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# ISFP-III

## THE THIRD INTERNATIONAL SEMINAR ON FERROELASTICS PHYSICS

VORONEZH, RUSSIA, September 11-14, 2000

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# ABSTRACT BOOK

**ISFP-III**  
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**on**  
**Ferroelastics Physics**

**Voronezh, Russia**  
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# OXYGEN NONSTOICHIOMETRY, LINEAR DEFORMATION AND CONDUCTIVITY OF La-Sr-Ga-Fe-Mg-O PEROVSKITE CERAMICS

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LaGaO<sub>3</sub>-based oxides have attracted much attention in recent years due to their perspectives for high-temperature electrochemical applications.

In this work structure, dielectric and electroconducting properties of the ion-conducting La-Sr-Ga-Mg-Fe-O perovskite ceramics have been studied by means of X-Ray, dielectric spectroscopy, thermogravimetry and dilatometry in the temperature range of 20-1000°C in order to reveal phase transitions and correlation between electroconductivity, oxygen deficiency, weight losses, and elongation of the samples in the course of redox circling. Earlier, it has been found out that dilatometric method allows to estimate oxygen deficiency and mechanical stresses in membranes under oxidizing potential gradients [1].

Ceramic samples (La<sub>0.9</sub>Sr<sub>0.1</sub>)[(Ga<sub>1-x</sub>Fe<sub>x</sub>)<sub>0.8</sub>Mg<sub>0.2</sub>]O<sub>3-δ</sub> with x=0,1-0,5 have been prepared by the solid state reactions method. Decrease of the unit cell volume at x<0.4 is consistent with the substitution of Fe for Ga ions. Dielectric measurements performed have shown the highest electrical conductivity of about 0.01 Ohm<sup>-1</sup>cm<sup>-1</sup> at 900°C for the samples with x=0.4.

Two types of the redox experiments have been performed either under isobaric or isothermal conditions. Finally, it has been established that linear interrelations between the deformation  $\Delta L/L$ , oxygen deficiency on the one hand, and oxygen gas chemical potential  $\mu$  on the other hand exist for the perovskites investigated. Besides, chemical diffusion coefficients have been determined by the dilatometric method ( $D \sim 6 \cdot 10^{-7}$  cm<sup>2</sup>/s at 900°C).

1. L.A.Rudnitsky, V.V.Aleksandrovskii, S.Yu.Stefanovich. Oxygen nonstoichiometry and linear deformation of La-Sr-Fe-Co-O perovskites within the Redox cycle. J.Catalysis (in press, 2000).