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The role of oxygen vacancies of two-dimensional electron gases at LaAlO3/SrTiO3 interface TAEJUNE OH, YEON SOO KIM, KonKuk Univ, SUNG MOON HWANG, Sejong Univ, CHAN SOO YOON, SANGIK LEE, KonKuk Univ, TAEKJIB CHOI, Sejong Univ, BAE HO PARK, KonKuk Univ — High-mobility two-dimensional metallic states at two insulating oxides, especially LaAlO3 (LAO)/SrTiO3 (STO) interface, have provided great opportunities for novel oxide electronics. Its mechanism was explained with electronic reconstruction due to polar discontinuity or formation of oxygen vacancies at the interface, both of them have been still considered as major origins for this phenomenon. We deposit LAO layer with various thickness on STO substrate at 600° and 800° with pulsed laser deposition method. Both of thin films show good crystallinity and step terraced-surface morphology by x-ray diffraction and atomic force microscopy, respectively. Thickness of these films was confirmed by reflection high-energy electron diffraction. Transport properties measurement was performed by Physical Property Measurement System, however, only thin films grown at higher temperature shows high mobility properties independent on LAO thickness. Interestingly, STO substrate changed to opaque after staying for only several minutes at 800° in vacuum. Obviously this change was caused from oxygen vacancies, we have observed that the substrate was recovered after annealing at 900° in oxygen environment. We believe that oxygen vacancies have played important role for two-dimensional metallic state.

Taejune Oh
KonKuk Univ

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