MS25-P8 The substitution effect of chromium on the physical properties $La_{0.65}Eu_{0.05}Sr_{0.3}Mn_{1-x}Cr_xO_3$ nanocrystalline

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Nanocrystalline powders of $La_{0.67}Ba_{0.33}Mn_{1-x}Cr_xO_3$ perovskites have been synthesized by the sol-gel method. X-ray diffraction along with the Rietveld-refinement shows the formation of pure crystalline phase with rhombohedral symmetry (space group R-3C, no. 167). Magnetic measurements indicate that the ferromagnetic double exchange interaction is weakened with increasing Cr concentration, resulting in a shift in T_C from 342K to 285K as x varied between 0 and 0.15. Furthermore, all samples undergo a paramagnetic (PM) - ferromagnetic (FM) phase transition at $T = T_C$. Based on the idea that doped manganites consist of ferromagnetic-metallic and paramagnetic-semiconducting (M-SC) regions coexisting in the same specimen, a good fit of the resistivity with the phenomenological percolation model, may be obtained by combining the contributions of the resisitivity above and below T_{M-SC} by a single expression in the temperature region between 20 and 400K. We found that the estimated results are in good agreement with the obtained experimental data. The maximum magnetic entropy change (ΔS_M) and the relative cooling power (RCP) for the composition x=0.1 are found to be, respectively, 4.20 J kg^{-1} K^{-1} and 238 J kg^{-1} for a 5-T field change, making of this material a promising candidate for magnetic refrigeration near room temperature. Arrott plot analyses and a universal curve method were applied to study the order of the magnetic transition in this system.

Keywords: Nanocrystalline manganites,Rietveld refinement, magnetic properties, modified sol-gel Pechini method

MS25-P9 Synthesis, structural characterisation, magnetic and dielectric properties study of $SrFe_{12}O_{19}/CoFe_2O_4$ composite

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Nanocrystalline ferrites are known as the remarkable classes of materials due to their fascinating application. Of particular interest are hard-soft ferrite composites, especially since they can be considered as magnetically exchange coupled systems [1, 2]

The $SrFe_{12}O_{19}/CoFe_2O_4$ composite has been obtained by solid state reaction at T_s= 1050 °C and various synthesis time t_s= 4 h, 8 h, 14 h and 22 h. The X-ray diffraction (X'Pert PANalytical) indicates in the samples obtained at t_s= 4 h, 8 h, 14 h three phases: $SrFe_{12}O_{19}$ (*P6₃/mmc*), $CoFe_2O_4$ (*Fd-3m*) and Fe_2O_3 (*R-3c*), whereas in the sample sintered for 22 h only $SrFe_{12}O_{19}$ and $CoFe_2O_4$, which reveal different morphology in Scanning Electron Microscopy images (FEI Nova NanoSEM). Dielectric response (pellets, Alpha-A Novocontrol) and temperature variation of magnetization (PPMS, VSM probe) of the sample sintered for t_s= 22 h are shown in Figure 1. The temperature and frequency dependences of ε^* were found to be correlated with respective dependences of σ' and related to highly conducting grains with poor conducting grain boundaries of the ferrites [3].

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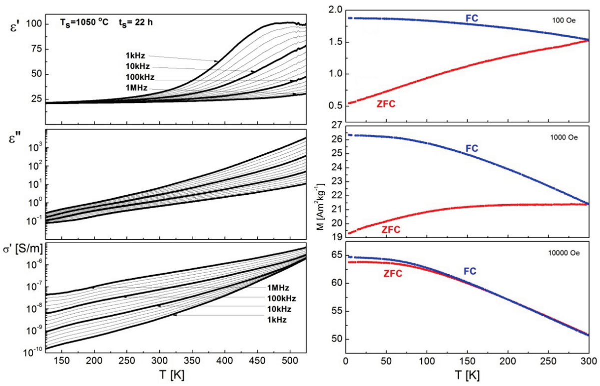

Figure 1. Temperature dependences of dielectric permittivity ε', ε'', electric conductivity σ' and magnetization M (ZFC- zero field cooling, FC- field cooling conditions).

Keywords: ferrite, composite