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Magnetic and Giant Dielectric Properties of $(1-x)CaCu_3Ti_4O_{12}$-$xSr_{0.7}La_{0.3}Fe_{11.7}Co_{0.3}O_{19}$ Composites

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In this study, the $(1-x)CaCu_3Ti_4O_{12}$-$xSr_{0.7}La_{0.3}Fe_{11.7}Co_{0.3}O_{19}$ (when x = 0, 0.1, 0.3, 0.5, 0.7, 0.9, and 1) ceramic composites are prepared by a conventional mixed-oxide method. The microstructure and phase composition of the ceramic composites are characterized by x-ray diffraction (XRD) and scanning electron microscopy (SEM), respectively. The dielectric properties of the ceramics are measured as functions of both temperature (-50 – 200 ^oC) and frequency (10^2 – 10^6 Hz). All of the samples exhibit a high low-frequency dielectric permittivity, which is mainly attributed to the Maxwell-Wagner polarization mechanism and thermally activated mechanism. The magnetic properties of the ceramics are determined using vibrating sample magnetometry (VSM) at room temperature. Our results reveal that the magnetization increases with the $Sr_{0.7}La_{0.3}Fe_{11.7}Co_{0.3}O_{19}$ phase increasing.

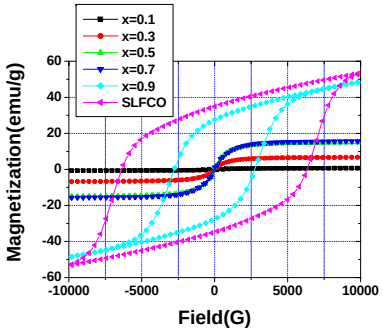

Fig. 1 Magnetization of the sintered (1-x) CCTO- x SLFCO composites as a function of field, measured at room temperature.

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Magnetic Properties of NiO Thin Films Synthesized by Reactive Sputtering

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Nickel Oxide (NiO) is considered to be a promising candidate for semiconductor with p-type conductivity (3.6 ~ 4.0 eV band-gap). Also, NiO is an interesting material to study magnetic properties, because it has been known for some time that small particles (less than 100 nm) of NiO show superparamagnetism that increases as the particle size decreases and NiO antiferromagnetic film has advantages over other antiferromagnetic films due to its high blocking temperature. Although NiO thin films have a wide range of applications because of excellent optical, electrical properties with chemical stability, many researches on NiO contain mainly related with its crystalline structure, preferred orientation and lack of magnetic behavior.

We have prepared NiO thin films on Si (100) substrate using a Ni target at various O_2 / Ar ratios, substrate temperatures and applied powers. The NiO thin film was synthesized by RF and DC reactive magnetron sputtering methods. The effect of process parameters were investigated in terms of crystallographic structures. The X-ray diffraction pattern shows that the sample synthesized at the substrate temperature of 573 K in the partial pressure of 25 % for oxygen content and applied power of 270 W forms a single NiO phase. The magnetic properties of samples were investigated by measuring magnetization as a function of magnetic field by using a vibrating sample magnetometer, and the results will be presented.