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STM Studies of Sub-monolayer SrO and $LaAlO_3$ Film Growth on $SrTiO_3$(001) Substrate Surfaces TAKEO OHSAWA, KATSUYA IWAYA, RYOTA SHIMIZU, SUSUMU SHIRAKI, TARO HITOSUGI, Advanced Institute for Materials Research (WPI-AIMR), Tohoku University. — We report atomic-scale observations of initial growth of sub-monolayer SrO and $LaAlO_3$ (LAO) films on the atomically-ordered ($\sqrt{13}\times\sqrt{13}$)-R33.7° $SrTiO_3$ (STO) (001) substrate surfaces using scanning tunneling microscopy/spectroscopy (STM/STS). We found that the growth processes depend strongly on the film compositions and the investigations unveil complex chemistry of thin-film oxides. These findings will provide microscopic insights into the understanding of transport properties at the LAO/STO interface, which is known to exhibit conducting and insulating behavior depending on the termination structures of STO substrates, namely, whether "TiO_2-" or "SrO-terminated" surfaces, respectively. Controlling the interface structure genuinely with atomic precision will eventually lead to the creation of exotic electronic phenomena and functionalities at the complex oxide interfaces.

Takeo Ohsawa
Advanced Institute for Materials Research (WPI-AIMR), Tohoku University.

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