

## INVESTIGATION OF LANTHANUM STRONTIUM COBALTITE THIN FILMS USING SYNCHROTRON RADIATION\*

*A.A. SOLOVYEV<sup>1</sup>, A.V. SHIPILOVA<sup>1</sup>, S.V. RABOTKIN<sup>1</sup>, E.A. SMOLYANSKIY<sup>2</sup>, A.N. SHMAKOV<sup>3</sup>*

<sup>1</sup> *Institute of High Current Electronics SB RAS, Tomsk, Russia*

<sup>2</sup> *Tomsk Polytechnic University, Tomsk, Russia*

<sup>3</sup> *Budker Institute of Nuclear Physics SB RAS, Novosibirsk, Russia*

Lanthanum Strontium Cobaltite (LSC) is a highly conductive perovskite material that is often used as a cathode material in Solid Oxide Fuel Cells (SOFCs) [1]. In this study,  $\text{La}_{0.6}\text{Sr}_{0.4}\text{CoO}_{3-\delta}$  (LSC) thin films were obtained by pulsed DC magnetron sputtering of the LSC target in  $\text{Ar}+\text{O}_2$  atmosphere. X-ray diffraction analysis of the LSC films was conducted for the synchrotron radiation beam during thermal annealing at different temperatures up to 1300 °C. The phase composition and structure of the films were determined using X-ray diffraction and scanning electron microscopy, respectively. Anode-supported solid oxide fuel cells with bi-layered thin-film yttria-stabilized zirconia (YSZ) / gadolinium-doped ceria (GDC) electrolyte and an LSC thin film cathode were fabricated. Polarization curves were measured in the temperature range from 600 to 800 °C. The effect of annealing temperature on the crystalline structure of the LSC films and the characteristics of SOFCs was investigated.

### REFERENCES

- [1] K. Develos-Bagarinao, T. Ishiyama, H. Kishimoto, H. Shimada, K. Yamaji, "Nanoengineering of cathode layers for solid oxide fuel cells to achieve superior power densities," *Nat. Commun.*, vol. 12, 3979, June 2021.
- [2] H. Uchida, S. Arisaka, M. Watanabe, "High Performance Electrode for Medium-Temperature Solid Oxide Fuel Cells  $\text{La}(\text{Sr})\text{CoO}_3$  Cathode with Ceria Interlayer on Zirconia Electrolyte," *Electrochem. Solid-State Lett.*, vol. 2, no. 9, pp. 428-430, 1999.

---

\* The work was supported by the Ministry of Science and Higher Education of the Russian Federation (project No. 075-15-2021-1348, event No. 2.1.1)