Electrical and optical properties of SrTiO$_3$ thin films substituted for SrRuO$_3$

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We have prepared SrTiO$_3$(STO) thin films randomly and uniformly substituted SrRuO$_3$(SRO) using pulsed laser deposition system by sequential deposition of two ablation targets. STO is well known as wide gap semiconductor and SRO as intrinsic ferromagnetic material. We measured R vs T characteristics with 4-point-probe down to 4.2K, and AFM images. Also, optical measurement was done. As the concentration of Ti increased, the resistivity changed from metallic to insulating. The optical measurements were well supporting this change of resistivity. And the AFM image showed the step growths that have been observed for many other oxide thin films. Also, it showed that each material is distributed uniformly.