

## **Thickness dependence of structural and electrical properties of electron-doped Sr<sub>1-x</sub>LaxCuO<sub>2</sub> infinite-layer thin films grown by pulsed laser deposition**

**Y. Sun, Y. Ma, M.R. Chen, J.Y. Yang, H. Li, and J.C. Nie**

Department of Physics, Beijing Normal University, Beijing 100875, China

As the building blocks for all of the high-T<sub>c</sub> cuprate superconductors, infinite layer (IL) compounds have the simplest structures and the highest T<sub>c</sub> of electron-doped superconductors, enabling fundamental research and improved techniques for synthesizing higher T<sub>c</sub> superconductors. However, IL structure is one of the high-pressure forms, which makes it difficult to synthesize a single crystal. Therefore, it is highly desirable to obtain high-quality epitaxial thin films making use of epitaxial effect. Although there are many reported attempts to grow IL thin films on different substrates, no one has systematically studied the thickness dependence of structural and electrical properties of IL thin films. In this report, electron-doped Sr<sub>1-x</sub>LaxCuO<sub>2</sub> thin films of various thicknesses were deposited on (001) KTaO<sub>3</sub> substrate by PLD. IL phase with low resistivity at room temperature was obtained. It is shown that IL peak red shifts with increase of film thickness, indicating the reduction of the tensile strain introduced by the mismatch. With further increase of thickness, there emerges a modulated superstructure phase which is believed to deteriorate superconductivity. Transport measurements showed strong influence of the sample thickness on resistivity and T<sub>c</sub>. A moderate thickness is required to obtain IL thin films with optimal properties.