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Disorder induced superconductor-insulator transition in epitaxial $La_{1.85}Sr_{0.15}CuO_4$ thin films HAN-BYUL JANG, CHAN-HO YANG, KAIST — $La_{2-x}Sr_xCuO_4$ is a well-known superconducting system showing various electronic properties as a function of Sr content. Especially, epitaxial thin layers of the compound show enormous increase of superconducting critical temperature (T_c) by a compressive strain. It has been reported that T_c can be controlled by misfit strain, thickness, and oxygen annealing. In this study, we report structural and transport properties of high quality epitaxial $La_{1.85}Sr_{0.15}CuO_4$ thin films. According to x-ray diffraction study, *c*-axis lattice parameter shows no significant change for various film thicknesses and the in-plane lattice parameters of the films are coherently matched with that of substrate. Electronic transport measurements show a clear superconductor-to-insulator transition (SIT), accompanying variation of T_c depending on film thickness. These results are analyzed by using the McMillan equation to find the relation between the T_c and a disorder correlating with film thickness. We have found the disorder exhibits an explicit power-law behavior with respect to film thickness in our $La_{1.85}Sr_{0.15}CuO_4$ thin films.

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