11th International Conference
on Advanced Materials

Rio de Janeiro Brazil
September 20 - 25

ICAM2009

Microwave attenuation properties of CoTi substituted and La doped Ca hexaferrites

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In this work microwave attenuation properties of Radar Absorbing Material (RAM) based on $[Ca(CoTi)_{0,2}Fe_{11,6}O_{19}]_{96,0}[La_2O_3]_{4,0}$ hexagonal ferrites with CoTi ions substituted and La doped were evaluated. The used hexagonal ferrite was prepared by powder metallurgy process as described by Singh et al [1]. RAM preparation was based on epoxy resin added with 50; 60; 70 and 80% (w/w) of the prepared hexaferrite. RAM characterization was performed using the waveguide technique in the frequency range of 8.2 to 12.4 GHz. Reflectivity curves show the microwave absorption behaviors of the studied RAM samples. These measurements were performed in a Network Analyzer System model 8510C. Hysterese curves show M_s and H_c equal to 123,65 Am^2/kg and 123,65 Am^2/kg, respectively (Figure 1(a)). Reflectivity curves show that the ferrite concentration increase in the RAM samples promotes better attenuation results, as shown in Figure 1(b). This figure show electromagnetic wave attenuation values near -16.1 dB at 8.2 GHz that corresponds to ~98% of absorption of the incident radiation. This good performance is attributed to the dielectric and magnetic characteristics of the used ferrite that is similar to those observed for polycrystalline materials [2]. According to the literature, low losses in the inversion of the magnetic field are related to soft magnetic material [2]. This behavior is attributed to the used ions in the ferrite modification that promote the hexaferrite softening. This result suggests that the doped hexaferrites behave as a very soft material and also that the studied RAM is more adequate for lower frequency range.

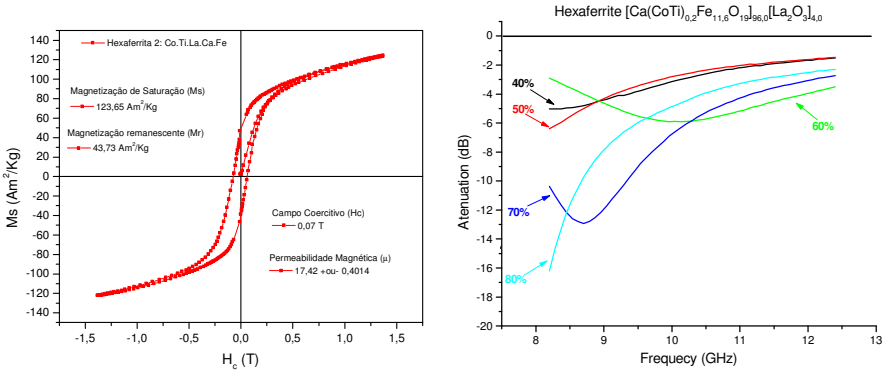

Figure 1 – Magnetic measurements of (a) $[Ca(CoTi)_{0,2}Fe_{11,6}O_{19}]_{96,0}[La_2O_3]_{4,0}$ hexagonal ferrites with CoTi ions substituted and La doped and RAM reflectivity behaviors (b).

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Keywords: hexaferrite, radar absorbing materials, reflectivity.

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