## Physico-Chemical nanomaterials science

# Crystallographic and magnetic properties of $La_{0.7-x}Ln_xSr_{0.3}MnO_3$ (Ln=Sm, Nd) nanoparticles

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Ferromagnetic nanoparticles (NPs) of heterosubstituted $(La,Sr)MnO_3$ manganites are of particular scientific and practical interest due to their possible applications as the mediators of hyperthermia, since they are able to efficiently heat up under the action of an alternating magnetic field [1]. The Curie temperature ($T_C$) of manganite NPs can be changed in the temperature range necessary for hyperthermia (42 – 45°C) and, thus, it is possible to control maximal heating temperature automatically. One way to control the $T_C$ and SLP (specific loss power) values is the change of the chemical composition, particularly, by means of partial substitutions of La ions by other rare-earth metal ions, for example, by Nd and Sm. To date, however, there has been only limited information about the influence of such substitutions on the properties of ferromagnetic NPs.

The aim of this study is synthesis of $La_{0.7-x}Ln_xSr_{0.3}MnO_3$ (Ln = Nd and Sm, $x$ = 0–0.1) NPs and investigation of their crystallographic and magnetic properties.

Ferromagnetic NPs were synthesized by sol-gel method according to procedure described in [1]. It is established that manganite NPs are crystalline, single-phased and weakly agglomerated. Their sizes are in the range of 35 – 45 nm. It is revealed that substitution of La by Sm more strongly affects the magnetic parameters (saturation magnetization and $T_C$) of the NPs than substitution of La by Nd. It is found that SLP values of synthesized NPs are in the range of 15 – 43 W/g.

The obtained results allow choosing the optimal compositions for application of manganite NPs in nanohyperthermia.

1. *S. Solopan, A. Belous et al Nanohyperthermia of Malignant Tumors. I. Lanthanum-Strontium Manganite Magnetic Fluid as Potential Inducer of Tumor Hyperthermia // Exp Oncol – 2011 – 33, 3 – P. 130 – 135.*