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Magnetic Properties of Manganite $Pr_{1-x}Ca_xMnO_3$ Films

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The properties of manganites with perovskite structure considerably depend on conditions of preparing and the subsequent heat treatment. It is possible to expect influence of preparation conditions on physical properties of thin-film dilute manganites [1, 2]. In given report the results of research of magnetic properties of $Pr_{1-x}Ca_xMnO_3$ (x=0.25; 0.3; 0.35) polycrystalline films, prepared by an extraction-pyrolitic method, are presented.

The essence of the extraction-pyrolysis method consists in component extraction from water solutions, mixing them in a required proportion, deposition of the solution on a substrate and the subsequent pyrolysis. After pyrolysis at temperature 770 K in 5-10 minutes the film was spent annealing on air in 2 hours at temperatures 1000 K (film N1) and 1070 K (film N2) [3].

The X-ray diffraction showed that the films obtained in the stage of pyrolysis (prior to the annealing) exhibited an X-ray amorphous structure. The subsequent annealing in air led to the formation of a polycrystalline single-phase perovskite. Diffraction patterns of films of different thickness and of annealing temperatures were made.

Research of magnetic properties was carried out in magnetic fields up 30 kOe at temperature range T = 4.2-350 K. In particular investigations of manganite $Pr_{0.7}Ca_{0.3}MnO_3$ films noted the high fields of saturation for both films: 15 kOe (a film 1) and 12 kOe (a film 2). Essential difference is observed in temperature dependences of saturation magnetization of films, received at various annealing temperatures. Character of temperature dependence of film 1 is closer to ferromagnetic behaviour, unlike corresponding dependence of film 2. Value of saturation magnetization of film 1 is below that of a film 2. Curie temperature of a film 1 is equal $T_C \sim 60$ K. The curve of temperature dependence of the saturation magnetization of film 2 most likely is superposition of corresponding curves with Curie temperatures $T_C \sim 60$ K and 120 K. Investigation of temperature dependence of the magnetic moment in fields up to 500 Oe accepted presence thermo-magnetic effects and properties similar to those spin glasses.

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DC07

Synthesis, Structural and Microstructural Studies of New Iron Based $LaO_{1-x}F_xFeAs$ Superconducting Materials

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Since the discovery of superconductivity at 3.2K in iron-based compound [1], extensive efforts have been devoted to searching for new superconductors among this system. It has seen the height of day when a team led by Hosono at the Tokyo Institute of technology [Japan], replaced P atom by As atom together with substitution of oxygen with fluorine. The resultant compound $LaO_{1-x}F_xFeAs$ (x=0.11) shows the superconducting transition temperature (T_C) at 26 K [2]. We have studied synthesis, structural, microstructural and superconducting characteristics of iron based fluorine doped LaOFeAs superconductors. The successfully synthesis of the fluorine doped superconducting $LaO_{1-x}F_xFeAs$ materials have been done by choosing lower temperature and longer synthesis duration as compare to standard [3]. Shortening the lattice parameters are confirmed the substitution of fluorine which is depicted by powered x-ray diffraction. The superconducting transition temperature is 27.5 K which is observed at doping level of x=0.2. The scanning electron microscopy features shows the presence of layered structure. One outstanding feature as depicted by these micrographs is the presence of layered structure. Several layers forming a block can be easily seen in all the figures. These layered blocks are well aligned. The layered blocks are shifted with respect to each other forming stair like structure.

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