

### Electrical properties of LaVO<sub>3</sub> thin films

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LaVO<sub>3</sub> thin films have been deposited on SrTiO<sub>3</sub> and LaAlO<sub>3</sub> substrate by pulsed laser deposition. The structure of LaVO<sub>3</sub> thin films were measured by high-resolution x-ray diffraction. It indicated the epitaxial growth with (002) diffraction patterns on LaVO<sub>3</sub> thin films and substrate. After the film growth, we measured electrical resistivity of LaVO<sub>3</sub> thin films using van der Pauw geometry in the temperature range of 77 ~ 300 K. The resistivity vs temperature curve exhibited insulating behavior on LaAlO<sub>3</sub> substrate. However, it exhibited metallic behavior on SrTiO<sub>3</sub> substrate. To understand this phenomenon, we have investigated electronic reconstruction at the interface of the films and substrate.

**Keywords:** Mott insulator, Thin film

### The Electrical properties of LaTiO<sub>3+δ</sub> on LaAlO<sub>3</sub> substrate.

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Recently, Mott insulator such as LaMnO<sub>3</sub>, VO<sub>2</sub>, etc. has been widely studied because of their unusual properties. Especially, metal-insulator transition of Mott insulator has great potential for novel electric device like non volatile memory device. Metal-insulator transition of LaTiO<sub>3+δ</sub> single crystal is widely investigated by many researchers. On the other hand, reports on metal-insulator transition of LaTiO<sub>3+δ</sub> thin film are much less than single crystal bulk LaTiO<sub>3+δ</sub> because stabilizing Ti<sup>3+</sup> state is difficult. Ohtomo et al. reported that LaTiO<sub>3+δ</sub> thin films grown on SrTiO<sub>3</sub> substrate have mixed Ti valence and exhibit metallic behavior because of electronic reconstruction. In this study, we successfully fabricated insulating state LaTiO<sub>3+δ</sub> thin films on the LaAlO<sub>3</sub> substrate. To prevent charge reconstruction and oxygen vacancy at the interface, LaAlO<sub>3</sub> substrate is used. Structures of LaTiO<sub>3+δ</sub> thin films are studied by x-ray diffraction. Pseudo-cubic LaTiO<sub>3+δ</sub> thin films were epitaxially grown on LaAlO<sub>3</sub> substrate at ambient oxygen pressures below 10<sup>-4</sup> Torr. The transport property of LaTiO<sub>3+δ</sub> thin film was measured using the van der Pauw geometry in the temperature range 77 K < T < 300 K. The resistivity versus temperature curves exhibit insulator behavior below 10<sup>-5</sup> Torr of oxygen ambient pressure. With increasing oxygen content (δ), LaTiO<sub>3+δ</sub> thin film changes from insulator to metal with hole concentration of 2δ. When δ more increases, LaTiO<sub>3+δ</sub> changes to a band insulator.

**Keywords:** thin film, mott insulator, Mltransition