 2 and 3-step solid state reaction methods. The mixture of $BaCO_3$, $SrCO_3$, Co_3O_4 -Fe_2O_3 was ball milled. In the 2-step method, the milled mixture was first calcined at 1000 ^oC, and then the calcination was continued at the temperature of 1200 ^oC. In the 3-step method, first calcination was done at 1000^oC. After first calcination, the samples were ball milled again and second calcination was carried out at 1200 ^oC. All the prepared powders were mixed with polyvinyl alcohol and pressed into the toroidal shape. These toroids were sintered with various sintering temperatures and cooling rates. The magnetic properties and crystal structures of Co_2Z samples were characterized with network analyzer, vibrating sample magnetometer, and x-ray diffractometer. The Co_2Z samples prepared by the 2-step method have shown the considerably improved permeability and tan δ compared to those from the 3-step method. Based on the XRD measurements, we believe that the complete formation of Z-type phase from the calcination during the 2-step process leads to the enhanced permeability. When Co_2Z sample, prepared by 2-step method, was being sintered at 1125 ^oC and treated with slow cooling rate, the value of tan δ remained below 0.1 up to 750 MHz, and at 750 MHz, the values of permeability,

δ

[1] J. Lee et al, J. Appl. Phys. 109,07E530 (2011).
[2] L. Zhang et al. IEEE Trans. Magn. 47, 2149 (2011).