

34-37 高周波マグネトロンスパッタリング法による LaFeO_3 ペロ ブスカイト薄膜の作製とその電気伝導性

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La-Fe complex oxide films were prepared on Si(111), MgO(100) and SiO_2 glass substrates by radio frequency magnetron sputtering using a LaFeO_3 target. All the films prepared by this method have the La/Fe atomic ratio of about 1.0. The films were amorphous when the substrate temperature was lower than 650°C , while orthorhombic $\text{LaFeO}_{3.8}$ perovskite films were formed at the substrate temperature higher than 700°C in Ar atmosphere. The orthorhombic $\text{LaFeO}_{3.8}$ perovskite films were also obtained on Si(111), MgO(100) and SiO_2 glass substrates by reactive sputtering in $\text{O}_2/\text{Ar} = 0.2$ -1.0 at the substrate temperature higher than 700°C . However, in the case of MgO(100) substrate, the orthorhombic $\text{LaFeO}_{3.8}$ perovskite film with (101) orientation was formed. The orthorhombic $\text{LaFeO}_{3.8}$ perovskite films were formed by heat-treatment of the amorphous La-Fe complex oxide and the crystalline $\text{LaFeO}_{3.8}$ perovskite films in air or O_2 atmosphere. The electrical conductivities of $\text{LaFeO}_{3.8}/\text{MgO}(100)$ and $\text{LaFeO}_{3.8}/\text{SiO}_2$ perovskite films were measured in the range from room temperature to 600°C . It was found that both $\text{LaFeO}_{3.8}/\text{MgO}(100)$ and $\text{LaFeO}_{3.8}/\text{SiO}_2$ perovskite films are n-type semiconductors with hopping conduction in N_2 , air and O_2 .

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