

課題番号 : F-14-UT-0031
 利用形態 : 機器利用
 利用課題名(日本語) : 楕形電極作製による酸化物薄膜のインピーダンス測定
 Program Title (English) : Fabrication of comb-type electrodes for impedance spectroscopy of oxide thin film
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1. 概要(Summary)

$\text{Li}_{0.33}\text{La}_{0.56}\text{TiO}_3$ (LLT) epitaxial thin films were grown on orthorhombic perovskite NdGaO_3 (110) (NGO) substrate by pulsed laser deposition method. Comb-type Au/Ti electrode was deposited on the thin films and was applied to measure its ionic conductivity along NGO [1-10] and NGO [001] direction.

2. 実験(Experimental)

LLT thin film was fabricated by pulsed laser deposition method. LLT thin film on NGO (110) substrate was orthogonally distorted along in-plane direction (lattice constant $a_{\text{NGO}[001]} = 0.3855$ nm and $b_{\text{NGO}[1-10]} = 0.3864$ nm). Various comb-type electrodes was patterned by MA6 Suss 6" Mask Aligner with JSR photoresist and a photo-mask. Au/Ti was deposited by electron beam ultrahigh vacuum evaporator. Ionic conductivity of LLT was measured by impedance analyzer (Solartron 1260) in a prober system in air.

3. 結果と考察(Results and Discussion)

Li ionic conductivity was measured LLT thin film on NGO substrate with $10 \times 10 \text{ mm}^2$ area. In-plane anisotropic ionic conduction was observed perpendicular to in-plane NGO [001] and NGO [1-10] direction (Figure 1). In-plane ionic conductivity and activation energy perpendicular to NGO [001] and NGO [1-10] were 2.1×10^{-4} S/cm and 4.0×10^{-4} S/cm, 0.36 eV and 0.34 eV respectively.

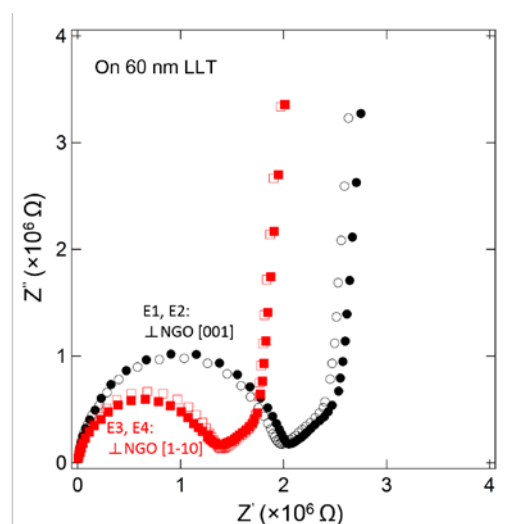


Figure 1 Complex impedance curves at room temperature measured with different pairs of electrodes.

4. その他・特記事項(Others)

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5. 論文・学会発表(Publication/Presentation)

- (1) J. Wei, D. Ogawa, T. Fukumura, Y. Hirose, T. Hasegawa, submitted.
- (2) J. Wei, D. Ogawa, T. Fukumura, Y. Hirose, T. Hasegawa, *E-MRS 2015 Spring Meeting*, May 11-15, Lille, France.

6. 関連特許(Patent)

Not applicable.