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Thickness induced superconductor-insulator transition in epitaxial La-Sr-Cu-O HAN-BYUL JANG, JI SOO LIM, CHAN-HO YANG, KAIST , CHAN-HO YANG TEAM — For many years, the superconductor-to-insulator transition (SIT) is studied by controlling external magnetic field, gating voltage, and hydrostatic pressure. In particular, for thin film systems, film thickness is also a candidate parameter by changing the dimensionality of system. We investigate SIT for the thickness dependent epitaxial $La_{1.85}Sr_{0.15}CuO_4$ thin films on $LaAlO_3$ with various perspectives. Electronic transport measurement shows thickness dependent T_c and SIT occurs at a critical thickness of ˜15 nm. By using transmission electronic microscopy imaging, it directly supports high quality of the epitaxial films with minimizing dislocations in the atomic resolution. X-ray diffraction and reciprocal space map represent that c-axis and in-plane lattice parameters exhibit no significant change and fully strained on substrate for all thicknesses. In addition, x-ray photoemission spectroscopy for O 1s and Cu 2p core level spectra also reveals a similar electronic structure irrelevant to the thickness. We will discuss possible mechanisms for the observed SIT.

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