EFFECTS OF STRUCTURAL ORDERING IN La$_{1-x}$Ca$_x$MnO$_{3-y}$ THIN FILMS

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Powder samples and thin films of La$_{1-x}$Ca$_x$MnO$_{3-y}$ (LCMO) were analyzed by an X-ray diffraction method. The solid-phase synthesis method was used to make LCMO powder samples with $x = 0.125, 0.333, 0.5$. To receive LCMO thin films La$_{1-x}$Ca$_x$MnO$_{3-y}$ was deposited on LaAlO$_3$ (LAO) and $\alpha$-Al$_2$O$_3$ (AO) substrates. Chemical consistence of these films was controlled by an X-ray fluorescent analysis. In this work the following problems have been accomplished:

i) was the short range order in La and Ca location obtained in perovskite structure?

ii) do the dimensional effects appear in the bulk samples and thin films?

iii) is there any difference in structures and characteristics of LCMO thin films deposited on various substrates?

iv) what kind of order parameter describes phase transitions in the analyzed LCMO compounds?

The short range order in La and Ca location was found in polycrystalline samples of LCMO ($x = 0.125, 0.333, 0.5$). This fact was determined by an x-ray diffusive dispersion and pair distribution function [1]. It was found that LCMO thin films have single-crystal structure and their lattice constants depend on the substrates structure. The LCMO structure changing depending on $x$ and samples temperature can be described by order parameter similarly in [2] for high temperature superconductor YBa$_2$Cu$_3$O$_{7-y}$ (YBCO).