THE INFLUENCE OF CRYSTALLITE SIZE ON MAGNETORESISTIVITY OF NANOSTRUCTURED $La_{1-x}Sr_xMn_yO_{3\pm\delta}$ THIN FILMS

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$La_{1-x}Sr_xMn_yO_{3\pm\delta}$ (LSMO) is an interesting material for its magnetoresistive (MR) properties where the resistance of the substance is changing under the influence of magnetic field. Due to this effect polycrystalline LSMO films are already used as scalar magnetic field sensors [1]. Currently used magnetic field sensors based on LSMO are operating at relatively high magnetic fields (>10 T), while at lower magnetic fields the magnetoresistance anisotropy (MRA) becomes a main problem. Therefore, to enable the usage of LSMO films as magnetic field sensors at average and low magnetic fields, the control and reduction of MRA should be achieved.

In the present study LSMO films were grown by pulsed injection metal organic chemical vapor deposition (PI-MOCVD) method. Two types of experiments were performed to grow LSMO films: 1) by using a single injector with precursor solution; 2) by using two injectors, one with precursor solution and the second one with pure solvent. The used technological changes, with certain supply of the precursor and/or solvent solution, enabled the dilution of the precursors in the vapor phase and to control the growth of LSMO films at early growth stage. The surface morphology of the grown LSMO films was characterized by Scanning Electron Microscopy (SEM), elemental composition by Inductively Coupled Plasma – Mass Spectrometry (ICP-MS), crystallographic properties by X-ray Diffractometry (XRD), and magnetoresistance magnitude was measured under permanent magnetic field up to 0.7 T using an electromagnet.

Chemical composition of LSMO films remained the same independent of differences in deposition process. However, larger crystallites were observed for second deposition series resulting in higher MR and nearly two times lower MRA, leading to improved possibility of LSMO films as magnetic field sensors at low and intermediate magnetic fields.

[1] Balevičius, S.; Žurauskienė, N.; Stankevič, V. ir kt. *Nanostructured thin manganite films in megagauss magnetic field.* Applied Physics Letters, **2012**, nr. 101 (9), p. 407-411.